The Korean Society of Community Nutrition

KJCN Korean Journal of Community Nutrition

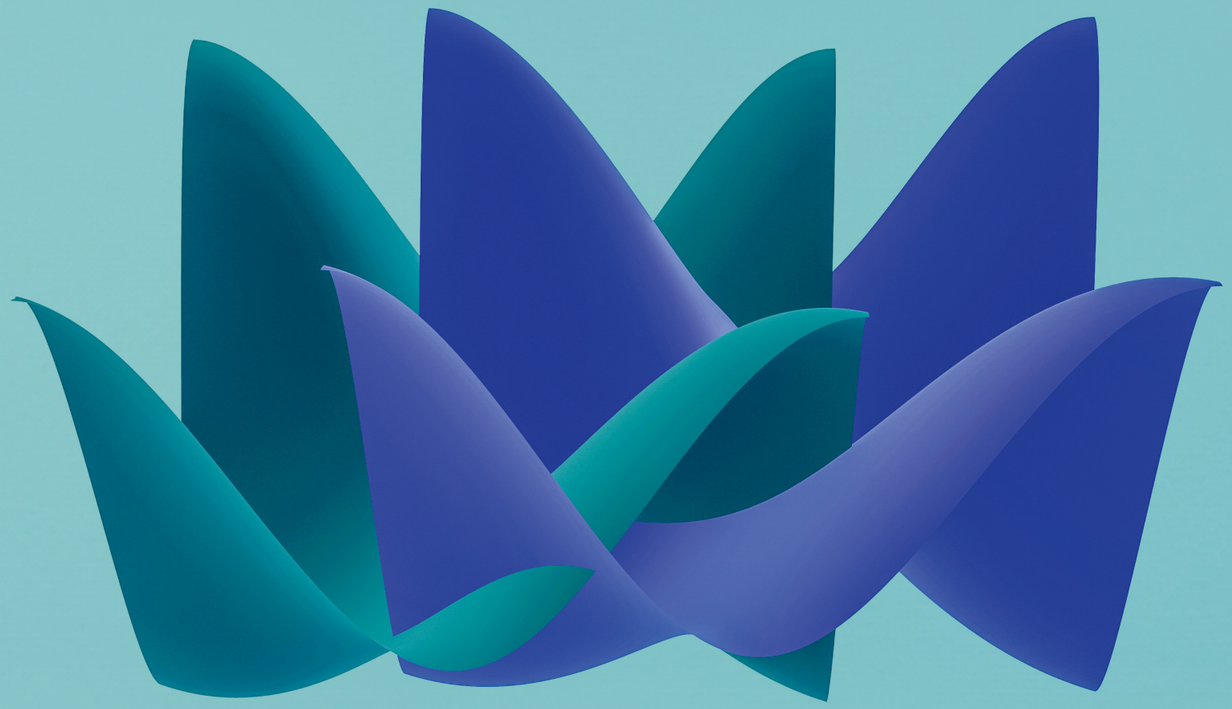
Vol. 29 • No. 5 • October 2024

The Korean Society of Community Nutrition

KJCN

Korean Journal of Community Nutrition

eISSN 2951-3146



Vol. 29 • No. 5 • October 2024
https://kjcn.or.kr

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AIMS AND SCOPE

The *Korean Journal of Community Nutrition* is the official peer-reviewed journal of the Korean Society of Community Nutrition. It was launched in 1996. The previous primary titles were Jiyeog sahoe yeong-yang hag-hoeji (pISSN 1226-0983) from vol. 1, no. 1 to vol 3. no. 5, and Daehan Jiyeok sahoe yeong-yang hakoeji (pISSN 1226-0983, eISSN 2287-1624) from vol. 4, no. 1 to vol. 27 no. 4. The English title (parallel tilte) was Korean Journal of Community Nutrition from vol. 4, no. 1 to vol. 27 no. 4. The *Korean Journal of Community Nutrition* has been the current primary title since October, 2022 (eISSN 2951-3126). The abbreviated title of the journal is *Korean J Community Nutr.* It is published bimonthly in February, April, June, August, October and December. It began to be published only as an e-journal from 2022.

BACKGROUND

KJCN was first published in March, 1996. Three issues were published in 1996, and then five issues per year was published from 1997 to 2001. Since 2002, KJCN has become a bimonthly journal. It is published in February, April, June, August, October and December. This work was supported by the Korean Federation of Science and Technology Societies(KOFST) grant funded by the Korean government. The abbreviated title of the journal is 'Korean J Community Nutr'.

DISTRIBUTION

KJCN is distributed to the members of Korean Society of Community Nutrition. This journal is open access and full text PDF files are available at the official website (http://kjcn.or.kr). The membership fee including subscription fee and postal charges is 50,000 Won for regular members, 20,000 Won for students, and 100,000 Won for institutional members.

ABSTRACTING AND INDEXING

KJCN is abstracted and indexed in the following databases: KoreaScience (1996-), KoMCi (2000-2020.2), Korea Citation Index (2002-), KoreaMed Synapse (2011-2020.2), KoreaMed (2011-), Science Central (2014-), CrossRef, Chemical Abstracts Service (CAS), CAB Abstracts, Directory of Open Access Journals (DOAJ, 2022-), SCOPUS (2022-), and google scholar.

Published on October 31, 2024

Published by

Publisher Sook Bae Kim, PhD
Editor in Chief Ji-Myung Kim, PhD
Korean Society of Community Nutrition
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Tel +82-2-749-0747 **Fax** +82-2-749-0746 **E-mail** kjcn45@koscom.or.kr

Printing Office

M2PI
#805, 26 Sangwon 1-gil, Seongdong-gu, Seoul 04779, Republic of Korea
Tel +82-2-6966-4930 **Fax** +82-2-6966-4945 **E-mail** support@m2-pi.com

KJCN
Korean Journal of Community Nutrition

eISSN 2951-3146

https://kjcn.or.kr

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KJCN
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eISSN 2951-3146

https://kjcn.or.kr

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Korean Journal of Community Nutrition

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Korean J Community Nutr. 2024 Oct;29(5):359-371
https://doi.org/10.5720/kjcn.2024.00013
eISSN 2951-3146

KJCN
Korean Journal of Community Nutrition

Research Article

Factors associated with malnutrition in demented and non-demented elderly residing in the community of Korea: a cross-sectional descriptive and analytical study

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Received: July 30, 2024
Revised: September 11, 2024
Accepted: September 26, 2024

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Objectives: This study aimed to investigate and compare factors associated with malnutrition according to the presence or absence of dementia in community-dwelling elderly people.

Methods: Needs assessment data from 311 long-term care insurance (LTCI) recipients (dementia group 203; non-dementia group 108) that participated in the second pilot program of the integrated care model in community care settings under the Korean LTCI system were used. Descriptive statistical analysis, independent *t*-test or Fisher's exact test were conducted on the sociodemographic characteristics, health and functional status, and nutritional status of the dementia and non-dementia groups. Logistic regression analysis was conducted to identify factors associated with malnutrition in the dementia and non-dementia groups.

Results: Malnutrition occurred in 33.5% and 26.9% of participants in the dementia and non-dementia groups, respectively. In the dementia group, living with family rather than living alone (odds ratio [OR]: 3.81; 95% confidence interval [CI]: 1.50–9.66; $P = 0.031$), increase in Korean Activities of Daily Living (K-ADL) score (OR: 1.35; 95% CI: 1.17–1.55; $P < 0.001$), and increase in the Neuropsychiatric Inventory-Questionnaire score (OR: 1.02; 95% CI: 1.01–1.03; $P = 0.005$) were associated with a higher risk of malnutrition. In the non-dementia group, the risk of malnutrition increased as the K-ADL score increased (OR: 1.20; 95% CI: 1.04–1.39; $P = 0.011$) and in the depressed group (OR: 2.84; 95% CI: 1.04–7.74; $P = 0.042$).

Conclusion: The study results confirmed the necessity of nutritional management for community-dwelling LTCI recipients. When developing a nutritional management program, considering the differences in factors related to malnutrition between the dementia and non-dementia groups is important. This study proposes policies for improving the LTCI system in terms of nutritional management and the utilization of community resources.

Keywords: malnutrition; long-term care; dementia; aged

INTRODUCTION

The rapid aging of the population significantly affects the prevalence of dementia. The prevalence of dementia has increased from 8.4% in 2008 [1] to 10.4% by the end of 2021 [2]. Malnutrition is one of the most serious health issues among older adults with dementia as it affects their physical and mental health and can even be a major cause of mortality [3, 4]. Additionally, dementia impairs the ability to perform essential tasks required for food intake, leading to eating behavior disorders, such as refusal to open the mouth, spitting out food, or inability to swallow [5]. Different malnutrition patterns have been observed with dementia progression. In the early stages, weight loss and reduced food intake are common; however, as dementia symptoms progress, various problems related to food intake emerge, such as increased or decreased food intake, changes in meal frequency, and alterations in dietary habits [6].

Numerous studies have reported malnutrition among older adults with dementia. Most studies have examined the prevalence of malnutrition and related factors in older adults with dementia residing in nursing homes or long-term care facilities [3, 6-9]. In a study by Meijers *et al.* [7] of 75,399 care home residents aged 65 years and older, the proportion of malnutrition in the dementia group was significantly higher (20.5%) than that in the non-dementia group (15.2%). Korean studies on malnutrition among older adults with dementia receiving long-term care have largely focused on those living in institutional settings. According to Hyun & Oh [3], among 140 elderly individuals with dementia residing in three nursing facilities in Chungnam, the proportion of high-risk malnutrition was high at 60.0% (84 individuals), which was related to sex, long-term care grade, physical function, eating behavior disorders, and cognitive function. Bae *et al.* [6] confirmed that older women with dementia in long-term care facilities in Incheon had significantly lower intake levels of key nutrients, including energy, carbohydrates, fats, and proteins, than those in older women with dementia who used day and night care facilities. This emphasizes the need for systematic nutritional management in welfare facilities for older adults. Thus, most studies on malnutrition in older adults with dementia receiving long-term care have been conducted in institutional settings, with relatively little research on those residing in the community.

According to the 2022 Long-Term Care Survey, among 4,423 long-term care insurance (LTCI) beneficiaries, 54.4% had dementia [10]. Examining the proportion of dementia across different types of LTCI services, 82.1% of nursing home residents, 80.7% of residents in shared living homes, 71.2% of day and night care users, and 42.0% of home-visit care users reported having dementia. Although the dementia rate among LTCI recipients residing in the community is lower than that in nursing homes, it remains high at 42.0% to 71.2%, underscoring the need for attention to their nutritional and meal management [10].

Recently, many countries of the Organization for Economic Co-operation and Development have implemented community-based care models to enable individuals with dementia to live independently within their communities for as long as possible [11]. These models help older adults with dementia to remain in their homes and maintain social relationships through community interactions. Various countries have set policy directions to promote community care and delay institutionalization in those with dementia. Korea's 4th Comprehensive Plan for Dementia Management (2021–2025) also emphasizes enabling patients with dementia to remain comfortable in familiar surroundings, with various initiatives introduced to support this objective [12]. To support older adults with dementia receiving long-term care while living at home, maintaining their health and functional status is essential.

Nutritional issues are an important factor affecting the quality of life, not only for older adults with dementia but also for those without dementia receiving long-term care [13, 14]. Studies examining the nutritional status of LTCI recipients residing in the community demonstrate that malnutrition prevalence varies from 16.7% to 45.3% [15, 16]. Given these findings, to support aging in place for elderly individuals receiving long-term care, policies need to be developed to help them maintain a proper nutritional status. As older adults with and without dementia differ in their communication ability, cognitive function, and behavioral issues [17], it is necessary to examine the factors associated with malnutrition status in each group to develop effective nutrition manage-

https://doi.org/10.5720/kjcn.2024.00013

ment policies.

This study aimed to explore factors associated with malnutrition in community-dwelling older adults with and without dementia who receive long-term care. These findings provide a basis for developing nutrition management policies tailored to LTCI beneficiaries living at home.

The specific research objectives are as follows: First, we aimed to identify the nutritional status of community-dwelling older adults with and without dementia who were LTCI recipients according to their sociodemographic characteristics, health, and functional status. Second, we aimed to identify the factors related to malnutrition in these groups.

METHODS

Ethics statement

Written informed consent was obtained from all participants. The study protocol was approved by the Institutional Review Board of National Health Insurance Services (approval number: 연-2021-HR-06-054).

1. Study design

This cross-sectional descriptive and analytical study aimed to identify nutritional status based on sociodemographic characteristics and health and functional status, including identifying factors related to malnutrition in older adults with and without dementia receiving long-term care in community settings. This study was in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) reporting guidelines (https://www.strobe-statement.org/).

2. Study subjects and period

The study subjects were all home care beneficiaries who applied for integrated home care services from October 2021 to December 15, 2021 and completed a comprehensive needs assessment at 11 institutions participating in the Integrated Home Care Service Pilot Project II using convenience sampling. Eleven institutions are located in Seoul, Gyeonggi-do, Gangwon-do, Gyeongsangnam-do, Gyeongsangbuk-do, Busan, Jeju-do, Chungcheongnam-do, and Jeollabuk-do. A total of 314 home care beneficiaries completed a needs assessment at each institution. Of these, 311 were included in the final analysis, after excluding three participants whose height and weight could not be measured because they were bedridden. Of the 311 participants, there were 203 older adults with dementia, and 108 had no dementia.

3. Data collection

This study used data from the "Evaluation of the integrated care model in community care settings under Korean long term care insurance system" [18]. Case managers (social workers or nurses) participating in integrated home care agencies conducted the survey using needs assessment records. The surveys were conducted through one-on-one interviews either at home or at an agency. The survey period was from October 1, 2021 to February 4, 2022.

4. Survey instruments

The survey instrument used was a needs assessment record for the comprehensive evaluation of home care beneficiaries collected in the "Evaluation of the integrated care model in community care settings under Korean long term care insurance system" [18]. In this study, the variables used are as follows: Dementia status was defined as responding "yes" to dementia in the disease characteristics domain of the needs assessment record under the item for diseases or symptoms lasting 3 months or longer.

The general characteristic variables included sex, age, long-term care grade, education level, household type, comorbidities, daily living patterns, and falls. Sex was coded as "male = 0," "female = 1," and age was categorized as "under 75 = 0," "75 to under 85 = 1," "85 and over = 2." Long-term care grade was categorized as "grade 1–2 = 1," "grade 3 = 2," "grade 4 = 3," "grade 5 = 4," and education level was categorized as "less than elementary school graduation = 0," "elementary school graduation to less than middle school graduation = 1," "middle school graduation to less than high school graduation = 2," "high school graduation or higher = 3." Household type was categorized as "living with family (living with children or other family members) = 1," "elderly couple (living with spouse) = 2," "living alone = 3." Comorbidities such as stroke (cerebral infarction), Parkinson's

disease, depression, hypertension, and diabetes were coded as "absent = 0," "present = 1." Daily living patterns were categorized as "spends most of the day in bed or lying down = 1," "spends most of the day sitting = 2," and "lives while engaging in appropriate activities = 3." Fall experience in the past 3 months was coded as "no = 0" and "yes = 1."

Nutritional status was assessed using the Mini-Nutritional Assessment (MNA) score. The Korean version of the MNA, developed by the Swiss Nestlé Research Institute and the University Hospital of Tours, France, was translated by Lee [19]. The MNA consists of 18 items on physical measurements and dietary habits, with a score range of 0–33 points. Nutritional status was classified as malnourished for scores below 17, at risk of malnutrition for scores 17–23.5, and normal nutritional status for scores 24 and above. In this study, the analysis was conducted by dividing into two groups: "normal + at risk of malnutrition" and "malnourished."

Functional status variables included Korean Activities of Daily Living (K-ADL), Korean Instrumental Activities of Daily Living (K-IADL), Korean Mini Mental State Examination-2 (K-MMSE-2), Short Form of Geriatric Depression Scale-Korean version (SGDS-K), and Neuropsychiatric Inventory-Questionnaire (NPI-Q) scores. The K-ADL tool developed by Won *et al.* [20] measures seven items, including dressing, face washing, bathing, eating, transferring, toileting, and continence, on a scale from "completely independent = 1 point" to "completely dependent = 3 points." The score range was 7–21 points, with higher scores indicating a lower functional status. The Cronbach's α coefficient of the tool at the time of development was 0.937, and in this study, it was 0.901. The K-IADL tool, developed by Won *et al.* [21], consists of 10 items. Seven items, including grooming, housework, meal preparation, laundry, short-distance outings, money management, and taking medication, were measured on a scale from "completely independent = 1 point" to "completely dependent = 3 points." Three items, including using transportation, shopping, and using the telephone, had an additional 4-point scale of "cannot do at all = 4 points." For four items, including housework, meal preparation, laundry, and money management, zero points were given for "does not perform." The score range is 6–33 points, with higher scores indicating a higher dependence on daily living. The Cronbach's α coefficient of the tool at the time of development was 0.935, and in this study, it was 0.916. The K-MMSE-2 developed by Kang *et al.* [22] was used, utilizing a standard test form (blue form). The test items consisted of three items for memory registration: five for temporal orientation, five for spatial orientation, three for memory recall, five for attention and calculation, five for language, and one for drawing, with a score range of 0–30 points. Lower scores indicated decreased cognitive function. The Cronbach's α coefficient of the tool at the time of development was 0.680, and in this study, it was 0.923. The SGDS-K used by Cho *et al.* [23] includes 15 questions on emotional discomfort, negative thoughts, physical weakness, cognitive dysfunction, and decreased social interest and activity. Each item was measured as "yes = 1 point," "no = 0 point," with a score range of 0–15 points. Higher scores indicate more severe depressive symptoms. In this study, scores were categorized as "normal" for < 6 points and "depressive symptoms present" for 6 points or more [24]. The Cronbach's α coefficient of the tool at the time of development was 0.890, and in this study, it was 0.909. The NPI-Q developed by Kaufer *et al.* [25] and translated into Korean by the Korean Association for Geriatric Psychiatry [26] was used in this study. The NPI-Q surveys the severity of symptoms and family burden of 12 neuropsychiatric behaviors over the past month, targeting families of patients with dementia. For each neuropsychiatric behavior, severity was measured as "no severity = 0 points," "mild = 1 point," "moderate = 2 points," and "severe = 3 points," and burden was measured on a 5-point scale from "very mild = 1 point" to "very severe = 5 points." The total score was calculated by multiplying the severity and burden with a score range of 0–180 points. Higher scores indicated more severe neuropsychiatric behaviors. The Cronbach's α coefficient was 0.884.

Health status variables included the number of medications taken, number of nursing treatments, medical use in the past 3 months, and subjective health status. The number of medications taken was the total number of medications (prescription and over-the-counter drugs) taken in the past 3 days, excluding medications taken without a doctor's prescription. The number of

https://doi.org/10.5720/kjcn.2024.00013

nursing treatments was calculated by assigning "not provided = 0" and "provided = 1" for 12 items, including tracheostomy care, suctioning, oxygen therapy, pressure ulcer care, tube feeding, pain management, urinary management, ostomy care, dialysis care, diabetic foot care, enema, and insulin therapy [27]. In the past 3 months, medical use was assessed by whether the participant had experienced an acute hospital admission, emergency room visit, outpatient clinic visit, or family member visit on behalf of the participant. The frequency was categorized as "not used = 0" if the frequency was 0 and "used = 1" if the frequency was 1 or more. Subjective health status was surveyed on a 5-point scale from "very good = 1" to "very poor = 5" and categorized as "good (very good + good)," "moderate," and "poor (poor + very poor)" [28].

5. Statistical analysis

First, a descriptive statistical analysis was conducted to evaluate the frequency, percentage, mean, and standard deviation to understand the socio-demographic characteristics, health, functional status, and nutritional status of the study participants. Second, independent *t*-tests or Fisher's exact tests were conducted to determine differences in nutritional status according to general characteristics, health, and functional status. Third, to identify factors related to malnutrition in both groups of older adults with and without dementia, logistic regression analysis was performed by assigning "0" for normal or at risk of malnutrition and "1" for malnourishment. Variables that showed a statistically significant relationship with nutritional status in the univariate analysis of socio-demographic, health, and functional status characteristics for each group of older adults with and without dementia were selected using the stepwise method. The independent variables used in the final analysis model included the household type; living pattern; K-ADL, SGDS-K, and NPI-Q for the dementia group; and K-ADL, SGDS-K, and K-MMSE-2 for the non-dementia group. Sex and age were adjusted for in the final analyses. Statistical analyses were conducted using SAS 9.4 (SAS Institute).

RESULTS

1. General characteristics and nutritional status

This study analyzed the nutritional status of 311 participants categorized into older adults with dementia (n = 203) and without dementia (n = 108) (Table 1). Among those with dementia, 6.9% had a good nutritional status, 59.6% were at risk of malnutrition, and 33.5% were malnourished. Among those without dementia, 15.7% had good nutritional status, 57.4% were at risk of malnutrition, and 26.9% were malnourished.

The prevalence of malnutrition was higher among female in both groups (38.6% in those with dementia and 28.1% in those without dementia); however, this difference was only statistically significant in the dementia group ($P = 0.006$). Regarding age, the highest malnutrition rate (34.9%) was observed in the 75–84 year age group for those with dementia, while for those without dementia, it was the highest in the 85+ year age group ($P = 0.025$, $P = 0.044$). In both groups, malnutrition rates increased with higher long-term care grades ($P < 0.001$ and $P = 0.001$, respectively). Education levels demonstrated different patterns; among those with dementia, the highest malnutrition rate (41.9%) was in those with less than elementary school education ($P = 0.038$), whereas for those without dementia, it was the highest (30.8%) among middle school graduates ($P = 0.005$).

In terms of family structure, those living with their families had the highest malnutrition rates in both groups (47.9% and 28.1%, respectively); however, this was statistically significant only in the dementia group ($P = 0.001$). Living style was significant only for the dementia group, with those spending most of the day in bed showing higher malnutrition rates (54.1%; $P < 0.001$). Falls in the past 3 months were associated with higher malnutrition rates (48.4%) in the dementia group ($P = 0.028$).

2. Health, functional status, and nutritional status

Analysis of health and functional status (Table 2) indicated that both groups had significantly higher K-ADL scores (indicating lower functionality) in the malnourished group than in those with a good nutritional status or those at risk of malnutrition ($P < 0.001$ for the dementia group, $P = 0.005$ for the non-dementia group). Similar patterns were noted for the K-IADL scores ($P <$

Table 1. Nutritional status by general characteristics of the study participants

Variable	Dementia (n = 203)		x^2	*P*-value	Non-dementia (n = 108)		x^2	*P*-value
	Normal or at risk of malnutrition	Malnutrition			Normal or at risk of malnutrition	Malnutrition		
Total	135 (66.5)	68 (33.5)	-	-	79 (73.1)	29 (26.9)	-	-
Sex			5.98	0.006			0.39	0.194
Male	46 (79.2)	12 (20.7)			15 (78.9)	4 (21.1)		
Female	89 (61.4)	56 (38.6)			64 (71.9)	25 (28.1)		
Age (year)			-	0.025[1)]			-	0.044[1)]
< 75	9 (75.0)	3 (25.0)			8 (80.0)	2 (20.0)		
75–84	54 (65.1)	29 (34.9)			33 (75.0)	11 (25.0)		
≥ 85	72 (66.7)	36 (33.3)			38 (70.4)	16 (29.6)		
Long-term care grade			27.18	< 0.001			-	0.001[1)]
Grades 1–2	1 (9.1)	10 (90.9)			1 (25.0)	3 (75.0)		
Grade 3	27 (56.3)	21 (43.8)			26 (65.0)	14 (35.0)		
Grade 4	64 (68.1)	30 (31.9)			47 (79.7)	12 (20.3)		
Grade 5	43 (86.0)	7 (14.0)			5 (100)	0 (0.0)		
Education			8.42	0.038			-	0.005[1)]
Less than elementary school graduation	61 (58.1)	44 (41.9)			41 (69.5)	18 (30.5)		
Elementary school graduation	43 (79.6)	11 (20.4)			22 (84.6)	4 (15.4)		
Middle school graduation	11 (78.6)	3 (21.4)			9 (69.2)	4 (30.8)		
More than high school graduation	20 (66.7)	10 (33.3)			7 (70.0)	3 (30.0)		
Family structure			13.54	0.001			0.24	0.887
Living with family	37 (52.1)	34 (47.9)			23 (71.9)	9 (28.1)		
Living with a spouse only	33 (64.7)	18 (35.3)			17 (77.3)	5 (22.7)		
Living alone	65 (80.2)	16 (19.8)			39 (72.2)	15 (27.8)		
Disease								
Stroke (paralysis, cerebral infarction)			0.12	0.139			1.63	0.098
Yes	25 (64.1)	14 (35.9)			20 (83.3)	4 (16.7)		
No	110 (67.1)	54 (32.9)			59 (70.2)	25 (29.8)		
Parkinson's disease			0.62	0.176			-	0.256[1)]
Yes	11 (61.1)	7 (38.9)			10 (76.9)	3 (23.1)		
No	124 (67.0)	61 (33.0)			69 (72.6)	26 (27.4)		
High blood pressure			0.31	0.102			6.86	0.006
Yes	77 (68.1)	36 (31.9)			49 (83.1)	10 (17.0)		
No	58 (64.4)	32 (35.6)			29 (60.4)	19 (39.6)		
Diabetes			0.81	0.091			0.67	0.195
Yes	30 (61.2)	19 (38.8)			17 (70.8)	7 (29.2)		
No	105 (68.2)	49 (31.8)			61 (73.5)	22 (26.5)		
Style of living			33.22	< 0.001			3.45	0.178
Spending nearly all day in bed	28 (45.9)	33 (54.1)			19 (67.9)	9 (32.1)		
Spending many hours a day sitting on a chair	52 (62.7)	31 (37.4)			35 (68.6)	16 (31.4)		
Spending a day doing daily activities	55 (94.8)	3 (5.2)			25 (86.2)	4 (13.8)		
Falls in the past 3 months			3.64	0.028			0.05	0.203
Yes	16 (51.6)	15 (48.4)			18 (75.0)	6 (25.0)		
No	119 (69.2)	53 (30.8)			61 (72.6)	23 (27.4)		

n (%).
[1)]Fisher's exact test.

https://doi.org/10.5720/kjcn.2024.00013

Table 2. Nutritional status by health and functional status of the study participants

Variable	Dementia (n = 203)		x^2/t	*P*-value	Non-dementia (n = 108)		x^2/t	*P*-value
	Normal or at risk of malnutrition	Malnutrition			Normal or at risk of malnutrition	Malnutrition		
Physical function								
K-ADL	11.8 ± 3.0	15.6 ± 3.1	−8.58	< 0.001	11.2 ± 3.3	13.7 ± 4.1	−3.00	0.005
K-IADL	20.5 ± 5.1	25.2 ± 5.3	−6.12	< 0.001	19.3 ± 4.6	21.6 ± 5.4	−2.17	0.032
Depression			6.71	0.005			8.91	0.002
≥ 6 points (feeling depressed)	37 (54.4)	31 (45.6)			29 (59.2)	20 (40.8)		
< 6 points (normal)	98 (72.6)	37 (27.4)			50 (84.7)	9 (15.3)		
K-MMSE-2[1)]	15.7 ± 6.2	12.1 ± 5.7	3.66	0.001	20.4 ± 5.9	16.8 ± 6.2	2.73	0.008
NPI-Q	16.8 ± 23.5	34.9 ± 34.9	−3.86	0.001	-	-	-	-
No. of medications	5.3 ± 3.6	5.4 ± 3.6	−0.22	0.830	5.1 ± 3.6	4.9 ± 5.3	0.20	0.845
No. of nursing treatments[1)]	0.9 ± 0.6	1.1 ± 0.8	−2.01	0.047	0.9 ± 0.4	1.3 ± 0.8	−2.30	0.028
Medical use in the past 3 months								
Acute hospital admission			-	0.102[2)]			-	0.319[2)]
Yes	4 (44.4)	5 (55.6)			4 (66.7)	2 (33.3)		
No	131 (67.5)	63 (32.5)			75 (73.5)	27 (26.5)		
Emergency room visit			-	0.040[2)]			-	0.233[2)]
Yes	1 (20.0)	4 (80.0)			2 (50.0)	2 (50.0)		
No	134 (67.7)	64 (32.3)			77 (74.0)	27 (26.0)		
Out-patient clinic visit			0.03	0.863			2.15	0.143
Yes	89 (66.9)	44 (33.1)			53 (77.9)	15 (22.1)		
No	46 (65.7)	24 (34.3)			26 (84.4)	14 (35.0)		
Instead of the recipients, family members' out-patient clinic visit			0.16	0.691			2.92	0.088
Yes	40 (64.5)	22 (35.5)			27 (84.4)	5 (15.6)		
No	95 (67.4)	46 (32.6)			52 (68.4)	24 (31.6)		
Subjective health status[3)]			17.88	0.001			5.69	0.058
Good	29 (96.7)	1 (3.3)			11 (91.7)	1 (8.3)		
Average	49 (70.0)	21 (30.0)			23 (79.3)	6 (20.7)		
Bad	27 (51.9)	25 (48.1)			34 (61.8)	21 (38.2)		

n (%) or Mean ± SD.
K-ADL, Korean Activities of Daily Living; K-IADL, Korean Instrumental Activities of Daily Living; K-MMSE-2, Korean Mini Mental State Examination-2; NPI-Q, Neuropsychiatric Inventory-Questionnaire.
[1)]Exclude nonresponse 22 persons (n = 289).
[2)]Fisher's exact test.
[3)]Exclude nonresponse 1 person (n = 310).

0.001, $P = 0.032$). Depression (SGDS-K score ≥ 6) was associated with higher malnutrition rates in both groups ($P = 0.005$, $P = 0.002$).

Cognitive function (K-MMSE-2) scores were significantly lower in the malnourished subgroup of both groups ($P = 0.001$ and $P = 0.008$, respectively). Neuropsychiatric symptoms (NPI-Q) were significantly higher in the malnourished subgroup, but only in those with dementia ($P = 0.001$).

In the past 2 weeks, the number of nursing interventions was significantly higher in the malnourished subgroups in both groups ($P = 0.047$, $P = 0.028$). Emergency room visits in the past 3 months were associated with nutritional status only in the dementia group ($P = 0.040$). Subjective health status was significantly related to nutritional status only in the dementia group ($P = 0.001$), with poorer perceived health associated with higher malnutrition rates.

3. Factors associated with malnutrition in community-dwelling older adults with and without dementia

Logistic regression model (Table 3) indicated that family structure, K-ADL, and NPI-Q scores were significantly associated with malnutrition in older adults with dementia. Those living with family were 3.81 times more likely to be malnourished than those living alone (P = 0.031). Each point increase in the K-ADL score was associated with a 1.35 times higher risk of malnutrition (P < 0.001), and each point increase in the NPI-Q score was associated with a 1.02 times higher risk of malnutrition (P = 0.005). For older adults without dementia, K-ADL and SGDS-K scores were significant factors. Each point increase in the K-ADL score was associated with a 1.20 times higher risk of malnutrition (P = 0.011). Those with depression (SGDS-K score ≥ 6) were 2.84 times more likely to be malnourished than those without depression (P = 0.042).

DISCUSSION

This study aimed to examine the nutritional status and associated factors among community-dwelling older adults with and without dementia who are recipients of LTCI to provide foundational data for developing nutritional management policies for home care recipients.

The study findings revealed that 33.5% of elderly individuals with dementia and 26.9% of those without dementia who received long-term care in community settings were malnourished. While the paucity of domestic research reporting malnutrition rates based on dementia status renders comparative discussions challenging, our findings and those of other studies underscore the critical need for nutritional management among long-term care recipients residing in communities. Yoon *et al.* [16] reported that 43.5% of long-term care recipients using home visit services were malnourished. Bang & Kim [29] found that the average Nutrition Quotient for the Elderly score for individuals with mild dementia using day care centers was 38.78, which is categorized as "low." Additionally, Cho *et al.* [15] utilized the MNA on 4,872 long-term care recipients in 2022 and reported that 16.7% of them were malnourished. Collectively, these findings highlight the importance of nutritional management in community LTCI recipients. Consequently, there is a pressing need to develop and implement more proactive nutritional management policies not only for elderly care facilities but also for long-term care recipients in community settings.

Multivariate analysis showed that household composition, activities of daily living (ADL), and neuropsychiatric symptoms were significantly associated with mal-

Table 3. Factors associated with malnutrition in demented and non-demented elderly residing in the community

Variable	Dementia (n = 203)	*P*-value	Non-dementia (n = 108)	*P*-value
Family structure				
Living with family	3.81 (1.50–9.66)	0.031	-	-
Living with a spouse only	2.33 (0.82–6.63)	0.710	-	-
Living alone	Ref.			
Style of living				
Spending nearly all day in bed	5.35 (1.26–22.67)	0.074	-	-
Spending many hours a day sitting on a chair	4.93 (1.26–19.36)	0.090	-	-
Spending a day doing daily activities	Ref.			
K-ADL	1.35 (1.17–1.55)	< 0.001	1.20 (1.04–1.39)	0.011
Depression				
≥ 6 points (feeling depressed)	2.20 (0.97–4.99)	0.060	2.84 (1.04–7.74)	0.042
< 6 points (normal)	Ref.		Ref.	
K-MMSE-2	-	-	0.94 (0.87–1.02)	0.162
NPI-Q	1.02 (1.01–1.03)	0.005	-	-

Adjusted odds ratio (95% confidence interval).
K-ADL, Korean Activities of Daily Living; K-MMSE-2, Korean-Mini Mental State Examination-2; NPI-Q, Korean Neuropsychiatric Inventory Questionnaire adjusted by sex and age group.

https://doi.org/10.5720/kjcn.2024.00013

nutrition among older adults with dementia. For those without dementia, ADL and depression were significant factors. These findings corroborate with those of previous domestic and international studies [3, 4, 7, 14, 30] that identified ADL and depression as critical factors for malnutrition in older adults. Functional limitations can hinder the ability of older adults to maintain a healthy diet, making them more vulnerable to inadequate nutritional intake and management [31]. Recent research in Japan has demonstrated a link between higher dietary vitamin C intake and lower depression symptoms in older adults [32]. Vitamin C is known to regulate catecholaminergic activity, reduce stress reactivity, anxiety, and prolactin secretion, improve vascular function, and decrease oxytocin secretion [33].

While household composition was not identified as a relevant factor for the non-dementia-afflicted elderly, the finding of this study that elderly individuals with dementia living with family members, such as sons or daughters, have a significantly higher risk of malnutrition (3.81-fold higher) than those living alone warrants careful consideration. This result contrasts with the findings of Yim & Lee [34], who reported significantly higher rates of poor nutritional intake among elderly individuals aged 65 years or older living alone in community settings. Although the LTCI system does not consider household composition when determining the types of home care benefits, many government or local authority-run elderly health and welfare services utilize living alone or as an elderly couple, along with income level, as the primary criteria for eligibility [35]. Consequently, elderly individuals who do not live alone or as elderly couples may be excluded from essential daily living support services such as free meal assistance and dietary support. Thus, nutritional support and other nutritional management services for elderly individuals in community-based long-term care, especially those with dementia, should be provided, regardless of household composition. This study found that 90.3% of elderly individuals with dementia living with family members resided with adult children such as sons, daughters, or sons. Given these findings, older adults with dementia living with adult children who are actively engaged in socioeconomic activities may require more proactive support. However, this study was cross-sectional; therefore, we could not determine whether elderly individuals began living with their adult children due to poor nutritional status, highlighting a limitation in establishing a causal relationship. Furthermore, we confirmed that managing neuropsychiatric symptoms is crucial for preventing malnutrition and maintaining adequate nutritional status among elderly individuals with dementia, as opposed to elderly individuals without dementia. This aligns with previous research indicating that dementia can lead to eating behavior disorders [5], which in turn contribute to malnutrition [3]. Conversely, this study found no significant association between cognitive function and malnutrition among elderly individuals with and without dementia, which differs from previous research on institutionalized elderly individuals with dementia [3]. In this study, the average cognitive function scores of elderly individuals with dementia corresponded to severe cognitive impairment, regardless of nutritional status, suggesting that the severity of neuropsychiatric symptoms, rather than cognitive function, may influence malnutrition. Although previous studies have reported that elderly individuals in communities with impaired cognitive function have poorer nutritional status and intake than those with normal cognitive function [36, 37], these findings primarily identify correlations or group differences, limiting the ability to explain the independent association between cognitive function and malnutrition. In this study, while univariate analysis indicated a significant association between cognitive function scores and nutritional status among the elderly without dementia, multivariate logistic regression analysis, considering various characteristics of the participants, showed that declines in physical and psychological functioning, such as daily living performance and depression, were more strongly related to malnutrition than cognitive function.

In contrast to previous studies [7, 34] that reported female sex, advanced age, and low educational level as factors related to poor nutritional intake in the general older adult population, our study found no independent associations between these characteristics and malnutrition status in either the dementia or non-dementia group. While univariate analysis demonstrated statistically significant differences in malnutrition rates based on general characteristics such as sex, age (75

and older), and education level, these factors lost statistical significance in the multivariate logistic regression analysis when considering ADL, depression, cognitive function, and neuropsychiatric symptoms. These results indicate that strategies to prevent and manage malnutrition in community-dwelling older adults receiving LTCI should address their physical, psychological, and cognitive functional status rather than focus solely on general demographic characteristics as in the general older population.

Furthermore, our study found no statistically significant associations between malnutrition and disease characteristics, medical service utilization, or subjective health status in community-dwelling older adults with or without dementia. While the limited domestic research renders it challenging to fully discuss these findings, our results differ from those of a previous study [30] that identified subjective health status as a significant factor in nutritional risk among older adults receiving home-delivered meals at community welfare centers. However, our findings align with those of previous research [3], which reported no association between the number of medications and malnutrition status in institutionalized patients with dementia. The KANAGAWA-AICHI Disabled Elderly Cohort study in Japan [14] found significant associations between malnutrition in community-dwelling older adults with disabilities and factors such as cognitive impairment, ADL, use of home medical care and home help services, recent hospitalizations, and dysphagia.

Based on these research findings, we propose the following policy recommendations for the nutritional management of community-dwelling older adults with and without dementia who are receiving LTCI: First, we incorporate systematic nutritional assessment and management into long-term care planning for home care recipients, along with evaluations of physical function, emotional state, and cognitive function. Given the high rates of malnutrition in both the dementia and non-dementia groups, nutrition should be considered a core aspect of care, regardless of dementia status. Although current evaluations of home care institutions encourage annual needs assessments, including nutritional status [38], the lack of specific nutritional assessment tools and malnutrition diagnostic guidelines limits effective nutritional management planning. Collaborative efforts from academic, practical, and policy sectors are necessary to develop and implement applicable nutritional assessment tools.

Second, it is necessary to consider placing nutrition management specialists in home care institutions. Currently, in these institutions, there are no mandatory staffing requirements for dietitians. Kwon *et al.* [39] found that 85.1% of day care centers lacked dietitians compared to 53.2% of home welfare facilities for the elderly [40]. However, it is noteworthy that 106 out of 710 daycare centers (14.1%) that were not required to employ dietitians did so voluntarily. It would be valuable to examine the reasons for hiring dietitians including their employment status and working conditions to derive relevant insights. Additionally, nutrition management specialists should be employed in home-based services, such as home-visit care and home-visit nursing.

Furthermore, it is important to establish a connection between daycare centers and other home-based long-term care institutions without dietitians and Social Welfare Meal Service Management Support Centers. These centers regularly visit small social welfare facilities with fewer than 50 individuals and no dietitians to assist with the hygiene management of meal preparation facilities, provide tailored meal plans and cooking methods according to health conditions, and offer nutritional education. This ensures that vulnerable populations, such as the elderly and individuals with disabilities, receive safe, nutritionally balanced meals [41].

In 2023, the Ministry of Food and Drug Safety established 68 Social Welfare Meal Service Management Support Centers nationwide following the implementation of the "Act on Supporting Meal Safety in Social Welfare Facilities" and plans to expand them to all local districts by 2026. It is recommended that a system be created in which home-based long-term care institutions can provide professional meal and nutrition management services through the support and collaboration of Social Welfare Meal Service Management Support Centers installed at the district level, even if dietitians are not on site.

Third, developing new services for nutritional management of home care recipients is necessary. Currently, there are no dedicated benefits related to meals or

https://doi.org/10.5720/kjcn.2024.00013

nutrition for home care recipients in the LTCI system. Consequently, the 2022 Long-Term Care Survey [10] found that families caring for home care recipients identified "meal and nutrition management services" as a critical additional service for supporting community living, consistent with the 2019 survey [42]. The need for these services was higher among male family caregivers, recipients aged 80 and above, and those with LTCI grades 3 and below. Surveys of home care recipients using home-visit care services indicate a need for dietary management, condition-appropriate meals, nutritional counseling, and nutrition education [16]. In Japan, the LTCI system offers a home care benefit called "home care management guidance" for nutritional management, which involves home visits by professionals to assess an individual's physical and mental condition and provide care management and guidance [43]. The development of similar meals and nutrition management services tailored for community-dwelling older adults with and without dementia should be considered.

Fourth, it is necessary to establish a system that allows LTCI recipients to access nutrition-related community health and welfare services. Current elderly care services provide meal management as part of daily life support services, and free meal services are available for low-income, homebound elderly individuals at risk of skipping meals [35]. However, these services primarily target low-income groups and elderly living alone, while LTCI recipients are excluded because of potential overlap. Expanding eligibility to include older adults who need meal management services could provide a broader safety net, with costs allocated based on an individual's financial capacity.

Limitations

This study has some limitations. First, as the study was conducted on recipients registered in the Integrated Home Care Service Pilot Project II using non-random sampling, the generalizability of the results remains limited. Second, the study did not include variables related to oral health, mastication, or swallowing, which are closely linked to the nutritional status of LTCI recipients. Addressing malnutrition in older adults receiving LTCI is essential for maintaining their health and functional status, as well as for ensuring the sustainability of the LTCI system. Future research should utilize representative sampling designs and include a wider range of variables to identify the factors associated with malnutrition in community-dwelling older adults receiving LTCI.

Conclusion

This study highlights the need for nutritional management among community-dwelling older adults receiving LTCI services regardless of their dementia status. Based on the research findings, we propose the following recommendations: inclusion of nutritional management as a core component in the case management for LTCI home care recipients, placement of nutrition management specialists within home care institutions or establishment of linkages with social welfare meal management support centers, development of new LTCI services dedicated to meal and nutrition management, and establishment of systems enabling LTCI home care recipients to access community health and welfare services focused on nutrition.

CONFLICT OF INTEREST

There are no financial or other issues that might lead to a conflict of interest.

FUNDING

None.

DATA AVAILABILITY

The participants in this study did not provide written consent for their data to be shared publicly; therefore, due to the sensitive nature of the research, supporting data are not available.

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Korean J Community Nutr. 2024 Oct;29(5):372-381
https://doi.org/10.5720/kjcn.2024.00008
eISSN 2951-3146

KJCN
Korean Journal of Community Nutrition

Research Article

지속가능한 식생활교육에 대한 영양(교)사의 교육요구도 분석: IPA, Borich 요구도, The locus for focus 모델 적용

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An educational needs analysis of sustainable dietary education for nutrition teachers: an application of the IPA, Borich needs assessment and The locus for focus model

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Received: June 25, 2024
Revised: September 9, 2024
Accepted: September 9, 2024

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Objectives: This study aimed to investigate the importance and performance levels of sustainable dietary education across the health, environment, and society domains as perceived by nutrition teachers and evaluate the needs and priorities for sustainable dietary education.

Methods: An online survey was conducted for 151 nutrition teachers in Jeollanam-do. The survey included 20 questions across the health, environment, and society domains. The data were analyzed using a paired-sample t-test, the importance-performance analysis (IPA), the Borich needs assessment, and The locus for focus model.

Results: Overall, the average importance levels of the 20 items of sustainable dietary education were significantly higher than their average performance levels (4.44 vs. 3.68). The examination of each educational domain revealed that although the importance of education in the health domain was recognized and actively practiced by the nutrition teachers, the performance was comparatively lower in the environment and society domains. The Borich needs assessment and the locus for focus model identified education on biodiversity conservation, plant-based protein, and the use of local food as the top-priority group in the environment domain along with fair and ethical food, food security, regional food culture, food policy and trade, and family dining culture as the second-priority group in the society domain.

Conclusion: The results of this study underscore the need to support the nutrition teachers' perception and practice of sustainable dietary education in the environment and society domains. We believe that the educational needs and priorities proposed in this study will be considered in the future development and modification of sustainable dietary education programs.

Keywords: sustainable development; health education; nutritionists; needs assessment

INTRODUCTION

인류는 지속가능발전에 대해 큰 도전을 받고 있다[1]. 급속한 도시화와 산업화, 자본주의의 심화는 인류에게 편리함을 제공하였으나, 전 인류가 이러한 혜택을 누리고 있는 것은 아니다. 시야 밖에는 여전히 굶주림에 고통받고, 끊임없는 차별과 분쟁으로 인해 존엄한 삶을 누리지 못하는 이들이 많다. 급격한 사회의 변화는 동시에 천연자원의 고갈과 사막화, 가뭄, 토지 황폐화, 담수 부족, 생물다양성 손실 등 심각한 기후, 환경 및 생태 위기를 초래하였다[1]. 이러한 문제들을 통합적으로 해결하기 위해 United Nations (UN)을 중심으로 지속가능발전에 대한 논의가 시작되었다. 지속가능발전이라는 용어는 1987년 세계환경개발위원회의 '우리 공동의 미래' 보고서[2]를 통해 처음 등장하였다. 이 개념은 지속가능한 경제 성장과 포용적 사회, 깨끗하고 안정적인 환경이 지속가능성에 기초하여 조화와 균형을 이루는 발전을 뜻한다[3]. 이후 지속가능발전은 2015년 9월 UN개발정상회의를 통해 지속가능발전목표(sustainable development goals, SDGs)라는 행동 계획의 형태로 제시되었다. 총 17개의 SDGs 중 SDG4는 지속가능발전교육(education for sustainable development)을 포함하고 있는데, 이는 지속가능발전의 실현에 교육이 중심적인 역할을 한다는 것을 강조한다.

이러한 시대적 흐름에 맞춰, 2020년 우리나라의 농림축산식품부에서도 제3차 식생활교육기본계획을 통해 지속가능한 식생활을 발표함으로써 식생활교육의 새로운 방향성을 제시하였다[4]. 지속가능한 식생활교육은 식품의 선택, 보관, 조리, 섭취, 폐기의 전 과정에서 건강, 환경, 배려라는 다양한 사회적 가치에 기여하는 식생활교육을 의미한다[4, 5]. 이때 핵심 가치로 다루어지는 건강, 환경, 배려는 UN에서 제시한 지속가능성의 3대 축인 사회정의, 경제발전, 환경보존을 식생활교육의 관점에서 반영한 것으로, 지속가능한 식생활교육은 사회, 경제, 환경 측면의 다양한 문제를 극복하기 위한 범세계적인 노력에 동참하는 데 의미가 있다.

지속가능한 식생활교육에 관한 선행연구는 크게 교육 내용 체계의 개발, 교육 프로그램의 개발 및 적용, 교육의 실태 연구로 구분할 수 있다. 교육 내용 체계의 개발 연구 분야에서는 Kim 등[6]이 지속가능한 식생활교육 내용을 건강, 환경, 배려 영역으로 분류하였고, Lee 등[7]은 교육 내용 체계를 유아·초등 저학년, 초등 고학년, 청소년 등 교육 대상별로 분류하여 제시하였다. 교육 프로그램 개발 및 적용 연구 분야에서는 Kwon & Lee [8]가 텃밭활동 프로그램을 개발하여 유아의 지속가능한 식생활역량과 환경친화적 태도에 긍정적인 영향을 미치는 것을 확인하였다. Kim [9]과 Yun 등[10]은 각각 virtual reality와 문제중심학습법을 활용한 교육 프로그램을 개발하여 교수방법론적 차원에서의 지속가능한 식생활교육의 발전을 꾀하기도 하였다. 교육의 실태 연구 분야에서는 Yi [11], Chung [12], Yang & Yoon [13] 등이 영양(교)사의 지속가능한 식생활교육의 수행 실태를 조사하였다. 그러나 기존의 선행연구들은 지속가능한 식생활교육의 전체 운영 정도 또는 횟수라는 포괄적인 지표만을 사용하였으므로, 해당 교육이 건강, 환경, 배려의 모든 영역에 걸쳐 균형적으로 이루어지고 있는지 확인할 수 없다는 점에서 한계를 보인다. 지속가능한 식생활교육은 건강, 환경, 배려 영역 모두에서 균형적으로 실천되어야만 온전히 그 목적을 실현할 수 있으므로, 이제는 포괄적인 운영 실태를 넘어 세부 영역별 구체적인 실태를 파악할 시점이다. 또한, 단순 수행도 조사에 그치지 않고, 해당 교육에 대한 영양(교)사의 인식을 반영하여 보다 구체적이고 실제적인 교육요구도를 파악할 필요가 있다. 교육요구도란 교육에 대한 현재 수준(what is)과 교육을 통해 도달해야 할 바람직한 수준(what should be) 간의 차이를 뜻한다[14]. 이는 현장에서 학생들에게 지속가능한 식생활교육을 직접 전달하는 영양(교)사의 역할과 관계된다. Kang [15]은 교사가 교육에 대해 긍정적인 태도와 높은 교사 효능감을 가지고 있을수록 교육 효과가 커진다고 하였다. 지속가능한 식생활이 바람직한 방향으로 나아가기 위해서는 교육의 주체가 되는 영양(교)사의 해당 교육에 대한 이해와 인식을 면밀하게 들여다보고 분석할 필요가 있는 것이다[16]. 이처럼 교육의 주체로서 영양(교)사의 역할이 두드러짐에도 불구하고, 이들을 대상으로 한 지속가능한 식생활교육에 대한 인식 또는 교육요구도를 조사한 연구는 이루어지지 않고 있다. 따라서 영양(교)사가 지속가능한 식생활교육의 각 영역에 대해 얼마나 실천하고 어떻게 인식하고 있는지, 나아가 학습자에게 우선적으로 전달해야 하는 교육 내용이 무엇인지에 대한 구체적인 교육요구도를 파악할 필요가 있다.

본 연구의 목적은 다음과 같다. 첫째, 지속가능한 식생활교육의 건강, 환경, 배려 영역에 대해 영양(교)사가 인식하는 중요도와 수행도 수준을 조사하고, 중요도-수행도 분석(importance-performance analysis, IPA) (1977)[17]을 이용하여 두 수준 간 차이를 비교함으로써 해당 교육의 실태를 평가하고자 한다. 둘째, 수집한 데이터를 바탕으로 Borich 요구도 공식(1980)[14]과 The locus for focus 모델(1991)[18]을 적용하여 지속가능한 식생활교육에 대한 영양(교)사의 교육요구도 우선순위를 결정하고, 이를 통해 지속가능한 식생활교육의 활성화를 위한 기초자료를 마련하는 것을 궁극적인 목적으로 한다.

METHODS

Ethics statement

This study was approved by the Institutional Review Board of Sunchon National University (IRB No. 1040173-202307-HR-020-02).

1. 연구설계

본 연구는 단면적 설문조사 연구로, 자발적 참여자를 대상으로 편의 표본(Convenience sampling)을 사용하였으며, STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) 보고지침을 참고하여 기술하였다(https://www.strobe-statement.org/).

2. 연구대상 및 기간

본 조사는 지속가능한 식생활교육에 대한 영양(교)사의 교육 요구도를 파악하기 위해 전라남도 소재 초·중등학교에 근무하는 영양(교)사를 대상으로 실시되었다. 설문지는 전라남도 영양(교)사협회 측의 협조 하에 Korean Social Science Data Center에서 지원하는 온라인 설문 서비스 형태로 2023년 9월 13일부터 10월 7일까지 총 3주에 걸쳐 제공되었다. 협회에 가입한 총 657명의 영양(교)사 중 본 연구에 자발적인 참여 의사를 밝힌 152명의 응답을 회수하였고(회수율: 23.1%), 이 중 불충분하게 응답한 설문지 1부를 제외하고 최종적으로 151명의 응답을 연구에 활용하였다.

3. 연구내용 및 방법

1) 설문지 개발

본 연구에서 검사 도구로 사용한 지속가능한 식생활교육의 영역 및 항목은 선행연구[6,7]를 기반으로 개발되었고, 영양교육 전문가 2명의 검토와 전남지역 초등학교 영양교사 10명을 대상으로 한 1차 사전조사 및 인터뷰를 거쳐 수정·보완되었다. 또한, 1차 사전조사를 통해 지속가능한 식생활교육의 정의를 제시하고 동의를 구함으로써 개념 타당도를 확인하였고, 지속가능한 식생활교육의 각 영역과 항목 간의 연관도를 묻는 문항을 제시하여 검사 도구의 내용 타당도를 확보하였다. 이상의 검토 과정을 거친 최종 검사 도구는 전남지역 초·중등학교 영양(교)사 33명을 대상으로 한 2차 사전조사를 통해 교육 영역 3개(건강, 환경, 배려)와 항목 20개로 선정되었다.

2) 설문지 구성

연구대상자의 일반사항은 성별, 연령, 직급, 최종학력, 학교급 등 5개 문항으로 구성하였다. 지속가능한 식생활교육의 중요도와 수행도는 건강, 환경, 배려의 세부 영역으로 구분하여 측정하였다. 건강 영역은 채소·과일, 식중독 예방, 올바른 식습관, 건강하고 안전한 간식, 식품 알레르기, 식품표시제의 6개 항목, 환경 영역은 생물다양성 보존, 식물성 단백질, 로컬푸드, 친환경 농업, 음식물쓰레기 감량, 에너지 절약의 6개 항목, 배려 영역은 공정·윤리적 식품, 식량 안보, 지역의 식문화, 식품 정책과 무역, 가정의 식문화, 식사 예절, 한국의 전통식문화, 세계의 식문화와 다문화가정의 8개 항목으로 구성하였다. 각 문항은 Likert 5점 척도로 측정하였다.

4. 자료분석

수집된 자료는 SPSS Statistics ver. 21.0 (IBM Co.)을 이용하여 분석하였다. 연구대상자의 일반사항에 관한 응답은 빈도와 백분율로 제시하였다. 검사 도구의 내적 일관성을 검증하기 위해 Cronbach's α값을 이용하여 신뢰도를 측정하였고, 그 결과 모든 영역의 Cronbach's α값이 0.8 수준 이상으로 나타났다. 지속가능한 식생활교육의 중요도와 수행도의 차이는 대응표본 t-test를 실시하여 통계적 유의성을 파악한 후, IPA 분석을 통해 시각적으로 제시하였다. 기존의 IPA 분석은 중요도와 수행도의 단순 차이만을 비교하여, 항목간 변별 및 세부적인 우선순위 결정이 어렵다는 한계점이 보고되어 왔다[19-22]. 이에 본 연구에서는 중요도에 가중치를 부여하는 Borich 요구도와 The locus for focus 모델을 추가로 적용하여 기존의 IPA 분석이 가진 한계점을 보완하고, 분석 결과에 설명력을 더하고자 하였다.

Borich 요구도는 $\Sigma (RCL - PCL) \times \overline{RCL}/N$ [RCL = required competence level, 요구되는 역량 수준(각 중요도 점수); PCL = present competence level, 현재의 역량 수준(각 수행도 점수); $\overline{RCL}$ = 요구되는 역량 수준의 평균값(해당 항목 중요도 평균); N = 전체 사례 수] 공식을 활용하여 산출하였고, 산출된 요구도 수준에 따라 우선순위를 결정하였다.

The locus for focus 모델의 가로축은 중요도, 세로축은 중요도와 수행도 간의 차이값인 불일치 정도로 설정하고, 그 평균값을 사분면을 구분하는 기준으로 설정하였다. 1사분면(high discrepancy/high importance, HH)은 중요도가 평균값보다 높고 중요도와 수행도 간 불일치 정도가 평균값보다 높아, 가장 우선순위가 높은 영역이다. 2사분면(high discrepancy/low importance, HL)은 중요도가 평균값보다 낮으나 불일치 정도가 평균값보다 높은 분면으로, 낮은 중요도와 수행도를 높일 필요가 있어 차선적으로 우선순위가 높은 영역이다. 3사분면(low discrepancy/low importance, LL)은 중요도가 평균값보다 낮고 불일치 정도도 평균값보다 낮은 분면으로, 우선순위가 가장 낮은 영역이라 할 수 있다. 4사분면(low discrepancy/high importance, LH)은 중요도가 평균값보다 높고 불일치 정도가 평균값보다 낮은 분면으로, 현재 수행 수준이 바람직하여 지속적인 유지가 필요한 영역이다. 본 연구에서는 최우선영역인 HH분면과 차순위영역인 LH분면만을 중점적으로 검토하였다.

RESULTS

1. 연구대상자의 일반사항

연구대상자의 일반사항은 Table 1과 같다. 대상자의 성별은 여성이 150명(99.3%), 남성이 1명(0.7%)으로 여성의 비율이 현저히 높았고, 연령은 20대가 22명(14.6%), 30대가 22명(14.6%),

https://doi.org/10.5720/kjcn.2024.00008

Table 1. General characteristics of the participants (n = 151)

Variable	Description	Frequency
Sex	Female	150 (99.3)
	Male	1 (0.7)
Age (year)	≤ 29	22 (14.6)
	30–39	22 (14.6)
	40–49	31 (20.5)
	≥ 50	76 (50.3)
Education level	2-year college	7 (4.6)
	4-year university	71 (47.0)
	Graduate school	73 (48.4)
Occupation	Nutrition teacher	122 (80.8)
	Dietitian	29 (19.2)
School level	Elementary school	104 (68.9)
	Middle school	23 (15.2)
	High school	24 (15.9)

n (%).

40대가 31명(20.5%), 50대 이상이 76명(50.3%)으로 나타나 40대와 50대의 비율이 전체의 70% 이상을 차지하였다. 최종학력은 대학원 졸업이 73명(48.4%), 4년제 대학교 졸업이 71명(47.0%), 2년제 대학교 졸업이 7명(4.6%) 순으로 나타났고, 직급은 영양교사가 122명(80.8%), 영양사가 29명(19.2%)으로 나타났다. 대상자가 현재 근무하고 있는 학교급은 초등학교 104명(68.9%), 고등학교 24명(15.9%), 중학교 23명(15.2%) 순으로 나타났고, 초등학교의 비율이 중등학교에 비해 현저히 높았다.

2. 지속가능한 식생활교육의 중요도와 수행도

지속가능한 식생활교육에 대해 영양(교)사가 인식하는 중요도와 수행도 수준을 Table 2에 제시하였다.

지속가능한 식생활교육의 20개 항목에서 중요도와 수행도의 유의한 차이가 나타났고, 모든 영역 및 항목에 대한 중요도가 수행도보다 높게 나타났다. 전체 항목에서 중요도가 가장 높은 항목은 음식물쓰레기 감량(E5, M = 4.78)이었고, 올바른 식습관(H3, M = 4.67), 건강하고 안전한 간식(H4, M = 4.67), 채소·

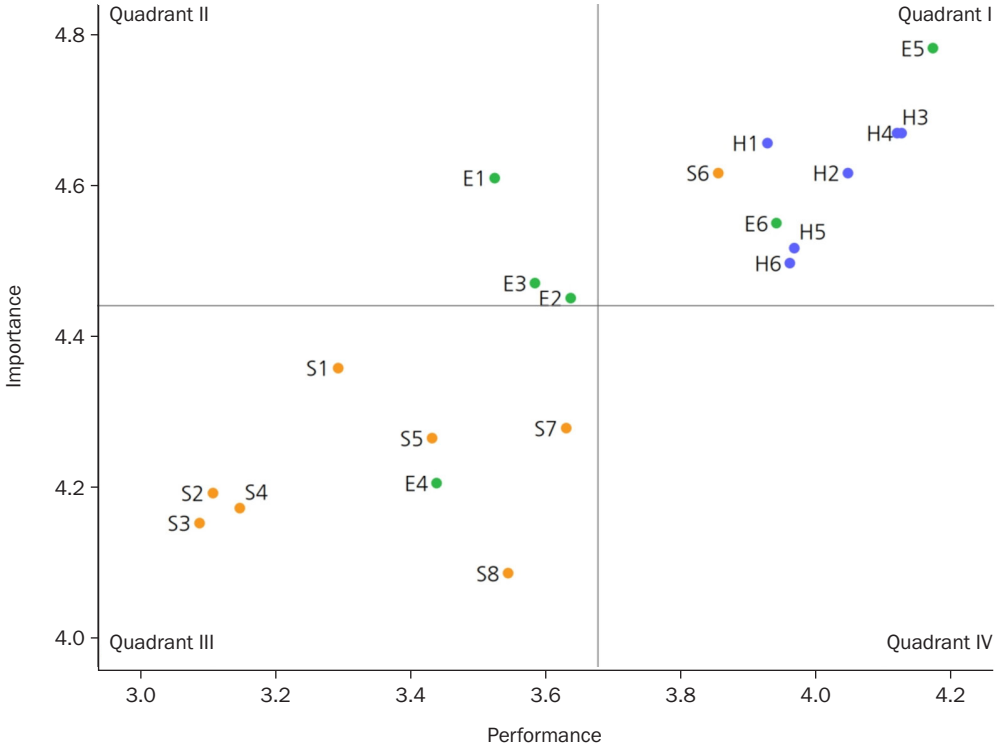

Fig. 1. Importance-performance analysis prioritizing the sustainable dietary education contents.
H1, vegetables and fruits; H2, prevention of food poisoning; H3, proper eating habits; H4, healthy and safe snacks; H5, food allergy; H6, food labeling agent; E1, conservation of biodiversity (endangered species); E2, plant-based proteins; E3, local food; E4, eco-friendly farming; E5, food waste reduction; E6, energy conservation; S1, fair and ethical food; S2, food security; S3, regional food culture; S4, food policy and trade; S5, family dining culture; S6, table manners; S7, Korean traditional food culture; S8, global food culture and multicultural families.

Table 2. Analysis of the sustainable dietary educational domains and their contents

Domain		Content	Mean ± SD		Gap[3]	t	Borich needs assessment[4]	Ranks for each content	Total rank
			Importance[1]	Performance[2]					
Health	H1	Vegetables and fruits	4.66 ± 0.63	4.05 ± 1.19	0.73	6.88***	3.39	1	10
	H2	Prevention of food poisoning	4.62 ± 0.67	3.93 ± 1.30	0.57	6.08***	2.63	2	15
	H3	Proper eating habits	4.67 ± 0.56	4.12 ± 1.18	0.55	5.83***	2.57	3	16
	H4	Healthy and safe snacks	4.67 ± 0.59	4.13 ± 1.16	0.54	5.94***	2.54	4	17
	H5	Food allergy	4.52 ± 0.76	3.97 ± 1.17	0.55	5.92***	2.48	5	18
	H6	Food labeling agent	4.50 ± 0.69	3.64 ± 1.35	0.54	5.60***	2.41	6	19
			4.60 ± 0.08	4.02 ± 0.09	0.58	19.22***	2.67	-	3
Environment	E1	Conservation of biodiversity (endangered species)	4.61 ± 0.67	3.52 ± 1.31	1.09	10.1***	5.01	1	1
	E2	Plant-based proteins	4.45 ± 0.81	3.96 ± 1.17	0.81	7.71***	3.63	2	6
	E3	Local food	4.47 ± 0.76	3.58 ± 1.37	0.89	7.88***	3.40	3	9
	E4	Eco-friendly farming	4.21 ± 1.00	3.92 ± 1.20	0.77	6.36***	3.23	4	11
	E5	Food waste reduction	4.78 ± 0.53	4.17 ± 1.04	0.61	6.69***	2.91	5	12
	E6	Energy conservation	4.55 ± 0.72	3.94 ± 1.19	0.61	5.92***	2.77	6	14
			4.51 ± 0.19	3.72 ± 0.28	0.80	10.78***	3.59	-	2
Society	S1	Fair and ethical food	4.36 ± 0.84	3.29 ± 1.44	1.07	9.57***	4.65	1	2
	S2	Food security	4.19 ± 0.93	3.11 ± 1.42	1.09	9.70***	4.55	2	3
	S3	Regional food culture	4.15 ± 0.88	3.09 ± 1.45	1.07	9.18***	4.43	3	4
	S4	Food policy and trade	4.17 ± 0.89	3.15 ± 1.42	1.03	9.17***	4.28	4	5
	S5	Family dining culture	4.26 ± 0.95	3.43 ± 1.41	0.83	7.19***	3.56	5	7
	S6	Table manners	4.62 ± 0.66	3.85 ± 1.27	0.76	7.74***	3.52	6	8
	S7	Korean traditional food culture	4.28 ± 0.83	3.63 ± 1.35	0.65	5.83***	2.78	7	13
	S8	Global food culture and multicultural families	4.09 ± 0.92	3.54 ± 1.26	0.54	4.92***	2.22	8	20
			4.26 ± 0.16	3.39 ± 0.28	0.88	11.70***	3.75	-	1
Total			4.44 ± 0.21	3.68 ± 0.35	0.76	16.42***	3.38	-	-

[1]Likert scale score from 5 (very important) to 1 (not important at all).
[2]Likert scale score from 5 (performed very well) to 1 (not performed at all).
[3]Gap calculated as "Importance – Performance".
[4]Borich needs assessment calculated as "Mean Gap × Importance".
***P < 0.001; t, paired t-test.

과일(H1, M = 4.66)이 뒤를 이었다. 이중 E5를 제외한 나머지는 건강 영역에 속하는 항목이었다. 교육 영역의 중요도는 건강(M = 4.60), 환경(M = 4.51), 배려(M = 4.26) 순으로 나타났다.

전체 항목 중 수행도가 가장 낮은 항목은 지역의 식문화(S3, M = 3.09)였고, 식량 안보(S2, M = 3.11), 식품 정책과 무역(S4, M = 3.15), 공정·윤리적 식품(S1, M = 3.29)도 낮은 수준을 보였다. 이상의 모든 항목이 배려 영역에 포함되는 항목이었다. 교육 영역의 수행도는 건강(M = 4.02), 환경(M = 3.72), 배려(M = 3.39) 순으로 나타났다.

3. 지속가능한 식생활교육에 대한 IPA와 교육요구도 분석

1) IPA 분석

지속가능한 식생활교육에 대한 중요도와 수행도의 차이를 비교한 IPA 분석 결과를 Fig. 1에 제시하였다.

중요도가 높으나 수행도는 낮아 가장 집중적인 강화가 필요한 2사분면에 위치하는 항목은 생물다양성 보존(E1), 식물성 단백질(E2), 로컬푸드(E3)로 나타났다. 세 항목 모두 환경 영역에 속하는 항목이었다. 중요도와 수행도가 모두 낮아 장기적인 지원이 필요한 3사분면에는 친환경 농업(E4), 공정·윤리적 식품

https://doi.org/10.5720/kjcn.2024.00008

(S1), 식량 안보(S2), 지역의 식문화(S3), 식품 정책과 무역(S4), 가정의 식문화(S5), 한국의 전통식문화(S7), 세계의 식문화와 다문화가정(S8)이 위치하였다. 이중 E4를 제외한 나머지는 모두 배려 영역에 포함되는 항목이었다.

2) Borich 요구도 및 The locus for focus 모델

Borich 요구도 공식을 활용하여 영양(교)사의 지속가능한 식생활교육에 대한 교육요구도를 산출한 결과를 Table 2에 제시하였다. 전체 항목 중 생물다양성 보존(E1)에 대한 교육요구도가 5.01점으로 가장 높게 나타났고, 공정·윤리적 식품(S1), 식량 안보(S2), 지역의 식문화(S3), 식품 정책과 무역(S4)이 뒤를 이었다. 교육 영역별로 살펴보면 건강, 환경, 배려 영역 중 배려 영역의 교육요구도가 3.75점으로 가장 높은 수준을 보였다.

The locus for focus 모델을 활용하여 우선순위를 분석한 결과를 Fig. 2에 제시하였다. 사분면을 구분하는 기준값으로 중요도의 평균(가로축)은 4.44점, 중요도와 수행도 간 불일치 수준의 평균(세로축)은 0.76점이었다. 최우선영역 HH분면에는 생물다양성 보존(E1), 식물성 단백질(E2), 로컬푸드(E3)가 포함되었다. 차순위영역 LH분면에는 친환경 농업(E4), 공정·윤리적 식품(S1), 식량 안보(S2), 지역의 식문화(S3), 식품 정책과 무역(S4), 가정의 식문화(S5)가 속하였다.

3) 교육요구도 우선순위 결정

최종적인 교육요구도 우선순위는 IPA 분석의 2사분면(우선순위 영역)과 3사분면(차순위 영역), Borich 요구도 공식에 의해 도출된 상위 우선순위, The locus for focus 모델의 HH분면(우선순위 영역)과 LH분면(차순위 영역)에 포함되는 항목의 개수와 중복 여부를 비교하여 결정하였다(Table 3).

최상위 우선순위군으로 결정된 항목은 생물다양성 보존(E1), 식물성 단백질(E2), 로컬푸드(E3)로 나타났다. 생물다양성 보존(E1)은 IPA 분석에서 2사분면, Borich 요구도에서 1순위, The locus for focus 모델에서 HH분면에 속하는 가장 우선순위가 높은 항목이었고, 식물성 단백질(E2)과 로컬푸드(E3)는 IPA 분석에서 2사분면, The locus for focus 모델에서 HH분면에 위치

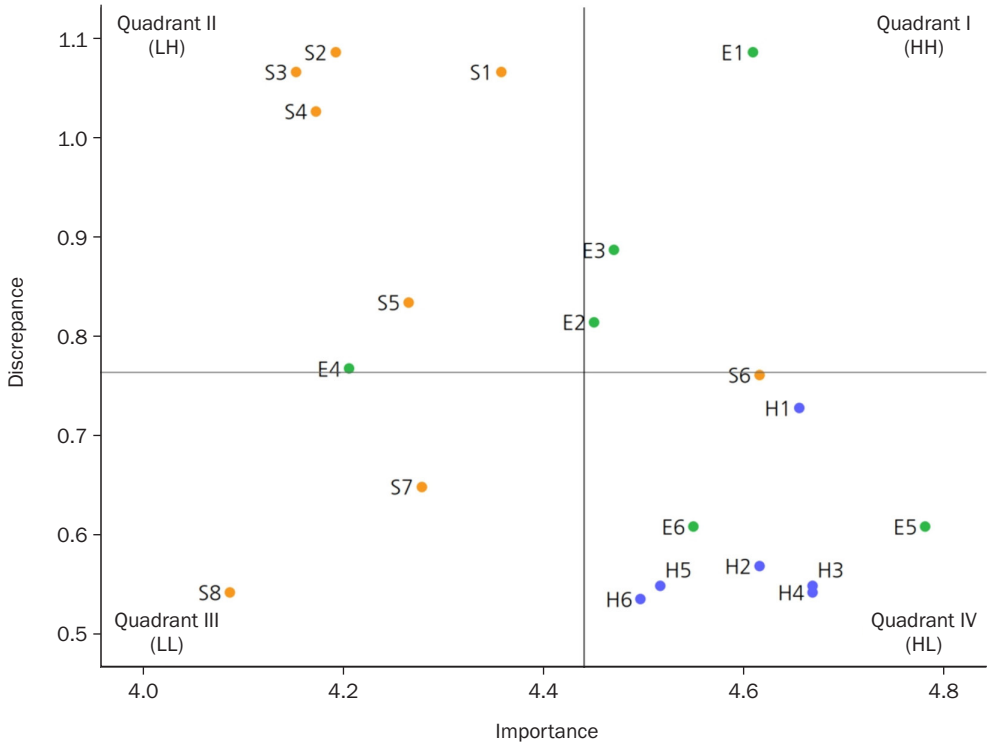

Fig. 2. The locus for focus model prioritizing the sustainable dietary education contents.
HH, high importance/high discrepancy; LH, low importance/high discrepancy; LL, low importance/low discrepancy; HL, high importance/low discrepancy; H1, vegetables and fruits; H2, prevention of food poisoning; H3, proper eating habits; H4, healthy and safe snacks; H5, food allergy; H6, food labeling agent; E1, conservation of biodiversity (endangered species); E2, plant-based proteins; E3, local food; E4, eco-friendly farming; E5, food waste reduction; E6, energy conservation; S1, fair and ethical food; S2, food security; S3, regional food culture; S4, food policy and trade; S5, family dining culture; S6, table manners; S7, Korean traditional food culture; S8, global food culture and multicultural families.

하였으므로 최상위 우선순위군으로 선정하였다.

차순위 우선순위군으로 결정된 항목은 친환경 농업(E4), 공정·윤리적 식품(S1), 식량 안보(S2), 지역의 식문화(S3), 식품 정책과 무역(S4), 가정의 식문화(S5)로 나타났다. 6개 항목 모두 IPA 분석에서 3사분면, Borich 요구도에서 상위 우선순위, The locus for focus 모델에서 LH분면에 속하였으므로 차순위 우선순위군으로 선정하였다.

DISCUSSION

본 연구에서는 영양(교)사가 인식하는 지속가능한 식생활교육의 중요도와 수행도 수준을 건강, 환경, 배려 영역별로 구분 조사함으로써 현재 해당 교육이 세 영역에 걸쳐 균형적으로 이루어지고 있는지, 그 실태를 파악하고자 하였다. 또한, IPA, Borich 요구도, The locus for focus 모델을 활용하여 지속가능한 식생활교육에 대한 교육요구도 및 우선순위를 제시하고자 하였다.

지속가능한 식생활교육에 대한 영양(교)사의 중요도와 수행도를 조사한 결과, 모든 교육 영역 및 항목에서 중요도가 수행도보다 높게 나타났다. 이는 선행연구[23]에서 영양교육에 대해 영양(교)사가 인식하는 중요도 수준(3.34)이 수행도 수준(2.45)보다 높게 나온 결과와 유사하다. 이를 통해 현재 지속가능한 식생활교육이 전반적으로 중요하게 인식되고 있음에도 불구하고, 수행 수준이 이를 따라가지 못하고 있음을 확인할 수 있다. 교육 영역별로 살펴보면, 중요도와 수행도 수준 모두 건강, 환경, 배려 순으로 나타났다. 건강 영역의 교육 수준은 비교적 바람직한 수준에 도달해있는 반면, 환경, 배려 영역의 교육은 우선적인 개선 또는 강화가 필요한 것으로 나타났다. 이렇듯 현재 지속가능한 식생활교육은 건강 중심의 영양교육에 머물러 있으며, 환경, 배려 영역으로의 교육 범위 확장에 어려움을 겪고 있는 것으로 보인다. 이는 고등학생이 지속가능한 식생활교육을 단순히 건강 중심의 식생활교육으로 인식하고 있음을 확인한 Hong 등[24]의 연구 결과와 맥을 같이 한다.

IPA 분석을 통해서도 환경, 배려 영역의 교육 강화의 필요성이 제기되었다. 분석 결과, 건강 영역의 모든 항목들이 1사분면에 포함된 것과 달리, 환경, 배려 영역에 속하는 다수의 항목은 2사분면과 3사분면에 위치하고 있었다. 이는 영양(교)사들이 건강 영역의 교육에 대해서는 그 중요성을 충분히 인식하고 활발히 실천하고 있는 반면, 환경, 배려 영역에 대해서는 교육 실천이 미흡함을 의미한다. 따라서 건강 영역의 교육 행태를 유지하면서도 환경, 배려 영역의 지속가능한 식생활교육의 활성화를 위한 추가적인 노력이 필요하다.

Borich 요구도와 The locus for focus 모델을 추가로 적용한 결과, 최상위 우선순위군으로 '생물다양성 보존', '식물성 단백질', '로컬푸드'가 선정되었다. 이는 육류 위주의 식생활과 기후, 환경 및 생태위기의 관계, 그리고 이를 해결하기 위한 대안과 관련된 내용이다. 육류 위주의 식생활은 사료 생산, 가축 사육, 축산물 처리 및 운송, 분뇨 및 폐기물 관리 과정에서 탄소 배출량의 증가를 야기하였고, 이어서 기후변화 및 환경오염에 주된 영향을 미쳤다. 생물다양성 보존은 기후변화 및 환경오염으로 인해 발생한 생태계 차원의 문제(멸종위기종 증가 등)를 해결하기 위한 움직임이며, 식물성 단백질과 로컬푸드 또한 이러한 문제를 해결하기 위한 식생활 차원에서의 노력과 관련된 내용이다. 세 항목은 모두 최근 전국적으로 확산되고 있는 학교 채식급식의 취지와 연결된다고 볼 수 있다. 학교 채식급식은 지속가능성을 기반으로 탄소 배출을 줄이기 위해 월 1–2회 이상 페스코 식단(육고기를 제외한 어류 및 달걀을 포함한 식단)을 제공하는 먹거리 생태전환교육의 일환이다[25]. 영양(교)사는 학교 채식급식 운영의 주체로서 기후, 환경 및 생태위기에 직접적으로 대응하고 있다. 이러한 직접적인 참여가 영양(교)사의 인식에 긍정적인 영향을 미쳐, 환경 영역 중에서도 학교 채식급식과 관련이 있는 세 항목에 대한 중요도 인식이 높게 나온 것으로 보인다.

동시에, 본 결과는 세 항목에 대한 영양(교)사의 긍정적인 인식이 교육 실천으로까지 이어지지 못하고 있는 현 상황의 문제점을 보여준다. 이에 세 항목에 대한 영양(교)사의 교육 행동을 방해하는 요인을 파악할 필요가 있겠다. Yang & Yoon [13]은 지속가능한 식생활교육을 수행하고자 하는 영양(교)사의 의도에 가장 큰 영향을 미치는 요인이 외부 자원(장소, 시간, 예산, 교재)이라는 결과를 도출하였다. 동시에 Yang & Yoon [13]은 식생활교육의 개념과 범위가 시대의 흐름에 따라 건강 중심에서 환경, 배려 영역으로 확장되었음에도 불구하고, 교육 수행에 필요한 외부지원체계가 미흡한 현실을 지적하였다. 이에 본 연구에서 환경, 배려 영역의 항목 대부분의 수행도가 건강 영역에 비해 낮게 나타난 것은 식생활교육의 범위 확장에 따른 외부적 지원이 부족하였기 때문이라고 볼 수 있다. 생물다양성 보존, 식물성 단백질, 로컬푸드에 대한 영양(교)사의 교육 수행이 활발하지 못한 것도 이러한 이유 때문일 것으로 사료된다. 따라서 세 항목에 대한 영양(교)사의 긍정적인 인식을 교육 실천으로 옮길 수 있도록 교육 장소 마련, 수업시수와 예산의 확대, 교육자료의 개발 및 보급 등 적합한 지원체계가 적극적으로 마련되어야 할 것이다.

차순위 우선순위군으로 분류된 항목은 친환경 농업, 공정·윤리적 식품, 식량 안보, 지역의 식문화, 식품 정책과 무역, 가정의 식문화였다. 이중 '친환경 농업'이 차순위 우선순위군으로 선정된 것은 식품의 '생산'과 연관된 내용이기 때문일 것으로 사료된다. 이와 관련하여 Song & Lee [22]는 현재의 식생활교육이 식품의 선택 및 섭취와 관련된 내용에만 편중되어 있으며, 식품의 생산 영역에 대한 교육 수행이 저조하다는 결과를 도출하였다. 바람직한 식생활을 영위하기 위해선 식품의 생산부터 폐기까지의 푸드시스템 전 과정에서 직면하는 다양한 문

https://doi.org/10.5720/kjcn.2024.00008

Table 3. Prioritizing the sustainable dietary education contents according to the importance–performance analysis, Borich needs assessment model, and The locus for focus model

Domain		Content	IPA	Borich needs assessment ranks	The locus for focus model	Priority
Health	H1	Vegetables and fruits	Quadrant Ⅰ	10	HL	3
	H2	Prevention of food poisoning	Quadrant Ⅰ	15	HL	3
	H3	Proper eating habits	Quadrant Ⅰ	16	HL	3
	H4	Healthy and safe snacks	Quadrant Ⅰ	17	HL	3
	H5	Food allergy	Quadrant Ⅰ	18	HL	3
	H6	Food labeling agent	Quadrant Ⅰ	19	HL	3
Environment	E1	Conservation of biodiversity (endangered species)	Quadrant Ⅱ	1[1)]	HH[1)]	1[1)]
	E2	Plant-based proteins	Quadrant Ⅱ	6[2)]	HH[1)]	1[1)]
	E3	Local food	Quadrant Ⅱ	9[2)]	HH[1)]	1[1)]
	E4	Eco-friendly farming	Quadrant Ⅲ	11[2)]	LH[2)]	2[2)]
	E5	Food waste reduction	Quadrant Ⅰ	12	HL	3
	E6	Energy conservation	Quadrant Ⅰ	14	HL	3
Society	S1	Fair and ethical food	Quadrant Ⅲ	2[1)]	LH[2)]	2[2)]
	S2	Food security	Quadrant Ⅲ	3[1)]	LH[2)]	2[2)]
	S3	Regional food culture	Quadrant Ⅲ	4[2)]	LH[2)]	2[2)]
	S4	Food policy and trade	Quadrant Ⅲ	5[2)]	LH[2)]	2[2)]
	S5	Family dining culture	Quadrant Ⅲ	7[2)]	LH[2)]	2[2)]
	S6	Table manners	Quadrant Ⅰ	8	HL	3
	S7	Korean traditional food culture	Quadrant Ⅲ	13	LL	3
	S8	Global food culture and multicultural families	Quadrant Ⅲ	20	LL	3

IPA, importance-performance analysis; HH, high importance/high discrepancy; LH, low importance/high discrepancy; LL, low importance/low discrepancy; HL, high importance/low discrepancy.
[1)]The top-priority group.
[2)]The second-priority group.

제를 해결할 수 있는 지속가능한 식생활역량이 필요하다[26]. 이에 친환경 농업을 비롯한 식품의 생산과 관련된 교육 내용에 대해 보다 깊이 있는 연구 및 콘텐츠 발굴이 활발히 이루어져야 할 것이다.

차순위 우선순위군의 대부분은 배려 영역에 속하였다. 배려 영역은 개인적 차원에서 실현되는 사회적, 문화적, 경제적 책임 등 다양한 측면을 포함하기 때문에, 타 영역에 비해 추상적이고 광범위하다는 특징을 갖는다. 본 결과는 배려 영역의 가치를 일상생활에서 구체적으로 어떻게 실천할 수 있는지에 대한 영양(교)사의 이해와 직접적인 경험 부족에 의한 것으로 사료된다[27]. 이에 영양(교)사의 실제 삶에 배려의 가치를 반영하는 경험을 통해, 이들이 교육의 주체로서 배려 영역의 지속가능한 식생활교육을 충분히 중요하게 인식하고, 보다 현실감 있는 교육으로 실천할 수 있도록 지원할 필요가 있다. 이를 위해 다양한 연수 프로그램 및 캠페인의 확대, 영양(교)사 양성을 위한 교육과정의 개편을 통해 현직에 있는 영양(교)사와 예비 영양(교)사 모두에게 배려의 가치를 직접 경험할 기회를 제공하려는 노력이 필요할 것이다. 또한, 배려 영역의 내용이 문화, 평등, 공정, 정치, 경제와 밀접한 관련이 있는 만큼 가정 및 지역사회와의 연계가 활발히 이루어져야 할 것이다.

본 연구에서는 배려 영역에 속하는 '세계의 식문화와 다문화 가정'에 대해 추가적으로 논의하고자 한다. 비록 해당 내용이 우선순위군에 속하는 항목은 아니지만, 다문화 시대를 맞이하여 상호문화적 교류와 융합의 중요성이 강조되고 있기 때문이다. 특히 식생활은 인류의 보편적인 문화이자 각 문화별 특수성을 지니고 있어 다양성 및 다문화적 가치를 구현하는 중요한 도구가 될 수 있다. 그러나 본 연구 결과에 따르면, 해당 내용에 대한 영양(교)사의 교육 수행도와 중요도가 모두 낮게 나타나고 있었다. 이러한 결과는 앞서 배려 영역의 특징과 더불어, 농림축산식품부와 식생활교육국민네트워크에서 개발한 식생활교육 교재에서 '다양성·다원성' 요소가 충분히 다루어지지 않았음을 지적한 Lee [28]의 연구 결과와 관련이 있는 것으로 사료된다. 이에 향후 영양(교)사의 다양성 및 다문화에 대한 인식을 높이기 위한 연수 프로그램 개발과 식생활교육 교육과정 및 교재의

보완이 이루어져야 할 것이다.

Limitations

본 연구에는 몇 가지 제한점이 존재한다. 첫째, 연구대상자가 전남지역에 국한되어 있어, 연구 결과를 전체 영양(교)사의 경우로 일반화하기에 한계가 있다. 둘째, 양적 연구만을 진행하여, 검사 도구에 포함되지 않은 또 다른 교육 내용이 잠재할 가능성을 배제하였다는 점에서 한계를 갖는다. 향후 질적 연구를 통해 본 연구의 결과를 보완하여, 보다 정확한 교육요구도와 우선순위를 파악할 필요가 있겠다.

그럼에도 불구하고 본 연구는 지속가능한 식생활교육이 건강, 환경, 배려의 세분화된 영역 모두에서 균형적으로 중요시 및 수행되고 있는지, 구체적인 실태를 확인하였다는 점에서 연구적 의의를 갖는다. 본 연구를 통해 현재 지속가능한 식생활교육이 기존의 건강 중심 영양교육의 행태에서 벗어나지 못하고 있음을 확인하고, 환경, 배려 영역의 지속가능한 식생활교육에 대한 지원을 더욱 강화할 필요성을 제시하였다는 점에서 더욱 유의미하다. 또한, 지속가능한 식생활교육을 직접 수행하는 영양(교)사의 구체적인 교육요구도를 파악함으로써 현재 우선적으로 강화되어야 할 교육 내용이 무엇인지를 확인하고, 이를 향후 수업 설계에 반영할 근거를 마련하였으므로 교수학적 가치가 있다. 나아가, Borich 요구도와 The locus for focus 모델을 추가로 적용함으로써 IPA 분석의 단일 결과보다 합리적인 결과를 도출하고, 영양(교)사 대상의 중요도-수행도 비교 연구의 확장 가능성을 제시하였다는 점에서 이론적 의의를 갖는다. 이에 본 연구 결과가 지속가능한 식생활교육의 활성화를 위한 다양한 지원 방안 마련에 적극적으로 활용되기를 기대한다.

Conclusion

본 연구는 지속가능한 식생활교육에 대한 영양(교)사의 중요도와 수행도 수준을 조사하고, 이를 바탕으로 구체적인 교육요구도 및 우선순위를 파악함으로써 향후 지속가능한 식생활교육의 활성화에 필요한 기초자료를 제공하기 위해 수행되었다. 이를 통해 환경, 배려 영역의 지속가능한 식생활교육에 대한 적극적인 개선 및 강화가 필요함을 확인하였다. 향후 지속가능한 식생활교육 프로그램을 개발 또는 수정·보완하는 과정에 본 연구에서 제안한 영양(교)사의 교육요구도 및 우선순위를 우선적으로 반영함으로써, 지속가능한 식생활교육의 활성화에 도움이 되기를 기대한다.

CONFLICT OF INTEREST

There are no financial or other issues that might lead to conflict of interest.

FUNDING

None.

DATA AVAILABILITY

Research data is available upon request to the corresponding author.

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Korean J Community Nutr. 2024 Oct;29(5):382-395
https://doi.org/10.5720/kjcn.2024.00010
eISSN 2951-3146

KJCN
Korean Journal of Community Nutrition

Research Article

Outcome expectations, self-efficacy, eating environment, and eating behaviors by the stages of change in adequate sodium intake among university students: a cross-sectional study

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Received: August 12, 2024
Revised: September 19, 2024
Accepted: October 9, 2024

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Objectives: This study investigated whether outcome expectations, self-efficacy, eating environment, and eating behaviors differed according to the stages of change in adequate sodium intake among university students.
Methods: The participants were students recruited from nine universities in Seoul, Korea. An online survey was conducted, and data from 351 participants were analyzed. Participants were classified into pre-action and action stages based on adequate sodium intake. Data were analyzed using *t*-test, χ^2-test, analysis of covariance, and correlation analysis.
Results: Participants in the action stage (22.8%) felt fewer disadvantages of eating sodium adequately compared to those in the pre-action stage (77.2%, $P < 0.001$) and perceived more self-efficacy for healthy eating behaviors ($P < 0.001$) and controlling sodium intake ($P < 0.01$). The participants in the action stage also showed more desirable eating behaviors than those in the pre-action stage, including general eating behaviors, behaviors related to sodium intake, and sodium checks ($P < 0.001$). The physical environment in the action stage was more supportive of adequate sodium intake ($P < 0.05$). Eating behaviors, self-efficacy, and outcome expectations were significantly correlated with the stages of change; however, some differences were noticed in the correlation of the subscales of variables with the stages of change when examined by sex.
Conclusion: We observed differences in factors according to the stages of change in adequate sodium intake. For the pre-action stage, nutrition education can be planned to modify negative expectations of eating adequate sodium, foster self-efficacy, and practice general eating behaviors and behaviors to gradually reduce sodium intake. It is also necessary to alter the physical environment to reduce sodium intake. In the action stage, support and reinforcement are needed to continually practice and maintain desirable eating behaviors. Nutrition education for women may be planned using multiple paths, whereas a simple strategy may be useful for men.

Keywords: young adult; sodium; cognition; environment; behavior

INTRODUCTION

Young adults are at the stage of taking responsibility for their own food choices,

nutrition management, and health. Eating behaviors and habits likely persist not only during this period but also into middle and later adulthood, potentially influencing health outcomes in later life. Therefore, it is important to impart desirable eating behaviors to young adults.

Excessive sodium intake is a behavioral risk factor for noncommunicable diseases such as hypertension, heart disease, stroke, cancer, and diabetes [1]. Sodium intake among individuals aged 19 years and over in South Korea has decreased over the past ten years, however, sodium intake was 142% of the chronic disease risk reduction intake in 2022 [2, 3].

To identify factors explaining nutritional behaviors, theories such as the social cognitive theory (SCT) and the transtheoretical model (TTM) have been used. SCT suggests that personal cognitive factors, behavioral factors, and the environment interact and needs to be reflected in examining health behaviors. Personal cognitive factors include outcome expectations, self-efficacy, and knowledge. Outcome expectations are a person's expectation regarding the consequences, either advantages or disadvantages, of doing the behavior, whereas self-efficacy refers to confidence in one's ability to perform the behavior. Behavioral factors include behavioral capabilities, intentions, and reinforcement. Constructs such as social support, normative beliefs, barriers, and opportunities of behaviors represent environmental factors [4]. TTM describes the stages of change that people experience, and the mechanisms they use when adopting or modifying health-related behaviors. TTM suggests that behavioral change progresses in five stages: precontemplation, contemplation, preparation, action, and maintenance stages. It emphasizes the use of behavioral modification strategies appropriate to one's stage of change, thus making it possible to plan education that customizes one's stage of behavioral change [5]. SCT and the stages of change have been applied to research such as identifying factors related to healthy eating behaviors, planning, and evaluating the effectiveness of nutrition education programs [6-9].

Research on sodium has focused on its intake [10, 11], and the association between sodium intake and chronic diseases [12, 13]. Several studies have examined psychosocial factors related to sodium intake, and these studies were conducted in different populations such as consumers, housewives, and foodservice workers [6, 14-17]. Applying the concepts of SCT, this study aimed to investigate whether there were differences in factors such as outcome expectations, self-efficacy, eating environment, and eating behaviors according to the stages of change in adequate sodium intake among university students in Seoul, Korea. Furthermore, this study examined the association between these factors and the stages of change in adequate sodium intake according to sex. The hypothesis for this study was those in the action stage might have higher outcome expectations and self-efficacy, a more supportive eating environment, and more desirable eating behaviors than those in the pre-action stage of change in adequate sodium intake. Furthermore, the relationship between these factors and the stages of change in adequate sodium intake may differ between men and women. This study provides data for planning nutrition education tailored to the stages of change in eating adequate levels of sodium in young adults.

METHODS

Ethics statement

The study protocol was approved by the Institutional Review Board of Seoul Women's University (approval number: SWU IRB-2021A-26). Online informed consent describing the purpose and content of the study was obtained from each participant before they completed the online survey.

1. Study design

An online survey conducted between August 2021 and March 2022 was designed as a cross-sectional study. The study was performed in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) statement, available at https://www.strobe-statement.org/.

2. Study participants

The participants were undergraduate and graduate students from nine universities in Seoul, Korea. The investigator posted a notice describing the purpose and content of this study through channels such as websites for student communities at nine universities and bulle-

tin boards. Participants were recruited voluntarily, and those who agreed to participate completed an online informed consent form. The sample size was 341, based on the results of a previous study on population proportion [16], with a 95% confidence level, 5% margin of error, and a 10% dropout rate. We received 353 responses to the online survey, and data from 351 students (99.4%) were used for statistical analysis, excluding incomplete responses.

3. Measurement

1) Survey questionnaire

The questionnaire was made by reviewing literature on factors of sodium intake [6, 7, 9, 14, 15, 17, 18]. The questionnaire draft was revised several times considering content validity, and a pilot test was conducted with seven university students to validate it. The final questionnaire assessed general characteristics, stages of change in adequate sodium intake, outcome expectations regarding adequate sodium intake, self-efficacy, eating environment, and eating behaviors. General characteristics include age, sex, height, weight, grade, and residence type [7].

To examine the stages of change in adequate sodium intake, the item was developed based on the definition of the stages of change in the TTM [5]. Participants were asked to respond if they practiced adequate sodium intake and intended to do so if they did not. To help the participants understand adequate sodium intake, the amount of salt (limited to one teaspoon of salt per day when converting the sodium in food into salt) was suggested in the stages of change question, based on the World Health Organization's (WHO) recommendation of a daily sodium intake goal of 2,000 mg per day [19]. Participants were categorized into the precontemplation stage if they did not practice adequate sodium intake (not limited to one teaspoon of salt per day) and did not intend to do so in the future. The contemplation and preparation stages were defined as not practicing adequate sodium intake but having the intention to do so within the next six months or the next month, respectively. The action stage was defined as practicing adequate sodium intake and have been doing so for less than six months, and the maintenance stage was defined as practicing adequate sodium intake for more than six months.

Outcome expectations regarding adequate sodium intake were constructed based on the literature [6, 7, 15]. Two subscales, the advantages (six items) and disadvantages of eating adequate sodium (eight items), were obtained through factor analysis. Cronbach's α was 0.80 (total score of outcome expectations), 0.83 (advantages of eating adequate sodium), and 0.79 (disadvantages of eating adequate sodium). Self-efficacy consists of 13 items based on the literature [7, 14, 20]. Factor analysis revealed two subscales: self-efficacy for healthy eating behaviors (seven items) and sodium intake control (six items). Cronbach's α was 0.85 (total score of self-efficacy), 0.88 (self-efficacy for healthy eating behaviors), and 0.75 (self-efficacy for sodium intake control).

The eating environment comprised eight items [20], and factor analysis revealed two factors: social environment (four items) and physical environment (four items). Cronbach's α was 0.66 (total eating environment), 0.79 (social environment), and 0.45 (physical environment). Eating behaviors included twenty-five items [15, 17, 18, 20, 21] and were composed of three subscales: general eating behaviors (nine items), behaviors related to sodium intake (13 items), and behaviors related to sodium check (three items). Cronbach's α was 0.70 (total score of eating behaviors), 0.79 (general eating behaviors), 0.76 (behaviors related to sodium intake), and 0.72 (behaviors related to sodium check).

2) Measurement and scoring of items

Each item was measured using 5-point scales ranging from 'strongly disagree' to 'strongly agree' (outcome expectations, eating environment) or 'very difficult' to 'very easy' (self-efficacy). To measure the eating environment, a response category was provided if each item did not apply to the participants. Item of eating behaviors was measured using 4-point scales from '0–1 days/week' to '6–7 days/week' (general eating behaviors) or 'strongly disagree' to 'strongly agree' (behaviors related to sodium intake, and sodium check).

The total score or subscale score of the variables was the summed score of each item, while reverse scoring the negative items. A higher total or subscale score indicates that participants have more positive outcome

https://doi.org/10.5720/kjcn.2024.00010

expectations, higher self-efficacy, greater influence from the eating environment, and better eating behaviors. In contrast, a higher score on the disadvantages of eating adequate sodium indicated that the participants agreed more on the disadvantages. A higher score for behaviors related to sodium intake also suggests that participants practice behaviors that increase sodium intake.

4. Statistical analysis

Statistical analyses were performed using the IBM SPSS Statistics (version 24.0; IBM Co.). According to the responses on the stages of change in adequate sodium intake, the participants were classified into the pre-action stage (precontemplation, contemplation, and preparation stage) and the action stage (action and maintenance stage).

To investigate the differences in variables by the stages of change group, *t*-test, χ^2-test, and analysis of covariance (ANCOVA) were conducted. According to the analysis of general characteristics by the stages of change group, weight was used as a covariate in the ANCOVA to examine the relationship of variables with the stages of the change group. Factor analysis was conducted to obtain the subscales of the variables. To investigate the association of variables with the stages of change in adequate sodium intake according to sex, Spearman's correlation analysis between variables and the five stages of change was performed. The statistical significance level was set at $P < 0.05$.

RESULTS

1. General characteristics of participants

With respect to the stages of change in adequate sodium intake, 77.2% of the participants were in the pre-action stage and 22.8% were in the action stage. The mean age of participants was 23.6 years and 58.1% were women (Table 1). There were no significant differences in age or sex according to the stages of change. The weight and body mass index of the action stage in women were significantly lower than those in the pre-action stage ($P < 0.01$, $P < 0.05$, respectively). Approximately 27.6% of the participants were enrolled in the College of Social Science, followed by the College of Natural Science (25.4%) and the College of Humanities (22.2%). Approximately 29.6% of the participants were seniors and 21.1% were graduate students. Sixty-three percent of the participants lived with family members, whereas 37% lived in dormitory rooms or boarding houses. College attendance, grade, and residence type did not differ significantly according to the stages of change group. The distribution of the stages of change according to sex was not significantly different (Table 2).

2. Outcome expectations by the stages of change in adequate sodium intake

The total score for outcome expectations regarding adequate sodium intake (possible score: 14–70) was 43.6 (62.3/100, Table 3). The total score was higher in the action stage than that in the pre-action stage ($P < 0.001$), suggesting more favorable expectations of eating adequate sodium in this group. Participants in the action stage agreed less with the disadvantages of eating sodium adequately than those in the pre-action stage ($P < 0.001$). More specifically, participants in the action stage perceived fewer disadvantages of eating adequate sodium than those in the pre-actin stage, such as 'making me eat less of my favorite foods' ($P < 0.001$), 'foods and snacks are not delicious' ($P < 0.001$), 'difficult to reduce sodium alone when I eat with family members or friends' ($P < 0.01$), 'limitations in choosing processed foods' ($P < 0.05$), and 'difficult to choose a menu when I eat out' ($P < 0.05$). None of the six items regarding the advantages of eating sodium differed significantly according to the stages of change group.

3. Self-efficacy by the stages of change in adequate sodium intake

The total self-efficacy score (possible score: 13–65) was 43.0 (66.2/100). Participants in the action stage scored significantly higher on total self-efficacy ($P < 0.001$), as well as on the subscales of self-efficacy for healthy eating behaviors ($P < 0.001$) and sodium intake control ($P < 0.01$, Table 4).

Ten of the self-efficacy items differed significantly according to the stages of change group. Those in the action stage perceived more self-efficacy in 'choosing natural foods rather than instant foods or convenience foods' ($P < 0.001$), 'changing eating habits to reduce sodium intake step by step' ($P < 0.001$), 'cooking foods

Table 1. General characteristics of participants by stages of change in adequate sodium intake

Variable	Stages of change in adequate sodium intake			χ^2 or t[1)]
	Total (n = 351)	Pre-action stage (n = 271)	Action stage (n = 80)	
Age (year)	23.6 ± 3.7	23.6 ± 3.5	23.3 ± 4.3	0.5
Sex				
Men	147 (41.9)	117 (43.2)	30 (37.5)	0.8
Women	204 (58.1)	154 (56.8)	50 (62.5)	
Height (cm)	167.3 ± 8.8	167.6 ± 8.9	166.5 ± 8.4	0.9
Men	176.1 ± 4.4	176.1 ± 4.6	175.7 ± 3.5	0.4
Women	161.3 ± 5.2	161.1 ± 5.3	161.0 ± 4.8	0.2
Weight (kg)	62.0 ± 12.1	62.7 ± 12.0	59.4 ± 12.4	2.1*
Men	72.4 ± 8.7	72.4 ± 8.4	71.9 ± 9.7	0.2
Women	54.5 ± 8.2	55.3 ± 8.5	51.9 ± 6.4	2.6**
Body mass index (kg/m^2)	21.9 ± 2.9	22.1 ± 2.8	21.2 ± 3.1	2.4*
Men	23.3 ± 2.7	23.3 ± 2.5	23.3 ± 3.3	0.3
Women	21.0 ± 2.7	21.3 ± 2.8	20.0 ± 2.3	2.8*
Attending college				
Humanities	78 (22.2)	64 (23.6)	14 (17.5)	8.3
Social science	97 (27.6)	74 (27.3)	23 (28.8)	
Natural science	89 (25.4)	67 (24.7)	22 (27.5)	
Business/information technology	35 (10.0)	28 (10.3)	7 (8.8)	
Art & design	12 (3.4)	12 (4.4)	0 (0.0)	
Others	40 (11.4)	26 (9.6)	14 (17.5)	
Grade				
Freshmen	48 (13.7)	37 (13.7)	11 (13.8)	1.4
Sophomores	66 (18.8)	51 (18.8)	15 (18.8)	
Juniors	59 (16.8)	43 (15.9)	16 (20.0)	
Seniors	104 (29.6)	84 (31.0)	20 (25.0)	
Graduate students	74 (21.1)	56 (20.7)	18 (22.5)	
Residence type				
Living with family members	221 (63.0)	171 (63.1)	50 (62.5)	4.0
Dormitory rooms	36 (10.3)	32 (11.8)	4 (5.0)	
Boarding house	94 (26.7)	68 (25.1)	26 (32.5)	

Mean ± SD or n (%).
[1)] χ^2 value or *t* value was determined using a χ^2-test or *t*-test.
*P < 0.05, **P < 0.01.

with low sodium' (P < 0.01), 'finding information and practicing methods for reducing sodium intake' (P < 0.01), 'using less seasoning on the table' (P < 0.01), 'checking nutrition labeling and choosing low-sodium foods' (P < 0.01), 'choosing snacks with less sodium or fruits instead of salty snacks' (P < 0.01), and 'choosing a low sodium menu when I eat out' (P < 0.05). In addition, self-efficacy of 'having meals composed of diverse foods regularly' (P < 0.01), and 'eating vegetables when I have meals' (P < 0.01) were significantly higher in the action stage than those in the pre-action stage.

Table 2. Distribution of the stages of change in adequate sodium intake by sex

Variable	Sex	
	Men (n = 147)	Women (n = 204)
Stages of change in adequate sodium intake		
Precontemplation	46 (31.3)	71 (34.8)
Contemplation	51 (34.7)	53 (26.0)
Preparation	20 (13.6)	30 (14.7)
Action	9 (6.1)	18 (8.8)
Maintenance	21 (14.3)	32 (15.7)
χ^2[1)]	3.4	

n (%).
[1)] χ^2 value was determined using a χ^2-test.

https://doi.org/10.5720/kjcn.2024.00010

Table 3. Outcome expectations of participants by stages of change in adequate sodium intake

Variable	Stages of change in adequate sodium intake			F[1]
	Total (n = 351)	Pre-action stage (n = 271)	Action stage (n = 80)	
Advantages of eating adequate sodium				
1. It will help me keep blood pressure normal.[2]	3.9 ± 0.8	3.9 ± 0.8	4.0 ± 0.6	0.6
2. It will help me control body weight.	3.8 ± 0.8	3.8 ± 0.8	3.9 ± 0.7	0.1
3. It will prevent chronic diseases.	4.0 ± 0.7	4.0 ± 0.7	4.0 ± 0.7	0.4
4. It will help me to have a nutritious meal.	3.9 ± 0.7	3.9 ± 0.8	3.9 ± 0.7	0.2
5. It will be good for my skin.	3.8 ± 0.8	3.8 ± 0.8	3.9 ± 0.8	0.4
6. It will help to remove swelling.	4.2 ± 0.8	4.2 ± 0.8	4.2 ± 0.8	0.3
Disadvantages of eating adequate sodium				
7. It will be difficult to choose a menu when I eat out.	3.9 ± 0.9	4.0 ± 0.9	3.7 ± 1.0	5.0*
8. The foods and snacks are not delicious.	3.2 ± 1.1	3.3 ± 1.1	2.8 ± 0.9	19.2***
9. It will make me spend more time on cooking foods than using meal kit.	3.4 ± 1.1	3.4 ± 1.1	3.2 ± 1.0	1.7
10. It is difficult for me to cook.	2.9 ± 1.1	3.0 ± 1.1	2.7 ± 0.9	3.5
11. It will make me pay more money on the meal or snack.	3.0 ± 1.1	3.0 ± 1.1	3.0 ± 1.1	0.0
12. It is difficult to reduce sodium alone when I eat with family members or friends.	3.9 ± 1.0	4.0 ± 0.9	3.6 ± 1.0	7.6**
13. It will make me eat less of my favorite food.	3.6 ± 0.9	3.7 ± 0.8	3.2 ± 1.1	20.2***
14. There are limitations in choosing processed foods.	4.1 ± 0.8	4.2 ± 0.8	3.9 ± 0.9	5.7*
Advantages of eating adequate sodium[3]	24.0 ± 3.6	23.9 ± 3.7	24.1 ± 3.0	0.0
Disadvantages of eating adequate sodium[4]	28.3 ± 5.2	28.9 ± 5.1	26.4 ± 5.1	13.8***
Total score[5]	43.6 ± 5.6	43.0 ± 5.3	45.7 ± 6.0	13.0***

Mean ± SD.
[1]F value using analysis of covariance (ANCOVA) with covariate of weight.
[2]Each item was measured using 5-point Likert scales (1: strongly disagree, 5: strongly agree).
[3]Score of six items (1–6), possible score: 6–30. Higher scores indicated greater agreement with the advantages of eating adequate sodium.
[4]Score of eight items (7–14), possible score: 8–40. Higher scores indicated greater agreement with the disadvantages of eating adequate sodium.
[5]Total score of 14 items, possible score: 14–70. To calculate the total score, the disadvantages of eating adequate sodium (7–14) were scored inversely.
*P < 0.05, **P < 0.01, ***P < 0.001.

4. Eating environment by the stages of change in adequate sodium intake

The total score of the eating environment (possible score: 0–40) was 22.9 (57.3/100), and there was no significant difference between the stages of change group (Table 5). The subscale-level analysis revealed that the physical environment score was higher in the action stage (P < 0.05), while the social environment score was higher in the pre-action stage (P < 0.01). This indicates that participants in the action stage received more support from the physical environment to ensure adequate sodium intake. More specifically, participants in the action stage scored higher on the home as the environment for adequate sodium intake (P < 0.01), while participants in the pre-action stage scored higher on the support from 'professionals' (P < 0.01), and 'friends' (P < 0.01) for adequate sodium intake than the counterparts.

5. Eating behaviors by the stages of change in adequate sodium intake

The total score for eating behaviors (possible score: 25–100) was 61.2 (not presented in Table 6). Participants in the action stage scored significantly higher on eating behaviors, suggesting better eating behaviors than those in the pre-action stage (P < 0.001, Table 6). Subscale-level analysis showed that those in the action stage also scored significantly higher on general eating behaviors (P < 0.001) and behaviors related to checking sodium intake (P < 0.001), whereas they scored significantly lower on behaviors that increased sodium intake (P <

Table 4. Self-efficacy of participants by stages of change in adequate sodium intake

Variable	Stages of change in adequate sodium intake			F[1]
	Total (n = 351)	Pre-action stage (n = 271)	Action stage (n = 80)	
Self-efficacy for healthy eating behaviors				
1. I can have meals composed of diverse foods regularly.[2]	3.0 ± 1.0	2.9 ± 1.0	3.4 ± 1.0	10.0**
2. I can eat vegetables when I have meals.	3.5 ± 1.0	3.5 ± 1.0	3.8 ± 0.9	7.7**
3. I can check nutrition labeling and choose low-sodium foods when I purchase processed foods.	3.1 ± 1.0	3.0 ± 1.0	3.4 ± 1.1	8.0**
4. I can choose natural foods rather than instant foods or convenience foods.	3.1 ± 1.0	2.9 ± 1.0	3.5 ± 1.0	18.5***
5. I can find information and practice methods for reducing sodium intake.	3.0 ± 1.0	2.9 ± 1.0	3.4 ± 1.0	10.2**
6. I can cook foods with low sodium.	3.1 ± 1.0	3.0 ± 1.0	3.5 ± 0.9	12.1**
7. I can change my eating habits to reduce sodium intake step by step.	3.3 ± 0.9	3.2 ± 0.9	3.7 ± 0.7	14.9***
Self-efficacy for sodium intake control				
8. I can eat adequate amounts of meals.	3.4 ± 1.0	3.3 ± 1.0	3.6 ± 1.0	1.4
9. I can eat less when I have the soup or stew.	3.7 ± 1.0	3.7 ± 1.0	3.8 ± 1.0	0.4
10. I can use less seasoning (salt, soy sauce, etc.) on the table when I eat out or have meals.	3.5 ± 1.0	3.4 ± 1.0	3.8 ± 0.8	8.9**
11. I can choose a low sodium menu when I eat out.	3.0 ± 0.9	2.9 ± 0.9	3.2 ± 1.0	6.1*
12. I can put less seasoning when I use processed foods or instant foods (ramen, udon, etc.).	3.1 ± 1.1	3.0 ± 1.1	3.3 ± 1.1	3.0
13. I can choose snacks with less sodium or fruits instead of salty snacks (chips, salty snacks).	3.5 ± 1.0	3.5 ± 1.0	3.8 ± 0.8	7.8**
Self-efficacy for healthy eating behaviors[3]	22.5 ± 4.9	21.8 ± 4.8	24.8 ± 4.5	24.9***
Self-efficacy for sodium intake control[4]	20.5 ± 4.2	20.1 ± 2.4	21.8 ± 3.9	8.8**
Total score[5]	43.0 ± 8.2	41.9 ± 8.1	46.7 ± 7.4	20.8***

Mean ± SD.
[1]F value by ANCOVA with covariate of weight.
[2]Each item was measured on a 5-point Likert scale (1: very difficult, 5: very easy). Higher scores indicated higher self-efficacy.
[3]Score of seven items (1–7), possible score: 7–35. Higher scores indicated higher self-efficacy for healthy eating behaviors.
[4]Score of six items (8–13), possible score: 6–30. Higher scores indicated higher self-efficacy for sodium intake control.
[5]Total score of 13 items, possible score: 13–65.
*P < 0.05, **P < 0.01, ***P < 0.001.

0.001) compared to those in the pre-action stage.

Fourteen of twenty-five items were significantly different according to the stages of change. Among the general eating behaviors, percentages of those having eating behaviors more frequently, including 'eating 1–2 vegetables or vegetable side dishes at each meal' (P < 0.01), 'having 1–2 protein foods at each meal' (P < 0.05), and 'having breakfast' (P < 0.05), was significantly higher in the action stage than the pre-action stage. Participants in the action stage also performed behaviors more likely, such as 'using low-sodium foods' (P < 0.001) and 'choosing bland foods at restaurants' (P < 0.05). Participants in the action stage than the pre-action stage performed behaviors related to sodium intake less likely, such as 'eating hamburger, pizza or fried chicken' (P < 0.001), 'eating out or using delivery foods' (P < 0.001), 'eating instant foods' (P < 0.001), 'eating processed foods' (P < 0.01), 'eating all the liquid of soup, jjigae or noodles' (P < 0.01), and 'adding salt or soy sauce when the food or soup is bland' (P < 0.05).

6. Relationship between the factors and the stages of change in adequate sodium intake

The correlation of factors at the total score level with the five stages of change in adequate sodium intake by sex are presented in Table 7. In men, the stages of change showed a significant positive correlation with eating behaviors (ρ = 0.273, P < 0.01), self-efficacy (ρ = 0.210, P

https://doi.org/10.5720/kjcn.2024.00010

Table 5. Eating environment of participants by stages of change in adequate sodium intake

Variable	Stages of change in adequate sodium intake			F[1)]
	Total (n = 351)	Pre-action stage (n = 271)	Action stage (n = 80)	
Social environment				
1. My parents think I should not eat salty foods.[2)]	3.4 ± 1.3	3.5 ± 1.2	3.2 ± 1.4	1.9
2. My siblings think I should not eat salty foods.	2.5 ± 1.4	2.6 ± 1.4	2.3 ± 1.3	1.2
3. Friends think I should not eat salty foods.	2.4 ± 1.2	2.5 ± 1.2	2.0 ± 1.2	9.2**
4. Professionals (doctors, dietitians, etc.) think I should not eat salty foods.	2.9 ± 1.5	3.0 ± 1.5	2.3 ± 1.6	11.1**
Physical environment				
5. Home is the environment that I can have meals or snacks that are not salty.	3.6 ± 1.0	3.5 ± 1.0	3.9 ± 1.0	8.2**
6. School is the environment that I can have meals or snacks that are not salty.	2.8 ± 1.1	2.8 ± 1.1	3.0 ± 1.1	2.1
7. Eating out is the environment that I can have meals or snacks that are not salty.	2.2 ± 1.0	2.1 ± 1.0	2.3 ± 0.9	2.3
8. I encountered campaigns or educations on adequate sodium intake at schools.	2.8 ± 1.3	2.8 ± 1.3	2.7 ± 1.2	0.1
Social environment[3)]	11.3 ± 4.4	11.7 ± 4.2	9.9 ± 4.7	8.0**
Physical environment[4)]	11.5 ± 2.8	11.4 ± 2.8	12.1 ± 2.6	4.2*
Total score[5)]	22.9 ± 5.5	23.1 ± 5.6	22.0 ± 5.2	1.4

Mean ± SD.
[1)]F value by ANCOVA with covariate of weight.
[2)]Each item is measured by 5-point Likert scale (1: strongly disagree, 5: strongly agree). There was also a category of 'do not apply' (0).
[3)]Score of four items (1–4), possible score: 0–20. Higher scores indicated a greater influence of the social environment.
[4)]Score of four items (5–8), possible score: 0–20. Higher scores indicated greater support from the physical environment.
[5)]Total score of 8 items, possible score: 0–40.
*P < 0.05, **P < 0.01.

< 0.05), and outcome expectations (ρ = 0.166, P < 0.05), although the correlation coefficient was not high. Similarly, the stages of change in women were more positively correlated with self-efficacy (ρ = 0.347, P < 0.01), and eating behaviors (ρ = 0.343, P < 0.01) than outcome expectations (ρ = 0.229, P < 0.01).

The correlations of the factors at the subscale level with the five stages of change are shown in Table 8. In men, the stages of change in adequate sodium intake were significantly associated with four of nine subscales, showing a relatively high correlation with the behaviors related to sodium check (ρ = 0.454, P < 0.01), followed by self-efficacy for healthy eating behaviors (ρ = 0.247, P < 0.01). As in men, the stages of change in women were significantly correlated with the behaviors related to sodium check (ρ = 0.364, P < 0.01), and self-efficacy for healthy eating behaviors (ρ = 0.380, P < 0.01). Furthermore, the stages of change in women were also positively correlated with general eating behaviors (ρ = 0.270, P < 0.01) and physical environment (ρ = 0.237, P < 0.01), and negatively correlated with the disadvantages of eating adequate sodium (ρ = –0.286, P < 0.01) and behaviors related to sodium intake (ρ = –0.239, P < 0.01).

DISCUSSION

This study examined whether there were differences in outcome expectations, self-efficacy, eating environment, and eating behaviors according to the stages of change in adequate sodium intake. In this study, a high proportion of participants (77.2%) were classified in the pre-action stage. We attempted to measure the stages of change as accurately as possible by following the measurement of the stages of change suggested in the TTM and by suggesting an adequate level of sodium intake according to the WHO guidelines [5, 19]. Similar to our study, Tamaki *et al.* [22] reported that a high percentage of participants (84.8%) were assigned to the pre-action stage (precontemplation to preparation stages) in the stages of change to reduce salt intake in a study with a

Table 6. Eating behaviors of participants by stages of change in adequate sodium intake

Variable	Stages of change in adequate sodium intake								χ^2 or F[1]
	Pre-action stage (n = 271)				Action stage (n = 80)				
	0–1 days/week	2–3 days/week	4–5 days/week	6–7 days/week	0–1 days/week	2–3 days/week	4–5 days/week	6–7 days/week	
General eating behaviors									
1. Eat a variety of foods at meals.[2]	38 (14.0)	118 (43.5)	81 (29.9)	34 (12.5)	8 (10.0)	30 (37.5)	25 (31.1)	17 (21.3)	4.5
2. Eat adequate amounts of foods.	10 (3.7)	74 (27.3)	108 (39.9)	79 (29.2)	4 (5.0)	12 (15.0)	30 (37.5)	34 (42.5)	7.8
3. Eat meals regularly.	38 (14.0)	74 (27.3)	107 (39.5)	52 (19.2)	6 (7.5)	18 (22.5)	33 (41.3)	23 (28.8)	5.3
4. Have breakfast.	136 (50.2)	58 (21.4)	45 (16.6)	32 (11.8)	29 (36.3)	15 (18.8)	19 (23.8)	17 (21.3)	8.4*
5. Eat grain foods 3 times a day.	57 (21.0)	97 (35.8)	71 (26.2)	46 (17.0)	20 (25.0)	26 (32.5)	22 (27.5)	12 (15.0)	0.8
6. Eat 1–2 protein foods at each meal.	29 (10.7)	105 (38.7)	84 (31.0)	53 (19.6)	2 (2.5)	23 (28.8)	36 (45.0)	19 (23.8)	10.4*
7. Eat 1–2 vegetables/vegetable side dishes at each meal.	55 (20.3)	114 (42.1)	72 (26.6)	30 (11.1)	15 (18.8)	18 (22.5)	29 (36.3)	18 (22.5)	14.2**
8. Eat fruit or drink fruit juice 1–2 times a day.	97 (35.8)	106 (39.1)	49 (18.1)	19 (7.0)	24 (30.0)	27 (33.8)	17 (21.3)	12 (15.0)	5.8
9. Eat dairy products more than once a day.	85 (31.4)	100 (36.9)	60 (22.1)	26 (9.6)	16 (20.0)	31 (38.7)	20 (25.0)	13 (16.3)	5.5
Variable	Strongly disagree	Disagree	Agree	Strongly agree	Strongly disagree	Disagree	Agree	Strongly agree	χ^2 or F[1]
Behaviors related to sodium intake									
10. I often eat dried fish or salted fish.[3]	72 (26.6)	120 (44.3)	71 (26.2)	8 (3.0)	25 (31.3)	32 (40.0)	22 (27.5)	1 (1.3)	1.4
11. I often eat processed foods such as ham, sausage and canned foods.	26 (9.6)	98 (36.2)	119 (43.9)	28 (10.3)	19 (23.8)	32 (40.0)	22 (27.5)	7 (8.8)	14.1**
12. I often eat instant foods such as ramen and retort foods.	26 (9.6)	56 (20.7)	128 (47.2)	61 (22.5)	19 (23.8)	27 (33.8)	29 (36.3)	5 (6.3)	24.4***
13. I often eat hamburger, pizza or fried chicken.	32 (11.8)	67 (24.7)	135 (49.8)	37 (13.7)	22 (27.5)	35 (43.8)	18 (22.5)	5 (6.3)	30.9***
14. I add salt or soy sauce when the food or soup is bland.	58 (21.4)	85 (31.4)	98 (36.2)	30 (11.1)	27 (33.8)	31 (38.8)	19 (23.8)	3 (3.8)	11.2*
15. I mostly eat all the liquid of soup, jjigae, or noodles.	56 (20.7)	94 (34.7)	81 (29.9)	40 (14.8)	30 (37.5)	21 (26.3)	25 (31.3)	4 (5.0)	13.2**
16. I frequently eat soup, jjigae, jeongol, and tang.	20 (7.4)	80 (29.5)	138 (50.9)	33 (12.2)	13 (16.3)	29 (36.3)	33 (41.3)	5 (6.3)	9.2*
17. I often eat out or use delivery foods (2–3 times a week).	31 (11.4)	51 (18.8)	136 (50.2)	53 (19.6)	20 (25.0)	31 (38.8)	23 (28.8)	6 (7.5)	29.9***
18. I eat lots of Kimchi.	45 (16.6)	93 (34.3)	100 (36.9)	33 (12.2)	10 (12.5)	26 (32.5)	34 (42.5)	10 (12.5)	1.2
19. I usually eat fried foods, pan-fried dishes, sliced raw fish with plenty of soy sauce or red pepper paste.	55 (20.3)	88 (32.5)	93 (34.3)	35 (12.9)	25 (31.3)	30 (37.5)	22 (27.5)	3 (3.8)	9.3*
20. I often eat foods stewed in soy sauce or stir-fry foods as a side dish.	21 (7.7)	83 (30.6)	146 (55.0)	18 (6.6)	10 (12.5)	31 (38.8)	34 (42.5)	5 (6.3)	4.6
21. I often use sauce when I eat.	49 (18.1)	104 (38.4)	93 (34.3)	25 (9.2)	26 (32.5)	30 (37.5)	19 (23.8)	5 (6.3)	8.8*
22. I often eat chips or crackers for snack.	52 (19.2)	109 (40.2)	83 (30.6)	27 (10.0)	24 (30.0)	33 (41.3)	20 (25.0)	3 (3.8)	6.8
Behaviors related to sodium check									
23. I often choose bland foods at restaurants.	43 (15.9)	143 (52.8)	72 (26.6)	13 (4.8)	9 (11.3)	31 (38.8)	36 (45.0)	4 (5.0)	10.1*
24. I check the sodium content when I purchase the processed foods.	133 (49.1)	83 (30.6)	44 (16.2)	11 (4.1)	36 (45.0)	19 (23.8)	17 (21.3)	8 (10.0)	6.1
25. I use low-sodium foods.	103 (38.0)	117 (43.2)	43 (15.9)	8 (3.0)	18 (22.5)	23 (28.8)	33 (41.3)	6 (7.5)	29.1***
General eating behaviors[4]	21.2 ± 4.9				23.4 ± 5.0				12.9***
Behaviors related to sodium intake[5]	32.4 ± 5.7				28.1 ± 6.5				29.9***
Behaviors related to sodium check[6]	5.7 ± 1.9				6.7 ± 2.1				16.0***
Total score[7]	59.6 ± 7.9				67.0 ± 10.7				43.4***

n (%) or Mean ± SD.

[1] χ^2 value using χ^2-test or F value using ANCOVA with covariate of weight.

[2] Items 1–9 were measured using a 4-point scale (1: 0–1 days/week, 4: 6–7 days/week).

[3] Items 10–25 were measured using a 4-point Likert scale (1: strongly disagree, 4: strongly agree).

[4] Score of nine items (1–9), possible score: 9–36. Higher scores indicated more desirable eating behaviors.

[5] Score of 13 items (10–22), possible score: 13–52. Higher scores indicated behaviors that increased sodium intake.

[6] Score of three items (23–25), possible score: 3–12. Higher scores indicated that a subject checks more sodium in foods.

[7] Total score of 25 items; possible score: 25–100. Thirteen items (10–22) were scored in reverse order.

*P < 0.05, **P < 0.01, ***P < 0.001.

https://doi.org/10.5720/kjcn.2024.00010

Table 7. Correlation of the total score of factors with the stages of change in adequate sodium intake by sex

Variable	Total score of factors			
	Outcome expectations[1]	Self-efficacy[2]	Eating environment[3]	Eating behaviors[4]
Stages of change[5]				
Men (n = 147)	0.166*[6]	0.210*	0.138	0.273**
Women (n = 204)	0.229**	0.347**	0.023	0.343**
Total (n = 351)	0.203**	0.292**	0.082	0.318**

[1]Possible scores: 14–70.
[2]Possible scores: 13–65.
[3]Possible score: 0–40.
[4]Possible score: 25–100.
[5]Measured on a 5-point scale from the pre-contemplation stage (1) to the maintenance stage (5).
[6]Spearman's correlation coefficient.
*P < 0.05, **P < 0.01.

Table 8. Correlation of the subscale score of factors with the stages of change in adequate sodium intake by sex

Variable	Subscale of factors								
	Advantages of eating adequate sodium[1]	Disadvantages of eating adequate sodium[2]	Self-efficacy for healthy eating behaviors[3]	Self-efficacy for sodium intake control[4]	Social environment[5]	Physical environment[6]	General eating behaviors[7]	Behaviors related to sodium intake[8]	Behaviors related to sodium check[9]
Stages of change[10]									
Men (n = 147)	−0.036[11]	−0.187*	0.247**	0.137	0.077	0.197*	0.156	−0.132	0.454**
Women (n = 204)	−0.050	−0.286**	0.380**	0.198**	−0.107	0.237**	0.270**	−0.239**	0.364**
Total (n = 351)	−0.049	−0.248**	0.328**	0.177**	−0.028	0.217**	0.222**	−0.199**	0.390**

[1]Possible score: 6–30.
[2]Possible scores: 8–40.
[3]Possible scores: 7–35.
[4]Possible scores: 6–30.
[5]Possible score: 0–20.
[6]Possible score: 0–20.
[7]Possible score: 9–36.
[8]Possible scores: 13–52.
[9]Possible score: 3–12.
[10]Measured on a 5-point scale from the pre-contemplation stage (1) to the maintenance stage (5).
[11]Spearman's correlation coefficient.
*P < 0.05, **P < 0.01.

large sample of Japanese adults. Ahn *et al.* [16] reported that 47.3% of restaurant staff belonged to the precontemplation or contemplation stage of reducing sodium intake when cooking, which was lower than that in our study (63.0%). This suggests that the differences in the distribution of the stages of change depend on the characteristics of the participants or the behaviors examined.

The overall outcome expectations in the action stage were more favorable than those in the pre-action stage (P < 0.001). This was mainly due to the difference in expectations regarding the disadvantages of eating adequate sodium, such as the distaste for foods with less sodium, giving up eating one's favorite foods, difficulty in reducing sodium alone while having meals with others, and restrictions in choosing processed foods or menus at restaurants. Consistent with this study, a previous study found that misconceptions and beliefs about the importance of salt taste were related to discretionary salt use (e.g., salt use at the table and in cooking) [23]. Based on the study results, nutrition education for those in the pre-action stage should aim to decrease negative expectations of eating adequate levels of sodium. This might be achieved through methods such as

persuading negative expectations (e.g., distaste), menu planning, cooking using natural ingredients or seasonings, and consequently decreasing the threshold for salty taste. Okube & Kimani [24] reported that patients with metabolic syndrome improved their beliefs about the disadvantages of adopting a healthy lifestyle after receiving health education, suggesting that education is effective in modifying negative beliefs. In our study, the participants in both groups felt similarly on the benefits of consuming an adequate levels of sodium. In contrast, a study with Korean consumers showed that a higher percentage of participants in the action or maintenance stage compared to the pre-action stage perceived the health benefits of reducing sodium intake (e.g., decreasing blood pressure, prevention of stroke, and heart disease) [15].

Self-efficacy is important in explaining the stages of change in adequate sodium intake. Consistent with our study, Ahn *et al*. [14] reported that self-efficacy for sodium reduction methods in cooking in the action stage was higher than that in the pre-action stage in foodservice workers at childcare centers. Another study reported that self-efficacy was higher in the maintenance stage of reduced sodium intake, followed by the action and pre-action stage [15]. These findings suggest that nutrition education should incorporate strategies to increase self-efficacy. This might be achieved by building skills such as cooking with less sodium, reading nutrition labels for choosing processed foods with low sodium, finding information and practicing methods to reduce sodium intake, and substituting low-sodium foods with high-sodium foods. Self-efficacy in reducing sodium intake might also be increased by encouraging desirable behaviors step-by-step.

In this study, participants in the action stage were less likely to engage in behaviors that increased sodium intake, such as eating processed or instant foods, eating out or using delivery foods, and eating all the liquids of soup or noodles. Conversely, those in the action stage were more likely to consume low-sodium foods, choose bland foods at restaurants, and engage in desirable behaviors more frequently. A study on college students also found that the high sodium intake group was more likely to engage in behaviors related to sodium intake [25]. Consistent with our study, Hwang *et al*. [26] reported that children and adolescents in the precontemplation or contemplation stage to eat blandly performed dietary behaviors related to high salt intake more frequently than those in the action or maintenance stage. Nutrition education should be developed to change specific eating behaviors related to sodium intake, as well as general eating behaviors. Modification of eating behaviors can be achieved through the process of monitoring eating behaviors, goal setting, substitution of behaviors, and shaping desirable eating behaviors.

It seems that the association of eating environment with the stages of change was weaker than the other variables examined in this study. However, the pre-action stage received more pressure from significant others to eat less salty foods than the action stage. The majority in the pre-action stage might not think about eating sodium adequately, resulting in more pressure from significant others for healthy eating behavior. In contrast, the physical environment of the action stage was more supportive of eating adequate levels of sodium. Similarly, the recognition of a supportive environment for reducing sodium intake and recognition of sodium labeling on processed foods or foods in restaurants were higher in the maintenance or action stage than those in the pre-action stage, suggesting the importance of a supportive environment in the stages of change to reduce sodium intake [15, 16]. Based on the findings of this study, it is necessary to make the physical environment more supportive of reducing sodium intake for those in the pre-action stage. This might be achieved by providing information regarding the sodium content of foods at schools or restaurants, providing low-sodium menus at home or restaurants, and serving sauce separately rather than providing seasoned foods.

Correlation analysis showed that the stages of change in eating adequate sodium were associated with the subscales of the variables, and there were some differences in the degree of correlation by sex. For both men and women, behaviors related to sodium check (e.g., checking the sodium content of processed foods, and using low-sodium foods) were quite important in the stages of change to eat adequate sodium, suggesting the necessity of emphasizing these behaviors in the nutrition education of university students or young adults. The relationship between cognition (i.e., disadvantages,

https://doi.org/10.5720/kjcn.2024.00010

subscales of self-efficacy) or environment and the stages of change in adequate sodium intake among men was not high. In contrast, the stages of change in women were related to the subscales of variables such as cognition, behavior, and physical environment to a certain degree. Similarly, a previous study reported differences in health beliefs or behaviors related to salt consumption according to sex; adult women were more aware of the benefits of reducing sodium intake and more likely to reduce the consumption of processed foods than men [27]. The study findings suggest that nutrition education should be developed by considering the characteristics of the participants (e.g., sex). Nutrition education for young adult women can be planned using multiple paths to highlight the disadvantages of eating adequate sodium, increase self-efficacy, change behaviors related to sodium checks or sodium intake, and provide a more supportive physical environment for adequate sodium intake. Nutrition education for men might need a relatively simpler strategy, including providing tips to try or practice eating sodium adequately (e.g., reading nutrition labels, and choosing low-sodium foods).

Limitations

This study had some limitations. In assessing the stages of change, we suggested an appropriate level of sodium consumption to help the participants understand adequate sodium intake. However, there were also limitations as to how accurately participants recognized the adequate level of sodium intake, considering that sodium intake is a somewhat complex behaviors compared with other dietary behaviors (e.g., consuming five servings of vegetables per day). The participants were students recruited from universities in Seoul, Korea; thus, the findings may not be generalizable to other groups of young adults. Furthermore, this study was a cross-sectional survey, and it was difficult to explain the causal relationships between the variables. Despite these limitations, this study suggested that factors, including outcome expectations, self-efficacy, eating behaviors, and eating environment, were significantly different according to the stages of change in adequate sodium intake.

Conclusion

This study provides information for developing nutrition education or counseling, customizing needs according to the stages of change in adequate sodium intake. Nutrition education should be planned to motivate young adults in the pre-action stage to consider changes in sodium intake adequately. It is necessary to improve the negative expectations of eating adequate sodium, employ methods to increase self-efficacy, and gradually engage in desirable eating behaviors. Furthermore, the physical environment of the pre-action stage must be changed to reduce sodium intake. For those in the action stage, methods to help maintain desirable eating behaviors should be employed. Nutrition education might also be planned considering the sex of young adults. For women, multiple paths might be useful, whereas a simple strategy (e.g., providing tips to try) might be employed for men.

CONFLICT OF INTEREST

There are no financial or other issues that might lead to conflict of interest.

FUNDING

This work was supported by a research grant from Seoul Women's University (2024-0271).

DATA AVAILABILITY

The participants of this study did not provide written consent for their data to be shared publicly. Due to the sensitive nature of the research, supporting data is not available.

ACKNOWLEDGMENTS

We are grateful to the subjects who participated in the survey.

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Korean J Community Nutr. 2024 Oct;29(5):396-405
https://doi.org/10.5720/kjcn.2024.00011
eISSN 2951-3146

KJCN
Korean Journal of Community Nutrition

Research Article

Associations between the symptoms of gastroesophageal reflux disease and dietary and lifestyle behavior among young Korean adults: a preliminary cross-sectional study

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Received: August 13, 2024
Revised: October 10, 2024
Accepted: October 10, 2024

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Objectives: Gastroesophageal reflux disease (GERD) is a clinical condition caused by esophageal tissue damage resulting from the reflux of stomach or duodenal contents. An increasing number of GERD cases have been reported recently; however, research on this population, especially young adults, is lacking. This study aimed to investigate the dietary and lifestyle factors associated with GERD symptoms in young Korean adults.
Methods: A total of 202 individuals (19–34 years old) living in Gwangju were surveyed using a questionnaire to examine their general characteristics, lifestyle, and dietary behaviors. GERD symptoms were investigated using the gastroesophageal reflux disease questionnaire (GerdQ). The participants were grouped into normal (GerdQ score ≤ 4) and caution (GerdQ score ≥ 5), and their characteristics were analyzed according to the group.
Results: The findings suggested 15 participants (7.4%) belonged to the GERD caution group. More non-office workers were in the caution group than in the normal group ($P < 0.05$). The participants' smoking, physical activity, sleep duration, and pillow height were not significantly different between the GERD phenotypes; however, the caution group consumed alcohol more frequently than the normal group ($P < 0.001$). The analyses of the participants' eating behaviors revealed that the frequency of overeating, late-night snacking and chocolate consumption was significantly higher in the caution group ($P < 0.001$).
Conclusion: Lifestyle and dietary behaviors were associated with GERD symptoms in young Korean adults. Further studies with larger cohorts are required to confirm these findings.

Keywords: eating; food intake; gastroesophageal reflux; Korean

INTRODUCTION

Gastroesophageal reflux disease (GERD) is defined as a set of symptoms associated with tissue damages in the esophagus caused by the reflux of the stomach or duodenal contents [1]. According to big data analyses of the Health Insurance Review and Assessment Service [2], the total number of cases of GERD (code: K21) increased by approximately 6.1% from 4.58 million in 2019 to 4.86 million

in 2021. Additionally, the number of patients in their 20s increased from 389,162 to 467,973, and those in their 30s rose from 532,964 to 574,936 during the same period, resulting in annual prevalence increase of approximately 20.3% and 7.8%, respectively from 2019 to 2021. The prevalence rates among individuals in their 40s–50s and those aged 60 and older were consistently higher, around 11% and 14%, respectively, compared to the 20s–30s group. While these higher rates remained stable, the prevalence in the younger group, in their 20s–30s, has shown a gradual upward trend [2]. Therefore, further studies on the strategies for GERD care and prevention in this young population are required.

GERD is mainly caused by abnormalities in the sphincter that tightens the stomach and esophagus to prevent the reflux of stomach contents into the esophagus; a decrease in pressure, an increase in stomach contents, and an increase in pressure inside the stomach and abdominal pressure are also known to be associated with the disease. Heartburn and acid reflux are typical symptoms of GERD, and some patients experience atypical abdominal pain, indigestion, nausea, bloating, and belching [3]. Treatment of GERD aims to relieve pain, reduce acid reflux, heal wounds, and prevent complications and recurrence. Therapeutic approaches were performed in two steps, lifestyle modification and medication, considering the patient's medical history and severity [4]. Proton pump inhibitors are the primary medication for GERD; however, some patients do not respond to treatment, and multiple therapeutic trials have been conducted. GERD easily recurs but can progress to ulcers, Barrett's esophagus, and further malignancy. Therefore, changes in lifestyle, dietary behavior, and medications are essential for the treatment and prevention of GERD [5].

Earlier studies suggested that several lifestyle habits, including cigarette smoking and alcohol consumption, lower the pressure on the esophageal sphincter. Alcohol consumption is associated with increased reflux symptoms and esophageal exposure to gastric acid [6]. The symptoms of GERD are also associated with tobacco use [7, 8]. Dietary behavior is significantly associated with GERD, including consumption of caffeinated drinks, carbonated soda, fat-rich foods, chocolate, and sour and savory foods [9]. Additionally, eating fast and overeating can lead to excessive secretion of stomach acid, which damages the esophageal mucosa, leading to GERD [10].

Unhealthy lifestyles and dietary habits related to GERD are evident in younger population. According to 2021 the National Health and Nutrition Examination Survey reports, approximately 64% of people in their 20s–30s had alcohol at least once a month, which was the highest in the entire age group [11]. Additionally, 20% of those young adults are currently smoking tobacco (including those who smoked five or more packs of cigarettes in their lifetime) and this ratio was the highest among the entire population [11]. The young population also had more fatty foods (e.g. ramen, fried chicken/strips), sweets, carbonated drinks, and coffee, which lower the pressure on the lower esophageal sphincter (LES), and further their dietary quality index scored lowest in the population [11, 12]. This dietary behavior could be one of the risk factors of GERD, yet majority of studies performed in the hospital based with a case-control study design [7, 13, 14]. Research regarding such young adults in their 20-30s and general population is limited.

Therefore, this study aimed to examine the association between GERD symptoms, lifestyle, and dietary behaviors in young Korean adults. This study analyzed young Koreans living in Gwangju Metropolitan City to ascertain 1) the prevalence of GERD cases using a questionnaire and 2) the differences in lifestyle, dietary behavior, and intake between GERD phenotypes. This study provides preliminary evidence for understanding lifestyle and dietary behaviors for the prevention and management of GERD in young Korean adults.

METHODS

Ethics statement

All participants were volunteered and were free to stop the study anytime. Informed consent was obtained from individual. This study was approved by the Institutional Review Board of Chonnan National University (IRB No: 1040198-221018-HR-124-02).

1. Study design

This study was designed as a preliminary cross-sectional study. The details of study was described according to

STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) statement, available at https://www.strobe-statement.org/.

2. Participants

The study included young adults aged 19–34 years living in Gwangju Metropolitan City, Korea. Overall, 250 individuals were recruited for the study. Among them, 202 who completed the questionnaire were included in the analysis. Due to the potential alteration in lifestyle and dietary behavior post-diagnosis, cases defined by medical doctors were excluded from the study. Due to a purpose of the study, a preliminary trial, this study was performed with a limited number of individuals.

3. Data collection of participants' general and lifestyle characteristics

Study participants' sex, age, marital status, living type, monthly income, occupation, and medical history of GERD were surveyed. Their height and weight were also investigated by self-report and used as body mass index (BMI; kg/m^2). Obesity class was defined using BMI, following the rules of the Korean Society of Obesity Study: Underweight (< 18.5 kg/m^2), Normal (18.5–22.9 kg/m^2), Overweight (23–24.9 kg/m^2), Obesity (≥ 25 kg/m^2) [15]. Other lifestyle factors including the use and quantity of tobacco and alcohol, sleep duration, and pillow height were also recorded. Physical activity was also investigated using the International Physical Activity Questionnaire and was presented as the metabolic equivalent of task (MET-h/week) [16, 17].

4. Data collection of dietary behavior and intake

A literature review did not reveal any existing survey specifically addressing eating behaviors related to GERD in the general Korean population. Therefore, dietary habits and intake information were collected using a modified version of a questionnaire from a previous Korean study [18]. The questionnaire was designed to examine the weekly frequency of the following types of foods: five food groups commonly consumed by Koreans and three unhealthy food groups: fatty foods, instant foods, and fast foods. Additionally, based on a literature review [6, 19], the consumption frequency of five additional types of foods known to worsen GERD was also investigated: chocolate, carbonated drinks, coffee, tea, and fruit juice. Lastly, dietary habits such as meal regularity, meal duration, meal frequency, overeating, eating out, snacking, and late-night meals were assessed. Participants selected from the following options: Meal regularity (per week: very irregular [≤ 1 day], irregular [2–3 days], regular [4–5 days], very regular [6–7 days]); meal duration (minutes: < 10, 10–20, 20–30, ≥ 30); meal frequency (per day: 1, 2, ≥ 3); overeating (per week: none, 1–2, 3–4, ≥ 5); eating out (excluding work meals, including delivered food: none, 1–3/month, 1–2/week, 3–4/week, 5–6/week, daily); snacking (between-meal snacks, per week: none, 1–2, 3–4, 5–6, daily); late-night meals (after-dinner snacks: none, 1–3/month, 1–2/week, > 3/week).

5. Data collection of GERD symptoms

To investigate the GERD symptoms, the Korean version of the gastroesophageal reflux disease questionnaire (GerdQ) was applied [20, 21]. GerdQ is the initial tool used to determine the severity of GERD symptoms in patients who have not previously been treated for upper gastrointestinal symptoms when they first visit a primary healthcare provider to guide diagnosis and treatment.

The GerdQ consists of four potential symptoms of GERD (heartburn, acid reflux, sleep disturbance, and additional medications without a doctor's prescription) and two additional symptoms (upper abdominal pain and nausea) associated with diseases other than GERD. If the participants had one or more of the following symptoms, they scored one for each (heartburn, acid reflux, sleep disturbance, or medications). However, as described above, upper abdominal pain and nausea could indicate issues other than GERD and were not considered. GerdQ scores ranged from 0 to 12, with higher scores indicating the severity of GERD. Participants were divided into two groups based on their scores. If the subject's GerdQ is ≤ 4, then belongs to the normal, otherwise caution group.

6. Statistical analyses

All statistical analyses were performed using IBM SPSS Statistics 25.0 (IBM Co.). The reliability of the questionnaire was tested using the Cronbach's alpha. The coefficient for lifestyle items was 0.95, that for the dietary

https://doi.org/10.5720/kjcn.2024.00011

behavior was 0.669, and for GERD symptoms was 0.801, which was all appropriate (α > 0.6). The general characteristics, lifestyle, and dietary habits of the participants were presented as frequencies and percentages. The Fisher's exact test was used to examine the differences in general characteristics according to the GerdQ score, and the Mann-Whitney *U*-test was used to analyze the differences in lifestyle, dietary habits, and food group intake. Statistical significance was set at $P < 0.05$.

RESULTS

1. GerdQ score and the general characteristics of the study participants

The GerdQ scores of all participants are presented in Table 1. The GerdQ scores of the study group ranged from 0 to 7. Among the study participants, 187 (92.6%) were in the normal group (GerdQ ≤ 4) and 15 (7.4%) were in the caution group (GerdQ ≥ 5). The prevalence of GERD in this study was comparable to that observed among Koreans in the same age group (20–30 years) [2]. No participants had a GerdQ of more than 8.

Table 2 presents the general characteristics of study

Table 1. Distribution of study participants according to GerdQ score

Classification	GerdQ score (median [interquartile range])	Min	Max	n (%)
Total	0 [0–2]	0	7	202 (100)
Normal	0 [0–3]	0	4	187 (92.6)
	0			105 (52.0)
	1			39 (19.2)
	2			25 (12.4)
	3			10 (5.0)
	4			8 (4.0)
Caution	6 [5–6]	5	7	15 (7.4)
	5			7 (3.4)
	6			5 (2.5)
	7			3 (1.5)

GerdQ, gastroesophageal reflux disease questionnaire. Min, minimum; Max, maximum.

Table 2. General characteristics of the study participants according to GerdQ score

Characteristic	Category	Total	GerdQ score group		x^2
			Normal (n = 187)	Caution (n = 15)	
Sex	Male	68 (33.7)	63 (33.7)	5 (33.3)	–0.028
	Female	134 (66.3)	124 (66.3)	10 (66.7)	
Age (year)	20–24	96 (47.5)	92 (49.2)	4 (26.7)	–1.317
	25–29	64 (31.7)	58 (31.0)	6 (40.0)	
	30–35	42 (20.8)	37 (19.8)	5 (33.3)	
Marital status	Married	24 (11.9)	20 (10.7)	4 (26.7)	–1.835
	Single	178 (88.1)	167 (89.3)	11 (73.3)	
Type of residence	Living with family	127 (62.9)	116 (62.0)	11 (73.3)	–0.869
	Living alone	75 (37.1)	71 (38.0)	4 (26.7)	
Monthly income (10,000 Korean won)	< 100	126 (62.4)	119 (63.6)	7 (46.7)	–1.251
	100–199	16 (7.9)	13 (7.0)	3 (20.0)	
	200–299	43 (21.3)	41 (21.9)	2 (13.3)	
	≥ 300	17 (8.4)	14 (7.5)	3 (20.0)	
Occupation	Office worker	146 (72.3)	139 (74.3)	7 (46.7)	–2.297*
	Non-office worker	56 (27.7)	48 (25.7)	8 (53.3)	
BMI	Underweight	24 (11.9)	22 (11.8)	2 (13.3)	–0.417
	Normal	113 (55.9)	106 (56.7)	7 (46.7)	
	Overweight	30 (14.9)	27 (14.4)	3 (20.0)	
	Obesity	35 (17.3)	32 (17.1)	3 (20.0)	

n (%).
Comparisons between normal and caution groups were made Fisher's exact tests.
BMI, body mass index; GerdQ, gastroesophageal reflux disease questionnaire.
*$P < 0.05$.

participants according to their GERD scores. The GERD phenotype was associated with the subject's type of occupation. The proportion of participants with non-office jobs was higher in the caution group (53.3%) than in the normal group (25.7%, $P < 0.05$). However, other background information, including sex, age, marital status, type of residence, household income, and obesity, were independent of the GERD phenotype.

2. Lifestyle factors related to GERD taking account of GerdQ score

The differences in lifestyle behaviors related to GERD are presented in Table 3, considering the GerdQ score group. A total of five investigated items, the frequency of alcohol drinking per week differed between two GerdQ groups. Individuals in the GerdQ caution group were more likely to drink alcohol weekly than those in the control group ($P < 0.05$). However, other lifestyle characteristics, such as the amount of alcohol and cigarettes consumed, physical activity, sleep duration, and pillow height, were not associated with the GerdQ score in this young Korean adult group.

3. Dietary behavior and consumption taking account of GerdQ score

Table 4 shows the dietary behaviors of the study participants according to GerdQ group. Seven dietary habits were investigated; among them, the frequency of overeating and late-night meals was significantly associated with the GerdQ group ($P < 0.001$). Individuals with higher GerdQ scores in the caution group reported overeating and late-night snacks more frequently than those with lower GerdQ scores in the normal group. However, there were no significant differences in the regularity of meals, frequency of meals, eating out, snacks, or mealtimes between the GerdQ groups.

Table 3. Lifestyle factors related to gastroesophageal reflux disease according to GerdQ score

Characteristic	Total (n = 202)	GerdQ score group		*U*
		Normal (n = 187)	Caution (n = 15)	
Frequency of drinking (per week)	1.5 [0–1.5]	1.5 [0–1.5]	1.5 [0–3.5]	–1.628***
Amount of alcohol (glass/day)	1.5 [0–5.5]	1.5 [0–5.5]	1.5 [0–3.5]	–0.036
Amount of smoking (cigarettes/day)	0 [0–0]	0.0 [0–0]	0.0 [0–0]	–1.290
Physical activity (MET-h/week)	9.6 [4.9–16.9]	9.6 [4.9–16.9]	10.3 [6.3–16.9]	–0.260
Sleep duration (h/day)	6.5 [6.0–7.5]	6.5 [6.0–7.5]	6.5 [6.0–6.5]	–1.481
Pillow height (cm)	7.0 [2.5–7.0]	7.0 [2.5–7.0]	7.0 [2.0–7.0]	–0.263

Median [interquartile range].
Comparisons between normal and caution groups were from Mann-Whitney *U*-tests.
GerdQ, gastroesophageal reflux disease questionnaire; MET, metabolic equivalent of task.
***$P < 0.001$.

Table 4. Dietary habits according to the GerdQ score group

Characteristic	Total (n = 202)	GerdQ score group		*U*
		Normal (n = 187)	Caution (n = 15)	
Frequency of meal (per day)	2.0 [2.0–3.0]	2.0 [2.0–3.0]	2.0 [2.0–3.0]	–0.941
Meal regularity (per week)	4.5 [2.5–4.5]	4.5 [2.5–4.5]	4.5 [2.5–4.5]	–0.770
Mealtimes (min)	15.0 [15.0–25.0]	15.0 [15.0–25.0]	15.0 [15.0–25.0]	–0.336
Frequency of overeating (per week)	1.5 [1.5–3.5]	1.5 [1.5–3.5]	3.5 [1.5–5.5]	–2.672***
Frequency of eating out (per week)	1.5 [0.5–3.5]	1.5 [0.5–3.5]	3.5 [1.5–3.5]	–1.277
Frequency of snack (per week)	7.0 [3.5–7.0]	7.0 [3.5–7.0]	7 [3.5–7.0]	–0.758
Frequency of late-night meals (per week)	0.5 [0.5–0.5]	0.5 [0.5–1.5]	5 [1.5–5.0]	–3.551***

Median [interquartile range].
Comparisons between normal and caution groups were from Mann-Whitney *U*-tests.
GerdQ, gastroesophageal reflux disease questionnaire; MET, metabolic equivalent of task.
***$P < 0.001$.

https://doi.org/10.5720/kjcn.2024.00011

The frequencies of weekly food group consumption are presented in Table 5. Thirteen types of foods were investigated. Among them, the frequency of chocolate and fast food intake differed between the GERD caution and normal groups; the caution group had chocolate and fast food every week more often (for both, $P < 0.001$). However, the frequency of consumption of the rest of the investigated food groups (grain, protein, fruits, vegetables, dairy foods, coffee, tea, fruit juice, carbonated drinks, fatty foods, and instant foods) did not differ between the GERD phenotypes.

DISCUSSION

Growing prevalence of GERD resulting from a Westernized diet and stress has been markedly evident in Koreans, especially in young adults in 20s–30s. This young population may be at a higher potential risk of GERD because it commonly consumes more fatty foods, snacks, soda, and caffeinated drinks, which lowers the pressure on the LES. In this study, a group of young Korean adults aged 19–34 living in Gwangju Metropolitan City were analyzed. Using the Korean version of the GerdQ, the risk groups for GERD were identified, and their lifestyle, dietary behavior, and intake were also examined. The findings suggest that the GerdQ caution group showed differences in job, alcohol consumption, dietary habits, and intake compared with the normal group.

Fifteen individuals were identified in the GerdQ caution group (7.4%) among the 202 participants, a prevalence similar to that of GERD in Koreans within the same age group [2]. Among the general characteristics of study participants, occupation type was associated with the GerdQ group. Those with severe GERD symptoms in the caution group had a higher proportion of non-office workers. In a study from UK, the risk of GERD was increased with manual work, compared to sedentary jobs [22]. In this study, jobs involved in physical labor were included in the job type of non-office work. In line with this, the current findings–higher GerdQ scores in individuals with non-office workers–are also similar to earlier findings from the UK. Furthermore, in the current study, non-office workers had a higher proportion of smokers, compared to office workers (12.5% vs. 8.9%). Although the current study did not confirm the association between the smoking and the risk of GERD, the habitual use of cigarette is a lifestyle risk factor that affect GERD symptoms [23]. Additionally, sex differences in the prevalence and risk of GERD are also well

Table 5. Frequency of intake of foods per week according to the GerdQ score group

Characteristic	Total	GerdQ score group		*U*
		Normal (n = 187)	Caution (n = 15)	
Grain	7.0 [7.0–7.0]	7.0 [7.0–7.0]	7.0 [7.0–7.0]	–1.112
Protein	7.0 [3.5–7.0]	7.0 [3.5–7.0]	7.0 [1.5–7.0]	–0.826
Fruits	3.5 [1.5–7.0]	3.5 [1.5–7.0]	3.5 [1.5–7.0]	–1.365
Vegetables	7.0 [3.5–7.0]	7.0 [3.5–7.0]	7.0 [1.5–7.0]	–0.444
Dairy foods	3.5 [1.5–7.0]	3.5 [1.5–7.0]	3.5 [3.5–7.0]	–1.128
Chocolate	1.5 [0–3.5]	1.5 [0–3.5]	3.5 [1.5–3.5]	–2.266***
Coffee	4.5 [1.5–7.0]	3.5 [1.5–7.0]	7.0 [3.5–7.0]	–1.765
Tea	1.5 [0–3.5]	1.5 [0–3.5]	1.5 [0–3.5]	–0.487
Fruit juice	0 [0–1.5]	0 [0–1.5]	0 [0–1.5]	–0.312
Carbonated drinks	1.5 [0–3.5]	1.5 [0–3.5]	1.5 [0–3.5]	–0.808
Fatty foods	1.5 [1.5–3.5]	1.5 [1.5–3.5]	3.5 [1.5–5.5]	–1.735
Instant foods	1.5 [1.5–3.5]	1.5 [1.5–3.5]	3.5 [1.5–5.5]	–1.442
Fast foods	1.5 [1.5–3.5]	1.5 [1.5–3.5]	3.5 [1.5–3.5]	–2.265***

Median [interquartile range].
Comparisons between normal and caution groups were from Mann-Whitney *U*-tests.
GerdQ, gastroesophageal reflux disease questionnaire; MET, metabolic equivalent of task.
***$P < 0.001$.

documented. Females, particularly those over 50, have a higher risk of GERD compared to males, likely due to hormonal changes [24]. In this study of young Korean adults, although more females were surveyed, no significant sex differences in GERD symptoms were observed. This may be related to the age of the study population, as the participants were primarily in their 20s and 30s. Lastly, studies have reported that psychological factors, including job satisfaction and stress, are also associated with GERD symptoms [25, 26]. Further studies considering these psychological characteristics are required to confirm the current findings.

Among the participants' general characteristics, their sex, age, marital status, residence type, household income, and degree of obesity were not associated with the GerdQ score. Inconclusive findings were evident regarding the role of these factors in the etiology of GERD; however, earlier studies have observed that obesity is associated with the risk of GERD. Excessive fat and body weight increase abdominal pressure, which may lead to GERD [27-29]. A large cohort study also suggested that the risk of GERD increases with a BMI of 3.5 kg/m^2 [30]. However, in the young Korean adult group, there was no clear association between BMI and GERD symptoms. Anthropometric measurements were not performed for this project, and information was only collected from self-reporting. This may lead to an unclear association between BMI and GerdQ score.

The frequency of alcohol consumption was associated with GerdQ score, along with other lifestyle factors, including the amount of alcohol and tobacco consumed, frequency of smoking, physical activity, sleep duration, and pillow height. Multiple studies have suggested that alcohol consumption is a risk factor for GERD as it weakens esophageal movement and pressure of LES [31]. A meta-analysis revealed that alcohol consumption is associated with GERD, and that the amount and frequency of alcohol consumption are decisive risk factors for GERD [32]. However, there are still discrepancies between these studies: Alcohol does not affect the occurrence of GERD [33], and, although the current study confirmed that frequency of alcohol consumption was associated with higher GerdQ scores, other alcohol-related behaviors did not differ between the two GerdQ score groups. Tobacco smoking is also associated with GERD. Smoking is speculated to prolong acid clearance time due to decreased salivary secretion and bicarbonate concentration, decreased pressure on the LES, and reflux symptoms due to the rapid increase in intra-abdominal pressure caused by coughing [34-37]. Several epidemiological studies have supported the risk effect of tobacco smoking on GERD pathogenesis [7, 8, 38, 39]. Furthermore, to reduce nocturnal acid reflux, maintaining the upper body position [40], and sleeping on the left side of the body [41, 42]. However, in this study, lifestyle behaviors, except for alcohol consumption, were independent of GERD. This may be due to the limited size and age of the study population (mostly in their 20s) and the relatively short exposure to such substances. Further studies with larger sample sizes and more in-depth analyses are required.

The frequencies of overeating and late-night eating were associated with the GerdQ score. Having a meal leads to stomach distension and triggers transient LES relaxation (TLESR) to emit air during the meal. A large meal can cause more stomach distension, resulting in more frequent TLESR and acid reflux [43, 44]. Most cases of GERD occurs within three hours of eating due to stomach distension [45], and a group of people who overeat experience more frequent acid reflux and esophageal exposure than those who have regular meals [46]. Although studies have reported inconclusive findings [47], it is well known that overeating, eating fast, irregular meal times, and late-night snacking are all negatively associated with the risk of GERD. Possible mechanisms of action for these eating behaviors in GERD have also been suggested. Overeating and eating quickly can damage the esophageal mucosa and delay gastric emptying, which can increase the risk of GERD and worsen its condition [48, 49]. Other studies have also reported that eating within three hours of going to bed is associated with an increased risk of GERD [50]. The current findings provide supportive evidence that overeating and late-night eating are associated with GERD severity. However, overeating and late-night eating were defined by each participant; further studies are needed to investigate this dietary behavior using a more accurate definition.

This study analyzed the dietary consumption of selected food groups known to be associated with GERD

https://doi.org/10.5720/kjcn.2024.00011

symptoms. The findings suggest that individuals in the GerdQ caution group consumed more chocolate and fast foods than those in the normal group. Fast foods contain a large amount of fat, which causes and worsens GERD by weakening the LES. Chocolate is also associated with weakening of the LES, leading to acid reflux [9]. This study confirmed the known dietary therapy that a reduction in the consumption of fast food and cholate could relieve GERD symptoms, and findings should be considered in the treatment practice.

Limitations

This study applied a comprehensive approach to understanding various lifestyle and dietary factors, especially in young Korean adults. The findings showed that lifestyle, dietary habits, and food intake were associated with GERD in young Koreans and could be considered disease interventions. However, the following issues may have been present in this study: First, this study employed a quantitative design using the questionnaire. This self-report document cannot provide detailed information to explain the underlying mechanisms and associated risk factors. Second, the study was performed on a group of young people living in a limited area of a large city. These study participants did not fully represent all young Korean adults. Further studies with larger cohorts from various regions and better-descriptive questionnaires are warranted.

Conclusion

This study investigated the lifestyle and dietary factors that influence GERD symptoms in young Koreans. The results showed that those at risk of GerdQ scores were more likely to have non-office occupations, frequent alcohol consumption, heavy and late-night eating, and frequent consumption of chocolate and fast food. These findings could be referred to in the understanding of GERD and the development of guidelines to prevent and improve GERD symptoms in young Korean adults.

CONFLICT OF INTEREST

There are no financial or other issues that might lead to conflict of interest.

FUNDING

None.

DATA AVAILABILITY

Research data is available upon a reasonable request to the corresponding author.

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Korean J Community Nutr. 2024 Oct;29(5):406-417
https://doi.org/10.5720/kjcn.2024.00012
eISSN 2951-3146

KJCN
Korean Journal of Community Nutrition

Research Article

제주지역 성인의 먹거리 보장에 따른 먹거리 구매 실태 및 정책 인지와 먹거리 환경 만족도: 2022년 제주 먹거리 실태조사 자료를 활용하여

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Food purchase patterns, food policy recognition, and food environment satisfaction among adults in Jeju, Korea, according to food security: a cross-sectional study

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Received: July 16, 2024
Revised: September 20, 2024
Accepted: October 14, 2024

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Objectives: Recently, food insecurity has been a major public health issue along with the food crisis caused by COVID-19, climate change, and the polarization of food supply due to socioeconomic disparities. Food insecurity is known to be related to the food choices and environment of the consumer. Therefore, this study aimed to evaluate the food security statuses of adults in Jeju and investigate their food purchase patterns, food policy recognition, and food environment satisfaction.

Methods: Based on data from the 2022 Jeju Food Survey, 346 adults aged ≥ 19 years in Jeju were classified into food security and insecurity groups (quantitatively and qualitatively) using the questionnaire. Food purchase patterns, including purchasing frequency, items, and reasons, were surveyed for local and eco-friendly foods. The recognition and necessity of several food policies and satisfaction with diet and food environment (availability, accessibility, affordability, accommodation, and acceptability) were measured using the Likert scale.

Results: Among the total participants, 47.4% were in the food insecurity group. The frequency of purchasing local and eco-friendly foods did not significantly differ by food security status. The insecurity group exhibited a higher recognition rate of basic rights to food (36.0%) than the security group (24.7%, $P = 0.023$). The recognition and necessity of specific food policies did not significantly differ by food security status, except for the policy of promoting food communities, for which the food security group exhibited higher recognition than the food insecurity group did ($P = 0.004$). The food insecurity group exhibited significantly lower scores regarding satisfaction toward diet and food environment factors ($P < 0.05$ for all).

Conclusion: Overall, the food security group reported higher satisfaction with their diet and food environment than the food insecurity group. Further in-depth studies to investigate the determinants of food insecurity and effective promotional strategies for food policies are needed.

Keywords: food security; nutrition policy; access to healthy foods; quality of life

INTRODUCTION

먹거리의 양적 문제와 더불어 질적 문제(미량 영양소 섭취 문제, 식품 안전성 등)가 제기되고 있는 상황에서 세계 인구의 4분의 1 이상의 인구가 영양가 있는 음식 공급에 문제가 있다고 추정되고 있다[1-3]. 과거에는 식품 소비를 주로 개인의 선택 문제로 보았으나 최근 복지·분배적 관점에서 먹거리 보장의 개념이 등장하면서 국민이 기본적인 삶을 유지할 수 있도록 국가가 국민의 기본적인 먹거리를 보장해 주어야 한다는 사회적 인식이 확산되고 있다[1, 4]. 특히 코로나19 발생 이후 먹거리 위기의식이 심화되면서 먹거리의 중요성에 대한 인식이 더욱 높아지고 있다[1].

이에 따라 우리나라는 서울을 비롯해 강원, 경기, 전라 등 전국적으로 먹거리 기본권 보장 조례를 제정하고 있으며, 2022년 제주에서도 「먹거리 기본권 보장 조례」를 제정하여 도민이 건강하고 안전한 먹거리를 안정적으로 확보할 수 있도록 지속가능한 먹거리 체계를 확립하고 도민의 먹거리 기본권(누구나 건강하고 안전한 먹거리를 안정적으로 확보할 수 있는 권리)을 보장하고자 하였다[5]. 구체적으로 도민은 먹거리와 관련된 정보를 쉽게 전달받을 권리가 있고, 건강한 먹거리 확보에 취약한 도민에 대한 먹거리 지원을 우선으로 하며 지역 먹거리가 우선 공급되도록 노력해야 한다고 명시하고 있다[5].

지역에서 생산되고 가공된 농산물을 의미하는 로컬푸드(local foods) [6]는 유통거리가 단축되어 신선하고 경제적이며, 지역 경제의 활성화를 가져올 수 있다[7]. 더 나아가 먹거리 공급의 불확실성을 줄일 수 있어 먹거리 보장과 안전에 기여할 수 있다[7, 8]. 또한, 농약이나 인공 비료 없이 재배되는 친환경 식품은 기존 농산물에 비해 생리활성물질의 함량이 높고 카드뮴과 합성 비료 같은 해로운 물질 함량이 낮아[9, 10] 건강하고 지속가능한 먹거리로 여겨진다. 그러므로 접근성이 높고 경제적, 환경적으로 지속가능한 먹거리 체계 확립을 위해 지역사회의 먹거리 보장 수준과 로컬푸드 및 친환경 식품 구매실태에 대한 기초자료 구축이 필요하다.

최근 지자체의 먹거리 기본권 선언은 지역 푸드플랜 수립과 연계되고 있다[11]. 지역 푸드플랜이란 지역단위에서 시민의 먹거리 안전성, 가격 안정성, 취약계층의 먹거리 접근성 등을 먹거리 공공성 차원에서 실현하고자 먹거리 관련 사업에 로컬푸드를 확대한 것이다[12]. 먹거리 공공성은 정책 제안 및 의사결정 과정에서 지역 시민의 참여를 강조하는데[12], 이것이 잘 실현되려면 지역사회 구성원의 먹거리 정책에 대한 인지도 제고와 필요도 조사 및 반영이 이루어져야 한다.

한편, 성인에서 먹거리가 보장되지 않는 것은 채소, 과일 및 유제품 섭취 부족과 더불어 비타민의 섭취 부족과 관련이 있고, 정신적 건강상태에도 영향을 주는 것으로 보고되었다[13, 14]. 먹거리 보장 수준이 낮을수록 지방과 나트륨, 당류 함량이 높은 가공식품을 섭취하는 비율이 높았다[15]. 전 세계 사망원인 1위인 심혈관질환의 위험요인으로 먹거리 미보장이 꼽힌 가운데[15] 먹거리 보장과 관련된 선행연구들은 주로 저소득층이나 취약 계층을 대상으로 실시되고 있다[14-16]. 그러나, 먹거리 보장에는 먹거리의 가용성, 접근성, 경제성 등 여러 측면이 포함되므로 일반 성인의 먹거리 보장 수준을 전반적으로 평가할 필요가 있으나 일반 성인의 먹거리 보장과 먹거리 환경에 대한 정보는 제한적인 실정이다[17]. 특히 제주도민의 식생활, 식품구매 실태 등에 대한 연구는 일부 요인에 국한되어 수행된 바 있지만[18-20], 먹거리 보장 수준이나 먹거리 환경 등에 대한 평가는 현재까지 이루어진 적이 없는 실정이다. 그러므로 본 연구는 제주지역 일부 성인의 먹거리 보장 정도를 파악하고 이에 따른 먹거리 구매 실태 및 정책 인지, 먹거리 환경 만족도를 평가하여 지역 특성을 고려한 푸드플랜 수립, 먹거리 체계 강화에 기여하고자 한다.

METHODS

Ethics statement

The 2022 Jeju Food Survey was approved by the Institutional Review Board of Jeju National University (approval number: JJNU-IRB-2022-038-001) and this study was exempted from the review by the Institutional Review Board of Jeju National University because of the secondary analysis (exemption number: JJNU -IRB- 2024-076). The informed written consent was obtained from each participant.

1. 연구설계

본 연구는 단면연구이자 설문조사연구로 STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) 보고지침 (https://www.strobe-statement.org/)을 참고하여 기술하였다.

2. 연구 대상 및 모집

본 연구는 제주도민의 먹거리 구매실태, 식생활 만족도, 먹거리 보장 등의 현황에 대한 체계적인 실태조사를 통해 먹거리 기본권 보장 및 제주 1차산업의 지속 성장을 위한 기초자료 마련에 기여하고자 실시된 2022년 제주 먹거리 실태조사[21] 자료를 사용했다. 연구 대상은 제주지역에 1년 이상 거주하고 있는 만 19세 이상 도민으로 2022년 7월부터 9월까지 대상자에게 자가기입식 설문조사를 수행하였고, 자가기입이 어려운 경우 조사원에 의한 면접조사가 실시됐다. 제주 먹거리 실태조사 설문조사지는 선행연구를 참조해 제주 지역의 실정에 맞게 수정 및 보완하여 개발됐다[22-25]. 조사의 목표 대상자 수는 350명이었으며, 2021년 제주특별자치도 주민등록인구통계[26]를 참고하여

행정구역(제주시 및 서귀포시 동/읍·면) 별 연령대 및 성별 인구 비율을 고려해 표본 수를 할당한 후 읍·면·동사무소, 마을회관, 지역 소재 일부 회사, 학교 등에 방문하여 연구 참여에 자발적으로 동의한 대상자들에게 연구 동의서를 바탕으로 연구 목적 및 방법 등에 대하여 설명한 후 모집했다. 본 연구의 대상자는 조사 총 참여자 350명 중 먹거리 보장 관련 문항이 작성되지 않은 4명을 제외한 346명으로 선정했다.

3. 먹거리 보장

먹거리 보장 수준을 파악하기 위해 서울시 먹거리 통계조사와 국민건강영양조사[22, 23]를 참조해 최근 1년 동안 식생활 상황에 대해 질문하였다. 보기 문항에서 "충분한 양과 다양한 종류의 식품(음식)을 먹을 수 있었다"고 응답한 경우 먹거리 보장 그룹으로 분류하였고, "충분한 양을 먹을 수 있었으나, 항상 다양한 종의 식품(음식)을 먹지 못했다"고 응답한 경우 먹거리 질적 미보장 그룹, "가끔 혹은 자주 먹을 것을 충분하게 못 먹었다"의 경우 먹거리 양적·질적 미보장 그룹으로 분류하였다. 질적 미보장 그룹과 양적·질적 미보장 그룹을 대상으로 각각 먹거리 미보장의 원인에 대해 질문하였고 응답 문항은 서울시 먹거리 통계조사[22]를 참조하여 "식품을 구매할 돈이 충분하지 않아서", "주변에 원하는 다양한 종류의 식품이 없어서" (질적 미보장), "식품을 구매하거나 조리할 시간이 충분히 없어서", "거동이 불편해서", "식료품점까지 거리가 멀거나 교통편이 불편해서" 등으로 구성하였다.

4. 지역/친환경 먹거리 구입 실태와 먹거리 정책 인지

먹거리 보장 수준과 지역 먹거리 및 친환경 먹거리 구입과의 관련성을 파악하기 위해 지역에서 생산된(제주산) 식재료의 구입 빈도, 구입한 식재료 종류, 구입한/구입하지 않은 이유, 구입 시 어려운 점과 로컬푸드 직매장 이용 여부와 이용 시 어려운 점을 조사하였다. 친환경 먹거리의 경우 구입 빈도, 구입한/구입하지 않은 이유를 조사하였다. 제주산 및 친환경 먹거리 구입 빈도에 대한 응답으로 "매일", "주 4–6회", "주 2–3회", "주 1회", "월 2–3회", "월 1회", "월 1회 미만", "구입하지 않음"으로 구성하였고, 추후 분석에서는 "주 2–7회", "월 1–4회", "월 1회 미만"으로 재분류하였다. 제주산/친환경 먹거리를 구입한/구입하지 않은 이유와 로컬푸드 직매장 이용 시 어려운 점에 대한 응답은 2020 제주 푸드플랜 구축 실행계획 수립 조사와 서울시 먹거리 통계조사[22, 25]를 참조하여 구성하였다.

이와 함께 먹거리 보장 수준에 따라 먹거리 기본권과 제주 지역 먹거리 정책에 대한 인지도 및 필요도를 파악하였다[5]. 먹거리 기본권에 대해 "누구나 건강하고 안전한 먹거리를 안정적으로 확보할 수 있는 권리"에 대해 "들어본 적 있다"와 "들어본 적 없다"로 질문하였다. 조사시점 기준으로 제주도에서 시행 및 계획하고 있는 10개의 정책(예: 중소 영세농 중심의 다품목 생산체계 구축, 로컬푸드 활성화 지원, 친환경 농임수산업 지원, 식생활 교육 강화, 취약계층 먹거리 보장 등)에 대한 인지도를 "모른다", "들어본 적 있다", "잘 알고 있다"로 질문하여 추후 분석에서 "모른다"에 1점 부터 "잘 알고 있다"에 3점을 부여해 점수로 환산하였다. 각 정책에 대한 필요도는 "전혀 필요 없다" (1점) 부터 "매우 필요 있다" (5점)의 5점 리커트 척도로 질문해 점수로 환산했다. 인지도 및 필요도 문항의 내적 일관성 신뢰도를 검증하기 위하여 산출한 Cronbach's α 계수는 각각 0.889, 0.938로 모두 통계적으로 유의하였다.

5. 식생활과 행복, 먹거리 환경 만족도

먹거리 보장 정도에 따라 식생활 만족도와 중요도, 행복 정도를 살펴보기 위해 서울시 먹거리 통계조사[22]를 참조해 지난 1년 간의 식생활의 만족도와 행복해지는데 먹거리와 식생활이 중요한지에 대해 5점 리커트 척도(예: 매우 불만족, 불만족, 보통, 만족, 매우 만족)로 질문하였다. 식생활 만족도, 삶의 행복 정도, 행복해지는데 먹거리, 식생활 중요도 문항의 Cronbach's α 계수는 0.575로 나타났다.

대상자가 거주하는 지역의 먹거리 환경에 대한 만족도를 평가하고자 우리 동네(집 근처)에 다양하고 건강한 식품을 구매할 수 있는 식료품점이 충분한지(availability), 가까운 거리에 있는지(accessibility), 판매하는 식품들이 구매할 수 있는 가격인지(affordability), 서비스가 잘 되어 이용하기 편리한지(accommodation), 신선하고 질이 좋은 지(acceptability)를 질문하였다[22, 24]. 응답은 "전혀 그렇지 않다" (1점)에서부터 "매우 그렇다" (4점)까지의 4점 척도로 평가하였다. 먹거리 환경에 대한 만족도 문항의 Cronbach's α 계수는 0.864로 나타났다.

6. 인구사회학적 특성

조사 대상자의 인구사회학적 특성은 성별, 연령, 거주 지역, 가구원 수, 월평균 가구소득, 직업, 최종 학력을 포함하였다. 연령은 19–29세, 30대, 40대, 50대, 60세 이상으로 구분하였고, 거주 지역은 제주시와 서귀포시를 나누고 각각 동지역과 읍·면 지역으로 나눠 총 4개의 지역으로 분류하였다. 가구원 수는 1인 가구와 2인 이상 가구로 분류하였고, 월평균 가구소득은 200만 원 미만, 200만 원 이상 300만 원 미만, 300만 원 이상 500만 원 미만, 500만 원 이상의 총 4그룹으로 분류하였다. 직업은 관리/전문/사무직, 서비스/판매직, 농림어업/단순노무/기타, 무직(학생, 주부 포함)으로 분류하였다. 최종 학력은 고등학교 졸업 이하와 대학교 졸업 이상으로 분류하였다.

7. 통계분석

모든 통계분석은 SAS 9.4 (SAS Institute)를 사용했다. 모든 연속형 변수는 평균 ± 표준편차(standard deviation)로, 범주형 변수는 빈도와 분율(%)로 제시하였다. 대상자의 먹거리 보장 수

https://doi.org/10.5720/kjcn.2024.00012

준에 따른 일반적 특성, 먹거리 구매 실태, 식생활 및 먹거리 환경 만족도, 먹거리 정책 인지도 및 필요도의 차이는 연속형 변수의 경우 *t*-test를, 범주형 변수의 경우 chi-square test를 이용해 검정하였다. 모든 통계검정은 양측검정으로 유의성은 α = 0.05로 하였다.

RESULTS

1. 먹거리 보장 여부에 따른 일반적인 특성

연구 대상자의 일반적인 특성은 Table 1과 같다. 전체 대상자 중 남성이 43.9%, 여성의 비율이 56.1%였으며, 평균 연령은 47.1세로 나타났다. 거주지역은 제주시 동 지역의 비율이 59.8%로, 교육 수준은 대학교 이상이 57.2%로 가장 높았다. 대상자의 대부분은 다인가구였으며(83.8%), 대상자의 72.3%의 월평균 가구 소득수준은 300만 원 이상이었다. 연구대상자 총 346명 중 52.6%는 먹거리가 양적 및 질적으로 보장되어 있다고 응답하였으나, 39.6%는 양적으로 보장되었지만 질적으로 보장되어 있지 않았고 7.8%는 양적 및 질적으로 모두 보장되어 있지 않는 것으로 나타났다(Fig. 1A).

먹거리 미보장의 원인으로 질적 미보장 그룹에서는 "주변에 원하는 다양한 종류의 식품이 없어서" (36.5%)와 "식품을 구매하거나 조리할 시간이 충분히 없어서" (33.6%)라는 응답이 대부

Table 1. General characteristics of study participants by food security status

Characteristic	Total (n = 346)	Food security (n = 182)	Food insecurity (n = 164)	*P*-value[1)]
Sex				0.017
Male	152 (43.9)	91 (50.0)	61 (37.2)	
Female	194 (56.1)	91 (50.0)	103 (62.8)	
Age (year)	47.1 ± 16.2	47.3 ± 17.4	46.8 ± 14.8	0.780
Age group (year)				0.111
19–29	62 (17.9)	39 (21.4)	23 (14.0)	
30–39	53 (15.3)	24 (13.2)	29 (17.7)	
40–49	65 (18.8)	31 (17.0)	34 (20.7)	
50–59	88 (25.4)	41 (22.5)	47 (28.7)	
≥ 60	78 (22.5)	47 (25.8)	31 (18.9)	
Region				
Jeju-si dong	207 (59.8)	108 (59.3)	99 (60.4)	0.609
Jeju-si eup-myeon	48 (13.9)	26 (14.3)	22 (13.4)	
Seogwipo-si dong	49 (14.2)	29 (15.9)	20 (12.2)	
Seogwipo-si eup-myeon	42 (12.1)	19 (10.4)	23 (14.0)	
Education level				0.802
Less than high school	148 (42.8)	79 (43.4)	69 (42.1)	
College or above	198 (57.2)	103 (56.6)	95 (57.9)	
Household type				0.874
Single person	56 (16.2)	30 (16.5)	26 (15.9)	
Multi-person	290 (83.8)	152 (83.5)	138 (84.1)	
Occupation (n = 344)				0.655
Managers/professionals/clerk	119 (34.6)	60 (33.1)	59 (36.2)	
Service/sales workers	104 (30.2)	52 (28.7)	52 (31.9)	
Forestry and fishery workers/elementary workers/other	51 (14.8)	28 (15.5)	23 (14.1)	
Unemployed (including students and housewives)	70 (20.4)	41 (22.7)	29 (17.8)	
Monthly household income (n = 343, KRW)				0.241
< 2,000,000	54 (15.7)	29 (16.1)	25 (15.3)	
2,000,000–2,999,999	41 (12.0)	17 (9.4)	24 (14.7)	
3,000,000–4,999,999	123 (35.9)	61 (33.9)	62 (38.0)	
≥ 5,000,000	125 (36.4)	73 (40.6)	52 (31.9)	

n (%) or Mean ± SD.
[1)]*P*-value from chi-square test or *t*-test.

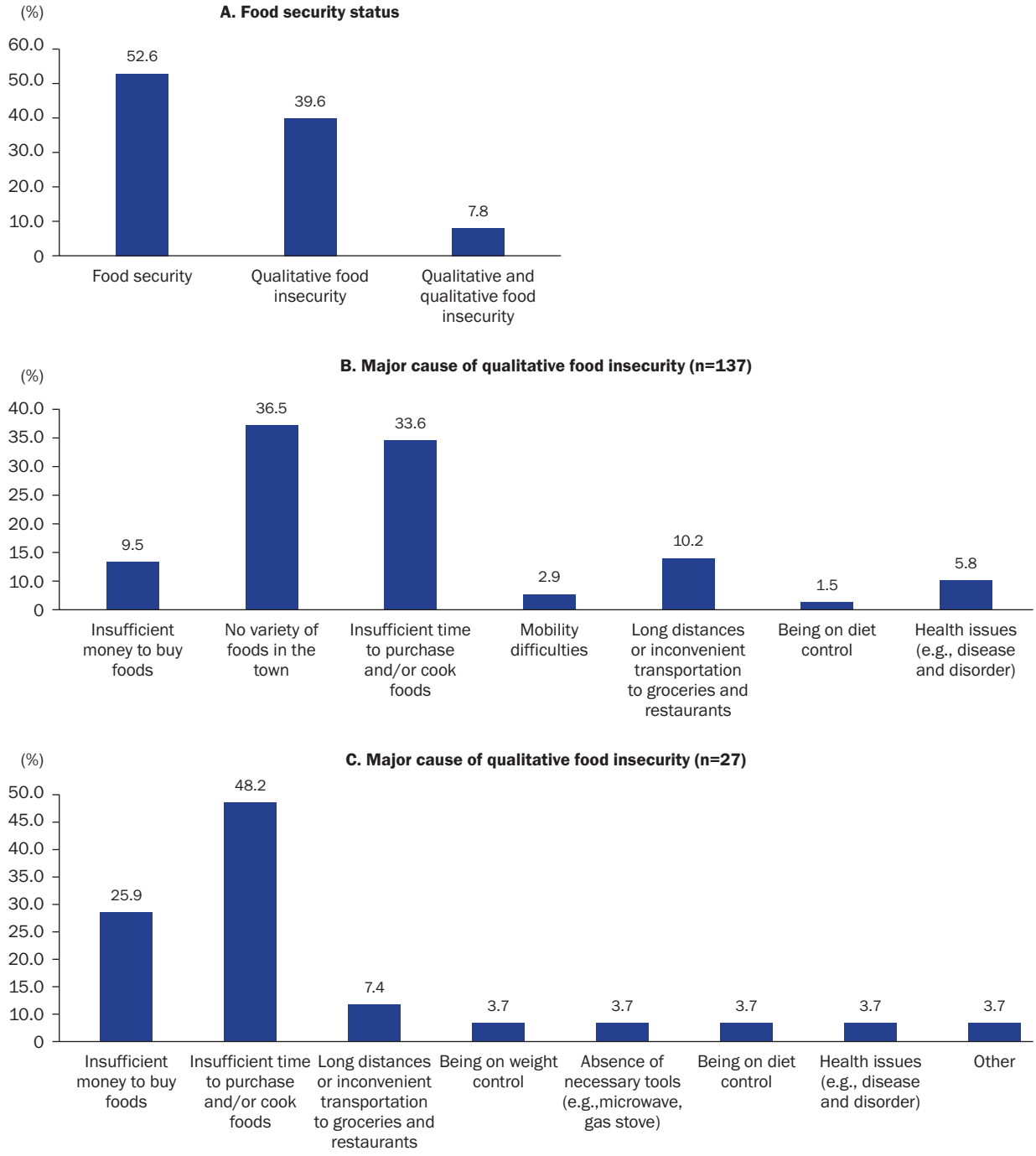

Fig. 1. Food security status of the study participants (A) and major cause of food insecurity (B, C).

분을 차지하였고, 양적·질적 미보장 그룹에서는 "식품을 구매하거나 조리할 시간이 충분히 없어서"라는 응답이 48.2%로 가장 많았고 "식품을 구매할 돈이 충분하지 않아서"가 25.9%로 다음으로 높았다(Fig. 1B, C).

먹거리 양적·질적 미보장 그룹의 대상자 수가 27명으로 적어 추후 분석에서는 질적 미보장 그룹과 양적·질적 미보장 그룹을 합하였다. 이에 따라 먹거리 보장 여부에 따른 일반적 특성의 차이를 살펴본 결과(Table 1), 먹거리 보장 그룹에 비해 먹거리 미보장 그룹에서 여성의 비율이 유의하게 높았다(각각 50.0%, 62.8%, $P = 0.017$). 이외의 연령, 거주지역, 교육 수준, 가구형

https://doi.org/10.5720/kjcn.2024.00012

태, 직업, 가구 소득수준에서는 먹거리 보장 여부에 따라 유의한 차이가 없었다.

2. 먹거리 보장 여부에 따른 지역/친환경 먹거리 구매 실태

먹거리 보장 여부에 따라 지역 먹거리(제주산, 로컬푸드 직매장)와 친환경 먹거리 구매 실태를 분석한 결과를 Table 2에 제시하였다. 대상자의 47.1%는 제주산 먹거리를 한달에 1–4회 구입하고 있었으며, 주로 육류(32.1%), 채소류(27.6%), 과일류(10.5%) 순으로 많이 구입하는 것으로 나타났다. 로컬푸드 직매장은 대상자의 61.0%가 이용하지 않는다고 응답하였으며 이용 시 가장 어려운 점으로 "인근에 직매장이 많이 없어서"가 1순위로 나타났다(54.5%). 친환경 먹거리는 대상자의 45.9%가 한 달에 한번 미만으로 구입했으나 40.4%는 한달에 1–4회 정도 구입하는 것으로 나타났다. 친환경 먹거리를 구매하지 않는 주된 이

Table 2. Food purchase of local and ecofriendly foods and related factors by food security status

Food purchase and related factors	Total (n = 346)	Food security (n = 182)	Food insecurity (n = 164)	*P*-value[1)]
Frequency of purchasing foods produced in Jeju				0.668
2–7 times a week	134 (38.7)	67 (36.8)	67 (40.9)	
1–4 times a month	163 (47.1)	87 (47.8)	76 (46.3)	
Less than once a month	49 (14.2)	28 (15.4)	21 (12.8)	
Types of foods produced in Jeju (n = 315)				0.411
Grains (rice, barley, etc.)	16 (5.1)	10 (6.1)	6 (4.0)	
Legumes	13 (4.1)	10 (6.1)	3 (2.0)	
Fruits	33 (10.5)	15 (9.1)	18 (12.0)	
Vegetables	87 (27.6)	40 (24.2)	47 (31.3)	
Meat	101 (32.1)	58 (35.2)	43 (28.7)	
Seafood products (fish, shellfish, etc.)	26 (8.3)	13 (7.9)	13 (8.7)	
Eggs (egg, etc.)	25 (7.9)	12 (7.3)	13 (8.7)	
Milk and dairy products	14 (4.4)	7 (4.2)	7 (4.7)	
Other	0 (0.0)	0 (0.0)	0 (0.0)	
Main reason for buying foods produced in Jeju (n = 315)				0.106
The ingredients are fresh.	222 (70.5)	109 (66.1)	113 (75.3)	
The taste, shape, and quality are good.	29 (9.2)	18 (10.9)	11 (7.3)	
It's cheap.	12 (3.8)	8 (4.9)	4 (2.7)	
It helps Jeju's farmers.	21 (6.7)	8 (4.9)	13 (8.7)	
It's an ingredient that I've been eating since I was young.	27 (8.6)	19 (11.5)	8 (5.3)	
Other	4 (1.3)	3 (1.8)	1 (0.7)	
Difficulties in buying foods produced in Jeju (n = 314)				0.448
There's no store nearby.	56 (17.8)	33 (20.0)	23 (15.4)	
It's hard to notice the mark of Jeju.	59 (18.8)	30 (18.2)	29 (19.5)	
There aren't many different types of ingredients.	95 (30.3)	46 (27.9)	49 (32.9)	
Due to low quality such as taste, appearance, etc.	13 (4.1)	7 (4.2)	6 (4.0)	
The price is expensive.	72 (22.9)	35 (21.2)	37 (24.8)	
Other	1 (0.3)	1 (0.6)	0 (0.0)	
No specific reason	18 (5.7)	13 (7.9)	5 (3.4)	
Main reason for not buying foods produced in Jeju (n = 29)				0.609
There's no store nearby.	5 (17.2)	3 (20.0)	2 (14.3)	
Don't know if it's from Jeju.	7 (24.1)	4 (26.7)	3 (21.4)	
It's not particularly different from other local agricultural products.	7 (24.1)	3 (20.0)	4 (28.6)	
Due to low quality such as taste, appearance, etc.	1 (3.5)	1 (6.7)	0 (0.0)	
The price is expensive.	2 (6.9)	0 (0.0)	2 (14.3)	
Other	7 (24.1)	4 (26.7)	3 (21.4)	

(Continued to the next page)

Table 2. Continued

Food purchase and related factors	Total (n = 346)	Food security (n = 182)	Food insecurity (n = 164)	*P*-value[1]
Use of local food stores				0.506
Yes	135 (39.0)	68 (37.4)	67 (40.9)	
No	211 (61.0)	114 (62.6)	97 (59.1)	
Most difficult aspect of using a local food store (n = 134)				0.297
There aren't many stores nearby.	73 (54.5)	39 (57.4)	34 (51.5)	
The foods are not fresh.	2 (1.5)	2 (2.9)	0 (0.0)	
There aren't many different types of ingredients.	31 (23.1)	14 (20.6)	17 (25.8)	
Due to low quality such as taste, appearance, etc.	5 (3.7)	1 (1.5)	4 (6.1)	
The price is expensive.	17 (12.7)	8 (11.8)	9 (13.6)	
Other	1 (0.8)	0 (0.0)	1 (1.5)	
No hard reason	5 (3.7)	4 (5.9)	1 (1.5)	
Frequency of purchasing eco-friendly foods[2] (n = 344)				0.984
2–7 times a week	47 (13.7)	25 (13.9)	22 (13.4)	
1–4 times a month	139 (40.4)	72 (40.0)	67 (40.9)	
Less than once a month	158 (45.9)	83 (46.1)	75 (45.7)	
Main reason for buying eco-friendly foods (n = 234)				0.467
The ingredients are fresh.	80 (34.2)	36 (30.0)	44 (38.6)	
The taste, shape, and quality are good.	13 (5.6)	5 (4.2)	8 (7.0)	
It's cheap.	4 (1.7)	2 (1.7)	2 (1.8)	
To protect the environment.	14 (6.0)	6 (5.0)	8 (7.0)	
It is more nutritious than regular agricultural products.	15 (6.4)	9 (7.5)	6 (5.3)	
I can eat it with confidence.	108 (46.2)	62 (51.7)	46 (40.4)	
Main reason for not buying eco-friendly foods (n = 104)				0.018
There's no store nearby.	21 (20.2)	13 (22.0)	8 (17.8)	
Eco-friendly product certification is not trustworthy.	7 (6.7)	2 (3.4)	5 (11.1)	
There is no difference from general foods.	20 (19.2)	16 (27.1)	4 (8.9)	
Due to low quality such as taste, appearance, etc.	4 (3.9)	3 (5.1)	1 (2.2)	
The price is expensive.	40 (38.5)	16 (27.1)	24 (53.3)	
Other	12 (11.5)	9 (15.3)	3 (6.7)	

n (%) or Mean ± SD.
[1]*P*-value from chi-square test or *t*-test.
[2]Measured using a 3-point scale (e.g., don't know = 1, have heard of it = 2, know well = 3).

유로 "가격이 비싸서"가 가장 높게 나타났는데(38.5%), 먹거리 보장 여부에 따라 살펴봤을 때 먹거리 미보장 그룹에서는 "가격이 비싸서"라고 응답한 비율이 53.3%로 절반을 차지하였으나 먹거리 보장 그룹에서는 27.1%로 "일반 먹거리와 차이가 없어서" (27.1%)라는 응답과 유사하게 나타났다 (P = 0.018). 이외에 제주산 먹거리 구입 실태와 로컬푸드 직매장 이용 실태 등에서는 유의한 차이가 확인되지 않았다.

3. 먹거리 보장 여부에 따른 먹거리 정책 인지도 및 필요도

먹거리 보장 여부에 따라 먹거리 기본권과 제주 지역 먹거리 정책에 대한 인지 및 필요도를 살펴본 결과(Table 3), 전체 대상자의 먹거리 기본권 인지율은 30.1%였는데 먹거리 미보장 그룹의 인지율이 36.0%로 보장 그룹(24.7%)에 비해 유의하게 높았다(P = 0.023). 먹거리 정책 인지도를 3점 만점으로 나타났을 때 "생활폐기물 감축" (2.0점)을 제외하고는 모두 1점대로 낮았다. 필요도의 경우 5점 만점으로 분석한 결과 필요도가 가장 높은 정책은 "생활폐기물 감축" (4.4점)이었고, 가장 낮은 정책은 "중소영세농 중심의 농가 조직화 등을 통한 다품목 생산체계 구축" (3.7점)으로 나타났다. 먹거리 보장 여부에 따라서는 "마을 부엌, 소셜 다이닝 활성화 등 먹거리 공동체 육성 정책"의 인지도가 먹거리 보장 그룹에서 미보장 그룹에 비해 유의하게 높았

https://doi.org/10.5720/kjcn.2024.00012

Table 3. Food policy recognition and necessity by food security status

Policy recognition	Total (n = 346)	Food security (n = 182)	Food insecurity (n = 164)	*P*-value[1]
Basic rights to food				0.023
Have heard of it	104 (30.1)	45 (24.7)	59 (36.0)	
Have never heard of it	242 (69.9)	137 (75.3)	105 (64.0)	
Establishment of multi-item production system by organizing small and medium-sized farmers (n = 345)				
Recognize it[2]	1.3 ± 0.5	1.3 ± 0.5	1.2 ± 0.4	0.054
Consider it necessary[3]	3.7 ± 0.9	3.7 ± 0.9	3.8 ± 1.0	0.658
Support for local food activation				
Recognize it	1.8 ± 0.6	1.8 ± 0.7	1.8 ± 0.6	0.989
Consider it necessary	4.0 ± 0.9	4.0 ± 0.9	4.0 ± 0.9	0.574
Support for processing and distribution using agricultural and fishery products from Jeju				
Recognize it	1.5 ± 0.6	1.6 ± 0.6	1.5 ± 0.6	0.273
Consider it necessary	4.0 ± 0.9	4.0 ± 0.8	3.9 ± 1.0	0.456
Expanding the supply of local food ingredients in public meals (n = 345)				
Recognize it	1.6 ± 0.7	1.6 ± 0.6	1.6 ± 0.7	0.782
Consider it necessary	4.1 ± 0.9	4.0 ± 0.8	4.2 ± 1.0	0.215
Support for eco-friendly agriculture, forestry, and fisheries				
Recognize it	1.6 ± 0.6	1.6 ± 0.6	1.5 ± 0.6	0.098
Consider it necessary	4.0 ± 0.9	4.0 ± 0.8	4.0 ± 1.0	0.985
Strengthening dietary education				
Recognize it	1.7 ± 0.7	1.7 ± 0.6	1.6 ± 0.7	0.599
Consider it necessary	4.1 ± 0.9	4.1 ± 0.8	4.0 ± 1.0	0.807
Strengthening the food safety management system (n = 345)				
Recognize it	1.7 ± 0.7	1.7 ± 0.7	1.7 ± 0.7	0.337
Consider it necessary	4.3 ± 0.8	4.3 ± 0.7	4.3 ± 0.9	0.745
Reduction of household waste (food waste and packaging containers) (n = 345)				
Recognize it	2.0 ± 0.7	2.1 ± 0.7	2.0 ± 0.7	0.301
Consider it necessary	4.4 ± 0.8	4.4 ± 0.7	4.3 ± 0.9	0.663
Ensuring food for the vulnerable (n = 345)				
Recognize it	1.8 ± 0.7	1.8 ± 0.7	1.8 ± 0.7	0.604
Consider it necessary	4.3 ± 0.8	4.3 ± 0.7	4.23 ± 0.9	0.996
Promoting food communities such as village kitchens and social dining (n = 344)				
Recognize it	1.5 ± 0.6	1.6 ± 0.7	1.4 ± 0.6	0.004
Consider it necessary	3.8 ± 0.9	3.9 ± 0.9	3.7 ± 1.0	0.106

n (%) or Mean ± SD.
[1]*P*-value from chi-square test or *t*-test.
[2]Measured using a 3-point scale (e.g., don't know = 1, have heard of it = 2, know well = 3).
[3]Measured using a 5-point scale (e.g., unnecessary = 1, normal = 3, necessary = 5).

던 것을 제외하고는 나머지 정책에서 유의한 차이를 보이지 않았다(P = 0.004).

4. 먹거리 보장 여부에 따른 식생활과 행복, 먹거리 환경 만족도

먹거리 보장 여부에 따라 식생활과 행복, 먹거리 환경 만족도를 살펴보았다(Table 4). 식생활과 행복에 대해 5점 만점으로 분석한 결과, 전체 대상자에서 식생활 만족도는 3.7점, 식생활 중

Table 4. Dietary satisfaction and importance of diet, happiness, and food environment satisfaction by food security status

Dietary satisfaction and situation	Total (n = 345)	Food security (n = 182)	Food insecurity (n = 164)	*P*-value[1]
Dietary satisfaction[2]				
Happiness in life	3.8 ± 0.7	3.9 ± 0.7	3.7 ± 0.7	0.006
Dietary satisfaction	3.7 ± 0.7	3.9 ± 0.6	3.4 ± 0.6	< 0.0001
Importance of diet in happiness	4.3 ± 0.7	4.4 ± 0.8	4.2 ± 0.8	0.046
Food environment satisfaction (n = 344)[3]				
Availability	2.8 ± 0.7	3.0 ± 0.7	2.7 ± 0.8	< 0.001
Accessibility	2.8 ± 0.8	2.9 ± 0.7	2.7 ± 0.8	0.013
Affordability	2.8 ± 0.7	2.9 ± 0.7	2.6 ± 0.7	< 0.0001
Accommodation	2.8 ± 0.8	2.9 ± 0.7	2.7 ± 0.8	0.003
Acceptability	2.9 ± 0.6	3.0 ± 0.6	2.8 ± 0.6	0.001

Mean ± SD.
[1]*P*-value from *t*-test.
[2]Measured using a 5-point Likert scale (e.g., very dissatisfied = 1, very satisfied = 5).
[3]Measured using a 4-point scale (e.g., highly disagree = 1, highly agree = 4).

요도는 4.3점, 삶의 행복도는 3.8점으로 나타났고 모든 항목에서 먹거리 미보장 그룹이 보장 그룹에 비해 유의하게 낮은 점수를 보였다($P < 0.05$ for all). 먹거리 환경의 경우 전체 대상자의 만족도를 4점 만점으로 나타낸 결과, 식료품점의 충분성, 접근성, 이용 편리성, 가격 적절성, 신선도 및 질 모든 항목에서 2.8–2.9점대의 점수를 보였으며 모든 항목에서 먹거리 보장 그룹이 미보장 그룹에 비해 유의하게 높게 나타났다($P < 0.05$ for all).

DISCUSSION

본 연구는 제주지역 성인의 식생활 상황에 따라 먹거리 보장 여부를 평가하고, 이에 따라 먹거리 구입 실태, 식생활 및 먹거리 환경 만족도, 먹거리 정책 인지도 및 필요도를 파악하고자 하였다. 본 연구 참여자 346명 중 먹거리가 양적 및 질적으로 보장된 그룹은 52.6%, 미보장 그룹은 47.4%였으며, 이중 먹거리가 양적 및 질적으로 모두 보장되어 있지 않다고 응답한 비율은 전체 대상자의 7.8%였다. 먹거리 미보장 그룹의 여성 비율은 62.8%로 먹거리 보장 그룹에 비해 유의하게 높았다. 지역/친환경 먹거리 구매 실태는 먹거리 보장 여부에 따라 유의한 차이를 보이지 않았고, 친환경 먹거리를 구입하지 않는 이유와 먹거리 기본권 및 일부 정책에 대한 인지도, 식생활 및 먹거리 환경에 대한 만족도에서 유의한 차이를 보였다.

국내 지방자치단체 차원에서 먹거리 실태조사가 이루어진 바가 아직 많지 않아 본 연구 결과와의 비교가 어렵지만, 2022 서울시 먹거리 통계조사 결과와 비교했을 때 본 연구 대상자의 먹거리 미보장 비율은 47.4%로 서울시의 25.6%에 비해 높았다[27]. 또한 서울시의 경우 먹거리 미보장 그룹의 대부분이 소득수준과 교육수준이 낮고, 무직자, 여성, 65세 이상으로 나타났으나, 본 연구에서는 성별 외에는 먹거리 보장여부에 따라 유의한 차이를 보이지 않았다. 이러한 차이는 조사간 참여자의 수, 모집 및 조사 방법 등의 차이와 관련이 있을 수도 있으므로 추후 먹거리 미보장의 결정요인을 파악하기 위한 보다 심층적인 조사가 필요할 것으로 생각된다.

한편, 우리나라의 대표적인 국가조사인 국민건강영양조사에서도 본 연구와 유사한 문항으로 식품안정성 확보비율을 조사해 보고하고 있는데 식품안정성 확보에 관한 정의에 따르면 먹거리의 양적 및 질적 보장뿐만 아니라 양적으로는 충족되었으나 질적으로 충족되지 않은 경우도 포함하고 있다[23]. 이에 따르면 2022년 우리나라 식품안정성 확보가구비율은 98.5%였으며, 본 연구에서 먹거리 보장 그룹과 질적 미보장 그룹을 합한 비율은 92.2%로 다소 낮게 나타났다. 본 연구에서는 먹거리의 질적 보장 여부에 따른 먹거리 구입 및 환경 등에 대한 차이도 함께 파악하기 위해 미보장 그룹에 질적 미보장 그룹을 포함하였다.

또한, 본 연구에서 식생활에 전반적으로 만족한 비율은 62.0% (3.7점/5점 만점)로 이전에 수행된 "2020 제주 푸드플랜 구축 실행계획 수립 조사"에서 보고한 47.3%[25]에 비해 높은 수준이었으나, 먹거리 미보장 그룹의 식생활 만족률이 45.1% (3.4점/5점 만점)로 보장 그룹에 비해 낮게 나타났다. 또한, 먹거리 보장 그룹에서 미보장 그룹에 비해 행복해지기 위한 식생활의 중요도가 유의하게 높았으나 두 그룹 모두에서 전반적으로 높은 점수를 보여 먹거리의 양적 및 질적 수준에서의 보장이 삶의 행복과 식생활 만족도 증가에 중요한 요인이 될 수 있음을 시사한다. 그러나, 본 연구는 식사섭취와 관련된 요인을 조사하지 못해 먹거리 미보장 그룹의 낮은 식생활 만족도와 관련된 요인을 설명하는데 제한이 있다. 향후 먹거리 미보장 그룹의 식사

https://doi.org/10.5720/kjcn.2024.00012

의 질, 영양불량, 건강상태 등을 평가하기 위한 식사조사 및 심층조사가 먹거리 보장상태 평가와 함께 주기적으로 이루어진다면 먹거리 취약계층의 먹거리 부족과 격차, 영양불량 등의 해결을 위한 효과적인 정책마련에 도움이 될 것으로 사료된다.

본 연구에서 친환경 먹거리 구매 빈도에 대해 조사한 결과 대상자의 45.9%가 친환경 먹거리를 한 달에 한 번 미만 구매한다고 했으며, 구입하지 않는 경우 그 이유에 대해 "가격이 비싸서"라고 응답했다. 이러한 결과는 제주지역 소비생활실태 및 소비자의식 조사결과[28]에서도 유사하게 나타났다. 그러나, 한국농촌경제연구원에서 수행된 2022 식품소비행태조사[24]에서 친환경 식품을 구입하지 않는 이유로 "일반 제품과 차이를 느끼지 못해서"가 1순위로 나타나 본 연구의 결과와는 차이를 보였는데, 본 연구의 먹거리 보장 그룹의 경우 미보장 그룹과 달리 친환경 먹거리를 구입하지 않는 주된 이유로 "일반 먹거리와 차이가 없어서"를 "가격이 비싸서"와 유사하게 높게 꼽아 선행연구와 유사한 결과를 보였다. 2015 한국소비자원 연구[28]에서 제주지역이 육지 대비 소비자 물가가 비싸다고 대상자의 84.4%가 응답했고, 경제적 부담을 느끼는 종합 소비지출 항목 중 1위도 식생활비로 나타났다. 2017 한국의 소비생활지표 및 생산연구[29] 에서도 제주지역 소비생활 문제 유형 중 비싼 가격이 40.9%로 전국 29.2%에 비해 높게 나타난 것으로 보아 제주도민들의 전반적으로 높은 식비에 대한 부담이 일반 먹거리보다 비싼 친환경 먹거리 구입에 영향을 미치는 것으로 생각된다. 특히, 먹거리 보장수준이 낮을수록 친환경 먹거리 구입에 대한 장벽이 높으므로 친환경 먹거리 산업 지원의 강화, 유통망 개선, 취약계층 지원 등과 같은 지역사회의 적극적인 노력이 요구된다.

또한, 본 연구에서 먹거리 보장에 따른 먹거리 기본권과 먹거리 정책에 대한 인지도를 조사한 결과, 먹거리 미보장 그룹의 먹거리 기본권 인지도가 36.0%로 보장 그룹의 24.7%에 비해 높았다. 먹거리 기본권의 경우 다른 지자체의 조례에서도 정의하고 있으나 먹거리 보장 여부에 따라 기본권의 인지도 차이를 살펴본 자료가 없어 비교에 제한이 있으나 먹거리가 보장되어 있지 않은 경우 먹거리 및 먹거리 보장 등에 대해 관심이 높음을 시사한다. 세부적인 먹거리 정책 인지도는 먹거리 보장 여부에 따라 유의한 차이가 없었으나 전반적으로 낮았고, 반면에 정책에 대한 필요도는 인지도에 비해 높았다. 그러므로 먹거리 정책에 대한 효과적인 홍보와 관심 촉구가 이루어진다면 정책 수혜율이 높아져 먹거리 안정성이 강화될 것이며, 지역사회 구성원의 요구도를 반영한 건강하고 안전한 먹거리 체계 수립에 기여할 수 있을 것이다. 이를 위해 구체적으로 기존 정책의 수혜자 특성에 대한 분석과 정책의 사각지대 발굴 및 해소를 위한 연구 수행이 도움이 될 것으로 사료된다.

본 연구에서 먹거리 보장 여부에 따라 가구소득 수준에 유의한 차이가 관찰되지는 않았으나, 먹거리 미보장 그룹에서 가구소득 수준이 가장 높은 그룹의 비율이 31.9%로 높은 편이었다. 먹거리 보장은 경제적 수준과 밀접한 관련이 있으나 이밖에 식습관, 식생활 환경, 먹거리 이해력, 건강 상태 등 다양한 요인들과 관련되어 있고, 객관적·주관적 평가 요소를 결합하여 측정해야 한다[27, 30, 31]. 본 연구에서 월 평균 가구소득과 먹거리 미보장에 대한 심층분석을 수행한 결과 가구소득이 월 500만 원 이상인 그룹의 비율은 질적 미보장 그룹에서 34.3%였으나, 양적·질적 미보장 그룹에서는 19.2%인 것으로 확인되었다(Supplementary Table 1). 또한, 질적 미보장 그룹에서의 먹거리 미보장의 주된 이유는 주변에 다양한 종류의 식품의 부재와 식품을 구매하거나 조리할 시간 부족이었다. 이로 인해 소득수준이 높음에도 불구하고 먹거리 보장 수준이 낮은 것으로 판단된다. 반면, 먹거리 양적·질적 미보장 그룹에서는 경제적인 원인이 두 번째로 높게 나타나 선행연구[27]와 유사한 결과를 보였으며, 이와 같은 결과는 경제적 지원을 통한 먹거리 보장뿐만 아니라 먹거리 미보장을 유발하는 다차원적인 요인들에 대한 종합적인 접근이 필요함을 시사한다.

Limitations

본 연구는 몇 가지 제한점을 갖는다. 첫째, 연구대상자의 모집이 편의추출로 이루어졌기 때문에 대표성을 확보하기 어렵고, 표본 수가 상대적으로 적어 먹거리 보장 여부에 대한 통계적 유의성이 약화되었을 수 있으며 결과의 일반화에 제약이 있다. 그러나 제주 지역의 특성을 최대한 반영하고자 대상자 모집 시 행정구역(제주시 및 서귀포시) 별 연령대 및 성별 인구 비율을 고려해 대상자를 모집할 수 있도록 노력하였다. 둘째, 본 연구에서 사용한 먹거리 보장에 대한 문항은 국민건강영양조사의 식품안정성 항목에 기반한 것이나 대상자마다 문항에 대한 주관적인 해석이 다를 수 있으며, 선행연구와의 비교를 위해 동일한 항목으로 조사를 진행하는 과정에서 4점 및 5점 리커트 척도가 혼재되어 있어 결과 해석에 주의가 필요하다. 셋째, 먹거리 정책의 인지도와 필요도에 대한 질문 시에 자세한 설명없이 정책의 이름만으로 설문조사가 이루어졌으나 필요 시 조사자들이 정책에 대한 설명을 할 수 있도록 하였다. 마지막으로 다른 선행연구에서는 체중이나 질환 이환 여부를 같이 포함하여 먹거리 미보장 그룹의 영양상태를 보았으나 본 연구에서는 신장이나 체중 등에 대한 정보는 얻지 못했다. 이러한 제한점에도 불구하고 본 연구는 제주특별자치도 먹거리 기본권 보장 조례의 제정에 따라 이루어진 제주도민의 먹거리 보장과 먹거리 실태에 대한 기초자료로써 의의가 있다.

Conclusion

본 연구 결과 제주지역 성인 중 먹거리 보장 그룹은 미보장 그룹에 비해 전반적으로 삶의 만족도, 식생활 만족도, 먹거리 환경에 대한 만족도가 높게 나타났으나 먹거리 문제는 음식이나 먹거리의 단편적인 문제로만 접근해서는 해결하기 어렵기

때문에 향후 제주지역 먹거리 미보장의 결정요인에 대한 심층 분석과 함께 먹거리 보장 정책 프로그램의 다각화와 기존 먹거리 정책에 대한 적극적 홍보가 필요할 것으로 사료된다.

CONFLICT OF INTEREST

There are no financial or other issues that might lead to conflict of interest.

FUNDING

This work was supported by the Jeju Special Self-Governing Province.

DATA AVAILABILITY

Research data is available upon request to the corresponding author.

SUPPLEMENTARY MATERIALS

Supplementary Table 1. Food insecurity status by household income and major cause for food insecurity in the participants with monthly household incomes ≥ 3,000,000 KRW.

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Korean J Community Nutr. 2024 Oct;29(5):418-430
https://doi.org/10.5720/kjcn.2024.00014
eISSN 2951-3146

KJCN
Korean Journal of Community Nutrition

Research Article

Health-related quality of life and nutrient intake of the elderly with type 2 diabetes according to comorbidity burden: a cross-sectional study

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Received: August 22, 2024
Revised: October 9, 2024
Accepted: October 23, 2024

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Objectives: This study aimed to explore the cross-sectional association between health-related quality of life (HRQoL) according to the number of comorbidities in older adults with type 2 diabetes mellitus (T2DM) using the Euro Quality of Life-5 Dimensions (EQ-5D) index.
Methods: This study included 3,553 participants aged ≥ 65 years from the 2008–2020 Korea National Health and Nutrition Examination Survey. Dietary data were collected through 24-hour recall interviews by trained researchers, and demographic and lifestyle information via self-administered questionnaires. HRQoL was measured using a modified EQ-5D scale. Multivariable linear regression analyzed the associations between EQ-5D scores, nutrients and comorbidity, controlling for sociodemographic and health variables.
Results: Most participants reported 'no problems' in the EQ-5D scores, although approximately 17% to 47% of participants reported 'some problems' or 'extreme problems,' depending on the dimension. As comorbidities increased, significant declines were observed across all dimensions, particularly in mobility, usual activities, pain/discomfort, and anxiety/depression. Nutrient intake analysis revealed that participants with three or more comorbidities consumed less carbohydrates, but more fat.
Conclusion: Our findings demonstrate that among older adults with T2DM, a higher number of comorbidities is associated with decreased HRQoL. Additionally, there are differences in nutrient intake patterns among those with more comorbidities, specifically decreased carbohydrate intake and increased fat intake. These results emphasize the need for comprehensive and tailored management strategies that consider both diabetes and the co-occurring health conditions. By addressing the complex healthcare needs of individuals with multiple comorbidities, it is possible to enhance their HRQoL and overall well-being.

Keywords: quality of life; diabetes mellitus, type 2; comorbidity; aged; Korea

INTRODUCTION

Recent years have witnessed accelerated aging of populations worldwide, including that of South Korea [1, 2]. This trend, coupled with increased life expectancy, extends the duration for which individuals live with chronic conditions. There-

fore, there is heightened interest in "healthy life expectancy," the time span of living in good health, free from diseases or disabilities [3-7]. This represents the duration of life spent in optimal physical and mental health [8].

In the context of an aging population and the escalating burden of chronic diseases, diabetes has become a critical global challenge for healthcare systems. This is directly associated with the increasing prevalence of diabetes worldwide and is acknowledged as a significant public health concern among aging populations. The International Diabetes Federation estimates that the global prevalence of diabetes among older people aged 65 and over at 43 million in 2021, and reports that it will double by 2045 [9]. Notably, the Korean Diabetes Association reported that the prevalence of diabetes among South Koreans aged 65 or older was 30.1% in 2020, a figure almost threefold the global average [10].

Patients with diabetes require continuous management of various aspects of their daily lives, including diet, exercise, and medication adherence for blood sugar control [11]. Previous research has indicated that older individuals with chronic conditions, such as diabetes, have a lower health-related quality of life (HRQoL) compared to those without such conditions. Moreover, the impact of these conditions on HRQoL is more significant in older age groups than in younger populations [12, 13]. In particular, decreased quality of life in patients with diabetes is associated with increased morbidity, mortality, and healthcare costs, making the improvement of their quality of life a foundational goal of treatment. This necessitates interventions such as nutritional therapy and psychosocial treatments [14-18].

The elderly population, particularly those aged 65 and older, presents unique challenges and considerations. As individuals age, they are more likely to develop multiple comorbidities, which complicates diabetes management and exacerbates the decline in quality of life [19]. This age group is also more vulnerable to physical and cognitive decline, making effective diabetes management more complex and demanding [20]. Moreover, older adults often face greater social and economic challenges, such as limited access to healthcare resources and reduced social support, further impacting their HRQoL [21]. Therefore, focusing on this specific age group is crucial to understanding and addressing their unique needs.

Previous studies investigating the associations between comorbidities and HRQoL were primarily conducted in local hospitals during the 2010s [22-24], including the Medical Expenditure Panel Survey in the United States from 2011 to 2013 [25]. Other studies focused on identifying factors affecting quality of life have been comprehensively summarized through meta-analyses [26, 27]. Furthermore, research has been conducted in Southeast Asia [22, 23] and parts of Europe [24]; however, recent studies in East Asia, including Korea, are limited. Specifically, there is a lack of research examining the associations between comorbidities, HRQoL, and nutritional intake among Korean patients aged 65 and older with type 2 diabetes mellitus (T2DM). Given the unique challenges faced by this age group, it is essential to investigate these associations to develop more tailored and effective interventions.

Therefore, this study aimed to analyze HRQoL in relation to the number of comorbidities among Korean T2DM patients aged 65 years and older, utilizing data from the Korean National Health and Nutrition Survey (KNHANES). The findings from this research are expected to offer valuable insights for the development of targeted nutritional and therapeutic interventions, with the ultimate goal of improving diabetes management and enhancing the overall well-being of South Korea's aging population.

METHODS

Ethics statement

The data utilized in this study, derived from the KNHANES for the years 2008–2020, were collected with informed consent from all participants. For the periods 2008–2014 and 2018–2020, the research received approval from the Institutional Review Board of the Korea Centers for Disease Control and Prevention (IRB approval numbers: 2008-04EXP-01-C, 2009-01CON-03-2C, 2010-02CON-21-C, 2011-02CON-06-C, 2012-01EXP-01-2C, 2013-07CON-03-4C, 2013-12EXP-03-5C, and 2014-12EXP-03-5C). Data from 2015–2017 were exempted from ethical review, as determined by the Research Ethics Review Committee of the Korea Disease Control and Prevention Agency (KDCA) [28].

1. Study design

This study is a cross-sectional analysis and has been reported in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines (https://www.strobe-statement.org/).

2. Study population

KNHANES is a nationwide health and nutrition survey conducted since 1998 under the National Health Promotion Act [28]. This large-scale cross-sectional study was designed to assess the health status, health behaviors, and food and nutritional intakes of a non-institutionalized civilian population in South Korea. The KNHANES data collection process encompasses household surveys, health questionnaires, physical examinations, and nutritional surveys. The survey was conducted in various phases, including the first (1998), second (2001), third (2005), fourth (2007–2009), fifth (2010–2012), sixth (2013–2015), seventh (2016–2018), and eighth phases (2019–2021) [28]. This study employed survey data from 2008 to 2020 that encompassed HRQoL assessments using the Euro Quality of Life-5 Dimensions (EQ-5D) instrument [28].

From a total of 108,497 participants in the KNHANES between 2008 and 2020, the following were excluded from the analysis: 1) individuals under 65 years of age (n = 87,549); 2) those with missing relevance analysis weights (n = 2,357); 3) individuals who were not diagnosed with or were unaware of having T2DM (n = 14,892); and 4) respondents who did not complete the EQ-5D questionnaire (n = 146). Consequently, 3,553 individuals were included in the primary analysis (Fig. 1). Participants whose blood glucose levels met the diagnostic criteria for diabetes but who had not been diagnosed or were unaware of their condition were excluded, as the study aimed to assess the quality of life in individuals who were both diagnosed and aware of having T2DM, potentially leading to lifestyle changes.

3. Demographic and lifestyle information

Data on age, sex, education level, monthly household income, employment status, and household composition were obtained through interviews with trained investigators. Data on body mass index (BMI), physical activity, smoking status, alcohol consumption, type of diabetes treatment, and duration of diabetes were collected using self-reported health questionnaires [28]. Educational level was categorized as less than elementary school, middle school graduate, high school graduate, or above. Income levels were analyzed based on equivalized household income, which was calculated by dividing the average monthly household income by the number of household members. It was then categorized into quartiles as low, mid-low, mid-high, and high. Economic activity was classified as employed, unemployed, or economically inactive, and household composition was classified as living alone or with a spouse and/or other relatives. BMI, calculated using measurements taken by trained personnel, was classified per World Health Organization Asia/Pacific obesity criteria into

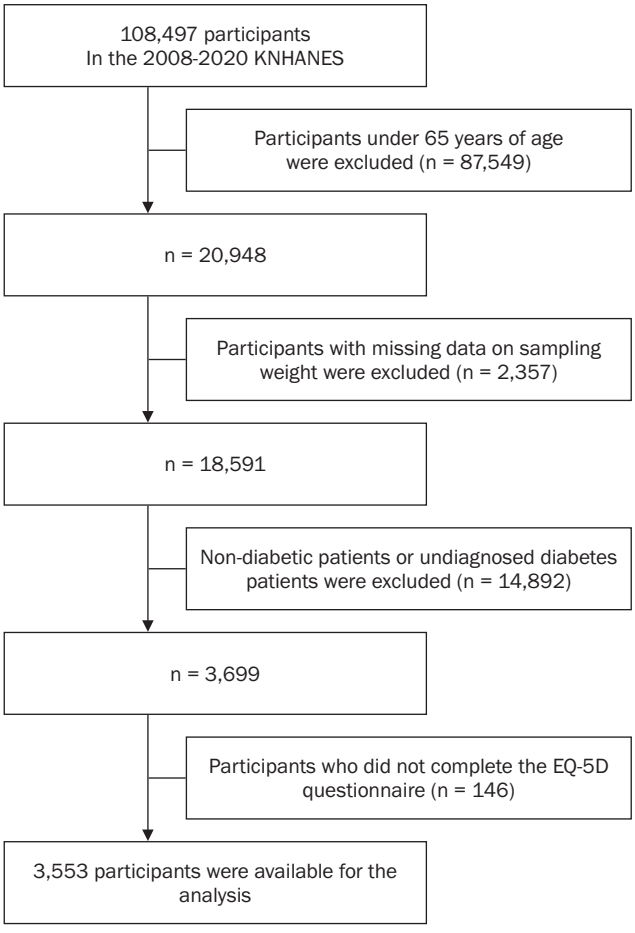

Fig. 1. Flow chart of the participants in the study.
KNHANES, Korea National Health and Nutrition Examination Survey; EQ-5D, Euro Quality of Life-5 Dimensions.

https://doi.org/10.5720/kjcn.2024.00014

underweight (< 18.5 kg/m^2), normal (18.5–22.9 kg/m^2), overweight (23–24.9 kg/m^2), and obese (≥ 25 kg/m^2) [29]. Owing to the low number of underweight individuals, underweight and normal individuals were combined for analysis into underweight/normal, overweight, and obese categories. For physical activity, the metabolic equivalent task-hours per week (METs-h/week) were calculated, with weights assigned based on the intensity of each exercise [30]. Smoking status was divided into nonsmokers, former smokers, and current smokers. Alcohol consumption was quantified by multiplying the frequency and quantity per occasion over the past year to determine the daily intake (servings/day), classifying the participants as non-drinkers or drinkers. Diabetes treatments were categorized as no treatment, oral hypoglycemic agents and/or insulin therapy, diet and/or exercise therapy alone, or in combination with medication. Duration of diabetes was calculated in years from the survey time and physician diagnosis, categorizing participants into < 5 years, 5–9 years, and ≥ 10 years, based on their distribution.

The dietary survey was conducted through face-to-face interviews with trained investigators who visited the participants' homes. Information on the food consumed on the previous day was collected using the 24-hour recall method [28]. The study analyzed the estimated intake levels of nutrients, including energy, carbohydrates, proteins, fats, vitamins A, B_1, B_2, C, niacin, calcium, phosphorus, iron, sodium, potassium and fiber. The acceptable macronutrient distribution ranges (AMDR) was based on the 2020 Korean Dietary Reference Intakes [31]. Each nutrient's proportion of total energy was classified into three categories: less than, acceptable (carbohydrates: 55%–65%, protein: 7%–20%, fat: 15%–30%), and more than the recommended range.

4. Definition of T2DM and comorbidities

In this study, the participants were defined as patients with T2DM who were aware of their condition. They were identified based on 1) self-reported health questionnaires in which they responded to having been diagnosed by a doctor, 2) currently suffering from T2DM, and 3) undergoing treatment with oral hypoglycemic agents, insulin therapy, or diet/exercise regimens.

To elucidate the association between comorbid chronic diseases and HRQoL in patients with T2DM, this study explicitly defined several chronic diseases as comorbidities. Hypertension, dyslipidemia, stroke, myocardial infarction/angina, renal failure, and cancer were included as comorbidities [32]. Cancer was approached more specifically and included patients diagnosed with any of the following: gastric, liver, colorectal, breast, uterine, lung, or bronchial cancers. Each comorbid disease included in the survey was defined based on 1) having been diagnosed by a doctor, 2) suffering from the disease in the past year or currently, or 3) currently receiving treatment. Based on the number of accompanying diseases, patients were categorized as having 0, 1, 2, or more than three comorbidities.

5. Health-related quality of life

In this study, HRQoL in older patients with T2DM was analyzed based on the level of comorbidities and dietary patterns using the EQ-5D, an HRQoL measurement tool provided by KNHANES [28]. The EQ-5D is an index that subjectively evaluates HRQoL and consists of five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression [33]. Each question can be answered at three levels (1: no problem, 2: somewhat problematic, and 3: serious problem), and through this, a total of 3^5 = 243 unique health states can be expressed [33]. The maximum score for the EQ-5D is 1, indicating the best possible quality of life, while the minimum score is –0.171, which indicates the worst possible quality of life.

The composite EQ-5D index was calculated using quality-of-life weights provided by the KDCA [34]. For ease of interpretation, responses for each item of EQ-5D in this study were reclassified into the following categories: 0 for 'extreme problems', 0.5 for 'some problems', and 1 for 'no problems', and the analysis was conducted accordingly. In other words, the higher the EQ-5D score, the better the quality of life, while a lower score indicates a poorer quality of life.

6. Statistical analysis

Statistical analyses were conducted considering the weights, strata, and primary sampling units of the complex sample design of the KNHANES. To analyze the general characteristics and lifestyle habits of older

patients with T2DM, categorical variables were presented as frequencies and percentages, and significance was tested using the chi-squared test. Analysis of the mean EQ-5D scores and calorie nutrient intake based on the number of comorbidities was conducted using multivariate linear regression, presenting the means and standard errors. To compare the adjusted means between groups, analysis of covariance and Tukey post-hoc test were conducted. Confounding variables were selected based on a review of previous studies and preliminary analyses [35-38]. The included variables were age, sex, education level, monthly household income, smoking status, alcohol consumption, physical activity level, BMI, and duration of diabetes. For the analysis of nutrient intake by comorbidity level, the adjusted mean was calculated considering age, sex, and total energy intake. *P* for trends were determined using linear regression analysis with the median values of each variable.

All statistical processing in this study was conducted using SAS 9.4 version (statistical analysis system; SAS Institute), and statistical significance was tested at the $\alpha = 0.05$ level.

RESULTS

1. General characteristics and lifestyle factors according to the level of comorbidities

The general characteristics and lifestyle factors of the participants were compared and analyzed according to the number of comorbidities (Table 1). As the number of comorbidities increased, the proportion of participants engaged in economic activities decreased ($P < 0.001$), and the proportion of those who were overweight tended to increase ($P < 0.001$). Additionally, as the number of comorbidities increased, physical activity levels, measured in METs, significantly decreased ($P < 0.001$), and a significantly lower proportion of participants reported not currently receiving treatment for diabetes ($P = 0.002$).

2. Distribution of EQ-5D responses across dimensions according to the level of comorbidities

Table 2 presents the distribution of responses across each level within the EQ-5D dimensions according to the number of comorbidities. In all dimensions, the highest proportion of participants reported 'no problems,' followed by 'some problems' and 'extreme problems.' As the number of comorbidities increased, there was a tendency for the proportion of participants reporting 'no problems' in all dimensions to decrease, while the proportion reporting 'some problems' and 'extreme problems' tended to increase (all, $P < 0.05$).

3. Average EQ-5D scores by level of comorbidities

Table 3 presents the mean scores of the EQ-5D according to the level of comorbidities among the participants. After adjusting for age, sex, education level, monthly household income, smoking status, alcohol consumption, physical activity level, BMI, and duration of diabetes, a clear trend was observed; As the number of comorbidities increased, scores across all dimensions of the EQ-5D, which are rated on a scale from 1 (no problems) to 0 (extreme problems), tended to decrease. Significant differences were observed in mobility ($P = 0.009$), with participants having ≥ 3 comorbidities showing lower mobility scores compared to those with 1 comorbidity. No significant differences were found in self-care across different levels of comorbidities ($P = 0.047$). For usual activity, significant differences were observed ($P < 0.001$), with lower scores for participants with ≥ 3 comorbidities compared to those with fewer comorbidities. Pain/discomfort levels also showed significant differences ($P < 0.001$), with participants having 2 or ≥ 3 comorbidities reporting lower scores (indicating more problems) compared to those with 1 comorbidity. Anxiety/depression scores were significantly lower (indicating more problems) in participants with ≥ 3 comorbidities compared to those with 0 comorbidities ($P = 0.004$). Finally, the EQ-5D index, where a score of 1 indicates no problems and 0 indicates extreme problems in any dimension, showed significant differences ($P < 0.001$), with lower overall scores in participants with more comorbidities.

The table also includes *P* for trend values, which indicate a consistent decline in EQ-5D levels as the number of comorbidities increases. Mobility (*P* for trend = 0.003), usual activity (*P* for trend < 0.001), pain/discomfort (*P* for trend < 0.001), anxiety/depression (*P* for trend < 0.001), and the overall EQ-5D index (*P* for trend < 0.001) all showed significant decreasing trends. Self-care, while

https://doi.org/10.5720/kjcn.2024.00014

Table 1. General characteristics of study participants according to the level of comorbidities

	No. of comorbidity				*P*-value
	0 (n = 573)	1 (n = 1,421)	2 (n = 1,135)	≥ 3 (n = 424)	
Age (range, year)					< 0.001
65 to < 70	178 (31.06)	414 (29.14)	376 (33.13)	132 (31.13)	
70 to < 75	190 (33.16)	412 (28.99)	353 (31.10)	158 (37.26)	
≥ 75	205 (35.78)	595 (41.87)	406 (35.77)	134 (31.61)	
Age (year)	72.47 ± 0.20	73.11 ± 0.13	72.39 ± 0.14	72.28 ± 0.23	0.036
Sex					< 0.001
Male	284 (49.56)	619 (43.56)	437 (38.50)	183 (43.16)	
Female	289 (50.44)	802 (56.44)	698 (61.50)	241 (56.84)	
Education level					0.032
Elementary school graduation or less	355 (62.28)	942 (66.71)	694 (61.53)	245 (58.19)	
Middle school graduation	81 (14.21)	182 (12.89)	168 (14.89)	70 (16.63)	
High school graduation or higher	134 (23.51)	288 (20.40)	266 (23.58)	106 (25.18)	
Monthly household income (KRW)					0.032
Low	172 (30.60)	399 (28.58)	224 (19.93)	69 (16.31)	
Mid-low	144 (25.62)	332 (23.78)	290 (25.80)	123 (29.08)	
Mid-high	110 (19.57)	351 (25.15)	326 (29.00)	117 (27.66)	
High	136 (24.21)	314 (22.49)	284 (25.27)	114 (26.95)	
Employed, yes	176 (30.93)	421 (29.77)	293 (25.98)	82 (19.34)	< 0.001
Living status, alone	116 (20.24)	344 (24.21)	269 (23.70)	107 (25.24)	0.212
Obesity status[1)]					< 0.001
Underweight	17 (2.98)	26 (1.84)	7 (0.62)	4 (0.95)	
Normal	243 (42.63)	454 (32.20)	291 (25.84)	110 (26.25)	
Overweight	135 (23.68)	340 (24.12)	282 (25.05)	115 (27.45)	
Obese	175 (30.71)	590 (41.84)	546 (48.49)	190 (45.35)	
Physical activity[2)]	28.56 ± 1.62	22.56 ± 1.02	18.59 ± 1.14	17.06 ± 1.87	< 0.001
Smoking status					< 0.001
Non-smoker	311 (55.14)	825 (58.68)	706 (62.59)	246 (58.57)	
Former smoker	157 (27.84)	421 (29.94)	320 (28.37)	130 (30.95)	
Current smoker	96 (17.02)	160 (11.38)	102 (9.04)	44 (10.48)	
Alcohol consumption					0.938
Non-drinker	315 (55.65)	787 (56.05)	639 (56.60)	242 (57.48)	
Drinker	251 (44.35)	617 (43.95)	490 (43.40)	179 (42.52)	
Diabetes care					0.002
Non-care	61 (10.65)	121 (8.52)	70 (6.17)	25 (5.90)	
Oral hypoglycemic agents/insulin treatments	419 (73.12)	1112 (78.25)	924 (81.41)	337 (79.48)	
Diet/exercise or oral agents/insulin treatments combination	93 (16.23)	188 (13.23)	141 (12.42)	62 (14.62)	
Diabetes duration (year)	11.49 ± 0.39	11.02 ± 0.25	10.5 ± 0.28	11.5 ± 0.46	0.417

n (%) or Mean ± SD.

P-values are derived from χ^2 test for categorical variables.

KRW, Korea Republic Won.

[1)]Based on World Health Organization guidelines for Asians: body mass index < 18.5 kg/m^2: underweight; 18.5–23 kg/m^2: normal; 23–24.9 kg/m^2: overweight; ≥ 25 kg/m^2: obese.

[2)]Physical activity level was calculated as metabolic equivalent task-hours per week (METs-h/week).

Table 2. Distribution of Euro Quality of Life-5 Dimensions (EQ-5D) according to the level of comorbidities

	No. of comorbidity				*P*-value
	0 (n = 573)	1 (n = 1,421)	2 (n = 1,135)	≥ 3 (n = 424)	
Mobility					0.006
No problems	329 (57.41)	760 (53.48)	586 (51.63)	192 (45.28)	
Some problems	234 (40.84)	620 (43.63)	509 (44.85)	216 (50.95)	
Extreme problems	10 (1.75)	41 (2.89)	40 (3.52)	16 (3.77)	
Self-care					0.031
No problems	486 (84.82)	1192 (83.88)	935 (82.38)	328 (77.36)	
Some problems	74 (12.91)	206 (14.50)	172 (15.15)	83 (19.58)	
Extreme problems	13 (2.27)	23 (1.62)	28 (2.47)	13 (3.06)	
Usual activity					< 0.001
No problems	432 (75.39)	1034 (72.77)	791 (69.69)	248 (58.49)	
Some problems	126 (21.99)	326 (22.94)	301 (26.52)	159 (37.50)	
Extreme problems	15 (2.62)	61 (4.29)	43 (3.79)	17 (4.01)	
Pain/discomfort					< 0.001
No problems	348 (60.73)	851 (59.89)	617 (54.36)	198 (46.70)	
Some problems	168 (29.32)	458 (32.23)	408 (35.95)	178 (41.98)	
Extreme problems	57 (9.95)	112 (7.88)	110 (9.69)	48 (11.32)	
Anxiety/depression					< 0.001
No problems	484 (84.47)	1191 (83.81)	912 (80.35)	319 (75.24)	
Some problems	81 (14.13)	208 (14.64)	193 (17.00)	90 (21.22)	
Extreme problems	8 (1.40)	22 (1.55)	30 (2.65)	15 (3.54)	

n (%).
P-values are derived from χ^2 test for categorical variables.

Table 3. Mean scores of Euro Quality of Life-5 Dimensions (EQ-5D) according to the level of comorbidities

	No. of comorbidity				*P*-value[1]	*P* for trend[2]
	0 (n = 573)	1 (n = 1,421)	2 (n = 1,135)	≥ 3 (n = 424)		
Mobility[3]	0.79 ± 0.01^{ab}	0.79 ± 0.01^{a}	0.76 ± 0.01^{ab}	0.75 ± 0.02^{b}	0.009	0.003
Self-care[3]	0.92 ± 0.01	0.93 ± 0.01	0.91 ± 0.01	0.89 ± 0.01	0.047	0.020
Usual activity[3]	0.88 ± 0.01^{a}	0.87 ± 0.01^{a}	0.85 ± 0.01^{a}	0.80 ± 0.02^{b}	< 0.001	< 0.001
Pain/discomfort[3]	0.77 ± 0.02^{ab}	0.79 ± 0.01^{a}	0.74 ± 0.01^{b}	0.71 ± 0.02^{b}	< 0.001	< 0.001
Anxiety/depression[3]	0.93 ± 0.01^{a}	0.92 ± 0.01^{ab}	0.90 ± 0.01^{b}	0.88 ± 0.02^{b}	0.004	< 0.001
EQ-5D index[4]	0.87 ± 0.01^{ab}	0.87 ± 0.01^{a}	0.85 ± 0.01^{bc}	0.83 ± 0.01^{c}	< 0.001	< 0.001

Mean ± SD.
Values are adjusted for age, sex, education level, monthly household income, smoking status, alcohol consumption, physical activity, body mass index and duration of diabetes.
[1]*P*-values are from ANCOVA, and different letters represent statistical differences determined by the Tukey post-hoc test.
[2]*P* for trend is from general linear model.
[3]Each dimension has 3 levels: no problems (1), some problems (0.5), and extreme problems (0).
[4]EQ-5D index scores of 1 indicates no problems and zero indicates extreme problems on any of each dimensions.

not significantly different between specific groups, also demonstrated a significant overall trend (*P* for trend = 0.020), indicating a general decline in self-care ability with more comorbidities.

4. Nutrient intake levels according to the level of comorbidities

Table 4 presents the average nutrient intakes levels of participants, according to the number of comorbidities. Significant differences were observed in several nutrient

https://doi.org/10.5720/kjcn.2024.00014

intakes. Participants with three or more comorbidities had a significantly lower carbohydrate intake ($P = 0.009$) compared to those with zero or one comorbidity, while fat intake was significantly higher in participants with three or more comorbidities ($P < 0.001$) compared to those with no comorbidities. Participants with two comorbidities had significantly higher fiber intake compared to those with zero or one comorbidity ($P < 0.001$), while the fiber intake of participants with three or more comorbidities was intermediate. Additionally, participants with two or more comorbidities had significantly higher vitamin B_2 intake ($P < 0.001$), and those with three or more comorbidities had significantly lower sodium intake compared to those with no comorbidities ($P = 0.008$), based on Tukey post-hoc test results.

5. AMDR levels of participants according to the level of comorbidities

Table 5 presents the distribution of participants consuming less than, within, or more than the AMDR for carbohydrates, proteins, and fats, according to the number of comorbidities. In all groups, the majority of participants consumed carbohydrates at levels exceeding the AMDR (> 65%). Protein intake was mostly within the AMDR (7%–20%) across all groups. For fat, the highest percentage of participants consumed less than the AMDR (< 15%), but fat intake distribution differed significantly based on the number of comorbidities ($P < 0.001$), with a higher proportion of participants with more comorbidities consuming fat within or above the AMDR.

DISCUSSION

In older Korean patients with T2DM, an increase in comorbidities was associated with a notable decline in quality of life across all domains of the EQ-5D. Overall EQ-5D index scores also demonstrated a downward trend with more comorbidities. Nutrient intake patterns shifted as comorbidities increased, with a decrease in carbohydrate consumption and an increase in fat intake.

Table 4. Average nutrient intake levels of participants according to the level of comorbidities

	No. of comorbidity				*P*-value[1]
	0 (n = 573)	1 (n = 1,421)	2 (n = 1,135)	≥ 3 (n = 424)	
Nutrient					
Carbohydrate (% of total energy)[2]	72.46 ± 0.54[a]	72.02 ± 0.35[a]	71.10 ± 0.40[ab]	70.08 ± 0.65[b]	0.009
Protein (% of total energy)[2]	13.02 ± 0.19	12.98 ± 0.11	13.20 ± 0.14	13.58 ± 0.22	0.088
Fat (% of total energy)[2]	12.61 ± 0.33[b]	13.13 ± 0.25[ab]	13.99 ± 0.28[a]	14.43 ± 0.50[a]	< 0.001
Average nutrient intake					
Energy (kcal)[2]	1,545.75 ± 29.30	1,613.28 ± 19.70	1,618.10 ± 21.49	1,530.15 ± 33.64	0.037
Vitamin A (R.E./R.A.E.)[3),4)]	497.17 ± 46.34	466.96 ± 19.54	444.93 ± 22.47	487.64 ± 36.60	0.646
Vitamin B_1 (mg)[3]	1.12 ± 0.06	1.14 ± 0.06	1.13 ± 0.06	1.15 ± 0.07	0.790
Vitamin B_2 (mg)[3]	0.94 ± 0.05[b]	0.96 ± 0.04[b]	1.03 ± 0.04[a]	1.07 ± 0.05[a]	< 0.001
Vitamin C (mg)[3]	74.13 ± 4.05	67.80 ± 2.43	65.63 ± 2.33	62.67 ± 3.27	0.150
Niacin (mg)[3]	11.13 ± 0.27	10.93 ± 0.13	10.73 ± 0.15	10.98 ± 0.29	0.563
Calcium (mg)[3]	429.89 ± 20.75	409.30 ± 8.56	417.88 ± 8.02	451.07 ± 15.86	0.120
Phosphorus (mg)[3]	895.70 ± 14.24	881.91 ± 7.92	879.61 ± 8.02	911.37 ± 17.53	0.304
Iron (mg)[3]	12.79 ± 0.63	12.12 ± 0.30	11.86 ± 0.33	11.53 ± 0.43	0.377
Sodium (mg)[3]	3,344.19 ± 108.99[a]	3,041.86 ± 56.42[ab]	3,115.73 ± 67.43[ab]	2,886.98 ± 83.35[b]	0.008
Potassium (mg)[3]	2,458.85 ± 44.68	2,449.37 ± 31.43	2,526.06 ± 36.39	2,489.72 ± 49.31	0.428
Fiber (g)[3]	17.89 ± 0.63[b]	18.30 ± 0.37[b]	21.70 ± 0.51[a]	20.27 ± 0.68[ab]	< 0.001

Mean ± SD.
[1]*P*-values are from ANCOVA, and different letters represent statistical differences determined by the Tukey post-hoc test.
[2]Adjusted for age and sex.
[3]Adjusted for age, sex and total energy intake.
[4]R.E. 2008–2015, R.A.E. 2016–2020.

Table 5. Acceptable macronutrient distribution ranges levels of participants according to the level of comorbidities

	No. of comorbidity				*P*-value
	0 (n = 573)	1 (n = 1,421)	2 (n = 1,135)	≥ 3 (n = 424)	
Carbohydrate (%)					0.144
Less (< 55)	44 (7.68)	110 (7.74)	90 (7.93)	44 (10.38)	
Acceptable (55–65)	66 (11.52)	187 (13.16)	168 (14.80)	67 (15.80)	
More (> 65)	463 (80.80)	1,124 (79.10)	877 (77.27)	313 (73.82)	
Protein (%)					0.895
Less (< 7)	6 (1.05)	14 (0.99)	12 (1.06)	4 (0.94)	
Acceptable (7–20)	545 (95.11)	1,354 (95.29)	1,070 (94.27)	399 (94.11)	
More (> 20)	22 (3.84)	53 (3.72)	53 (4.67)	21 (4.95)	
Fat (%)					< 0.001
Less (< 15)	391 (68.24)	978 (68.82)	714 (62.91)	248 (58.49)	
Acceptable (15–30)	166 (28.97)	401 (28.22)	373 (32.86)	156 (36.79)	
More (> 30)	16 (2.79)	42 (2.96)	48 (4.23)	20 (4.72)	

n (%).
P-values are derived from χ^2 test for categorical variables.

The findings of our study provide new insights and reinforce the conclusions drawn from previous studies. A meta-analysis identified factors affecting the quality of life in diabetic patients, highlighting comorbidities, hypertension, duration of diabetes, and a diet high in red meat as significant factors [27]. Another meta-analysis, which explored the association between the number of multimorbidities and HRQoL irrespective of disease type, found that HRQoL decreased as the number of multimorbidities increased [26]. This meta-analysis included a Korean study that used 2008 KNHANES data to examine participants aged 65 and older, finding a significant association between multimorbidity and lower quality of life, particularly in elderly women [39]. However, the study was limited by its use of data from only one year. More recent studies utilizing KNHANES data from 2016–2018 and 2015–2019 identified similar predictors of HRQoL in older diabetic adults, such as the number of comorbidities, living alone, stress levels, physical activity, age, education, and marital status [40, 41]. These studies, while insightful, were limited by shorter data collection periods and less comprehensive analysis. Our study fills these gaps by using KNHANES data from a broader range of years (2008 to 2020) to analyze the independent association between comorbidities and HRQoL in elderly Korean patients with diabetes, adjusting for multiple potential confounding factors identified through prior literature and preliminary analysis. Furthermore, we provide a comprehensive perspective on the overall management of elderly patients with diabetes, including dietary information.

Although our study focused specifically on older adults with T2DM, comparing our findings to those from healthy populations could offer valuable insights. Previous literature suggests that comorbidities negatively impact HRQoL in both diabetic and non-diabetic individuals, though the extent of the decline may differ. Healthy adults, for instance, may not experience as steep a reduction in HRQoL as their comorbidities increase, since managing diabetes and its complications adds an additional burden for those with the disease. While direct comparisons with healthy adults were not within the scope of this research, future studies should investigate these differences more thoroughly. Such comparisons would help illuminate the unique challenges faced by older adults with T2DM and multiple comorbidities, providing a clearer understanding of how comorbidities affect HRQoL across different populations.

Building on previous findings, our study adds a unique perspective on the role of nutrition in managing T2DM in older adults. Research on Filipino-American adults suggests that patients over 65 with T2DM may be more adept at reducing carbohydrate intake compared to younger individuals [42]. This observation aligns with our finding that carbohydrate intake decreases as

https://doi.org/10.5720/kjcn.2024.00014

the number of comorbidities increases in older Korean patients with T2DM. This trend likely reflects stricter dietary management strategies required for managing multiple comorbidities, including recommendations to prevent blood sugar spikes. Patients with more comorbidities may adhere more rigorously to these dietary recommendations, resulting in lower carbohydrate consumption. However, despite this decrease in carbohydrate intake with increasing comorbidities, all groups in our study still had a carbohydrate intake rate significantly higher than the AMDR. This high intake is likely due to the traditional Korean diet, which is rich in carbohydrates, emphasizing the need for targeted interventions to help elderly T2DM patients better align their carbohydrate consumption with AMDR guidelines [43, 44].

Additionally, our study revealed an alarming trend: sodium intake among all participants was more than double the recommended amount, regardless of comorbidity level. In contrast, the mean sodium intake in the general Korean elderly population without diabetes was reported to be 2,920 mg in 2020 and 2,837 mg in 2019, which is lower than the intake observed in our sample [45]. This excessive sodium consumption likely stems from the frequent consumption of high-salt foods such as kimchi, salted vegetables, soups, stews, and noodles, which are staples in the traditional Korean diet [46]. These findings underscore the need to implement tailored dietary strategies, focusing not only on reducing sodium intake but also on managing carbohydrate consumption, to improve health outcomes in older patients with T2DM.

One of the key strengths of our study is its focus on older Korean patients with T2DM, a demographic often underrepresented in diabetes research. By examining the associations between comorbidities, nutrient intake, and quality of life, our study provides valuable insights into the unique health challenges faced by elderly Korean diabetics. Using data from the large, nationally representative KNHANES sample, we ensured that our findings are robust and applicable to this population. The use of EQ-5D scores allowed us to capture the impact of multiple comorbidities on various dimensions of daily living. Additionally, our study draws attention to critical dietary issues, such as the high sodium intake prevalent among older Koreans, emphasizing the need for culturally appropriate dietary interventions to improve health outcomes.

Limitations

Nevertheless, our study is not without limitations. First, while confounding factors were progressively adjusted based on a review of previous literature and a preliminary analysis comparing the quality of life among older patients with T2DM with different numbers of comorbidities, there remains the possibility of residual confounding due to unmeasured or unknown potential confounders. For example, the severity of T2DM, treatment type, and management efficacy were not adjusted for in the present study. This oversight might lead to residual confounding as these factors can affect the HRQoL of patients. Additionally, while we considered analyzing the type of comorbidities, the small sample size in subgroups with multiple overlapping conditions made it difficult to conduct robust statistical analyses. As a result, we focused on the number of comorbidities rather than specific types, which could limit the depth of our analysis regarding how different comorbidity types impact HRQoL. Second, as the study analyzed the KNHANES data from to 2008–2020, its cross-sectional nature limited its ability to establish causal relationships between causes and outcomes. For instance, it is challenging to prove a direct causal relationship between higher number of comorbidities in older patients with T2DM and lower HRQoL scores observed in the study. Various intermediary factors between comorbidity levels and low HRQoL may be involved; however, these factors may not completely account for the observed relationship. Therefore, the study results provide preliminary insights into the association between comorbidities and HRQoL. Finally, the study relied on self-reported data, which may have been subject to subjective biases. In particular, there could be errors in information such as dietary records, physical activity levels, and medical history.

Conclusion

Our study demonstrates a multifaceted relationship between comorbidities, diet, and HRQoL in Korean patients over 65 years of age with T2DM. We observed that

an increase in the number of comorbidities correlated with a decline in HRQoL. Notably, different patterns in nutrient intake, such as reduced carbohydrate consumption and increased fat intake, were associated with varying comorbidity levels. These findings underscore the need for national health policies and support systems that focus on both medical treatments and nutritional care. Further large-scale prospective cohort studies and clinical trials are essential to deepen our understanding of these relationships and develop comprehensive management strategies to improve the quality of life for older diabetic patients in Korea.

CONFLICT OF INTEREST

There are no financial or other issues that might lead to conflict of interest.

FUNDING

This research was funded by 2024 Yeungnam University Research Grant and the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT) (grant number: 2021R1A2C1007869).

DATA AVAILABILITY

This data that supports the findings of this study are openly available in KNHANES at https://knhanes.kdca.go.kr/knhanes/main.do.

ACKNOWLEDGMENTS

The authors are thankful to the investigators and participants of KNHANES.

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https://doi.org/10.5720/kjcn.2024.00014

Korean J Community Nutr. 2024 Oct;29(5):431-443
https://doi.org/10.5720/kjcn.2024.00009
eISSN 2951-3146

KJCN
Korean Journal of Community Nutrition

Research Article

장애인 식생활 지원제도 필요 및 지원방안에 관한 탐색적 조사연구

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The needs and prioritization of nutrition and dietary support for individuals with disabilities: an exploratory study

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Received: July 24, 2024
Revised: August 22, 2024
Accepted: September 5, 2024

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Objectives: Based on a survey of officers, social workers, and dietitians involved in managing nutrition and welfare policies or projects for vulnerable groups in local governments or private welfare institutions, this study aimed to assess the need for nutritional and dietary support policies and programs for persons with disabilities (PWD), as well as to identify appropriate support measures.

Methods: An online survey was conducted from March 2 to 15, 2021. The survey included 20 questions exploring perspectives on the nutritional status of PWD, their need for nutritional and dietary support policies and programs, and the prioritization of appropriate support measures. A total of 132 responses were analyzed.

Results: Approximately 68.9% of the respondents rated the nutritional status of PWD as "bad" or "very bad." A substantial number identified "difficulty in purchasing ingredients, cooking, and preparing meals independently due to disability," and "limited knowledge about nutrition and recipes necessary for maintaining a healthy and balanced diet" as the primary challenges in the dietary and nutritional management of this population. Additionally, 97.0% of the respondents deemed that the introduction of nutritional and dietary support policies and programs for PWD was "needed" or "very much needed." Priority strategies to implement and strengthen these policies and systems included the "development of customized programs and services tailored to the needs and demands of the target population" and the "establishment of a dedicated department with specialized personnel."

Conclusion: Comprehensive nutritional and dietary support policies and programs should be actively implemented to ensure a healthy and stable diet for PWD, tailored to meet their actual needs and demands.

Keywords: disability; disabled persons; food assistance; nutrition policy

INTRODUCTION

우리나라의 등록장애인 수는 2023년 말 기준 약 264만 명으로 전체 인구 대비 5.1%의 분포를 유지하고 있다[1]. 이는 지난 2003년의 3.0%, 2006년의 4.0%에 비해 상당히 증가한 수치로 의학기술의 발달로 과거에 비해 질병이나 외상에서 생명을 구하는 기회가 많아지고, 평균수명이 연장되면서 만성질환 및 노인성 질환 등의 원인으로 장애를 가진 채 생존하는 인구 비율이 증가하는데 따른 것으로 보인다[2]. 특히, 등록장애인 중 약 37.0%는 장애정도가 심한 중증장애에 해당하며, 65세 이상의 고령장애인 비율도 꾸준히 증가하여 지난 2010년 37.1%에서 2023년에는 53.9%에 이르렀다. 따라서 지속적으로 증가하고 있는 장애인구의 규모와 장애유형의 다양성, 고령화로 인해 복잡·다기화된 장애인의 건강 욕구에 부합하는 적절한 건강 정책 및 서비스에 대한 필요가 급증하고 있지만[3], 그간 우리나라의 장애인 정책은 대부분 장애관련 치료와 재활에 대한 재정적 지원책을 마련하는 데 많은 부분이 집중되어 있을 뿐 적극적인 질병예방이나 건강증진 측면에서의 접근은 상대적으로 많이 부족하였다[4].

장애인은 비장애인보다 상대적으로 건강행태가 좋지 못하고 건강상태도 취약하여 만성질환의 유병률이 높고 이로 인한 사망률도 더 높은 것으로 알려져 있어[5-9], 적극적인 예방 및 건강관리의 필요성이 요구된다. 그 중에서 올바르지 못한 식이 섭취는 비만, 당뇨병, 심혈관질환, 암과 같은 주요 만성질환의 예방가능한 중요한 위험요인 중 하나이며, 세계질병부담연구(Global Burden of Disease Study)에 따르면 올바르지 못한 식이 섭취가 흡연을 포함한 다른 어떤 위험요인보다 전세계적으로 사망과 장애보정 생존년수(disability-adjusted life-years, DALYs)에 기여하는 것으로 보고되었다[10].

하지만 장애인은 장애로 인해 불가피하게 지출하는 보조기기 구입·유지비, 의료비, 보호·간병비, 교통비 등의 장애 추가비용 부담으로 인해 식품 불안정성(food insecurity)의 위험이 높다[11, 12]. 게다가 신체적 장애와 같은 일부 장애유형의 경우 장보기나 음식 조리 등의 식사 준비에 제한이 있으며, 건강한 식생활을 실천하기 위한 방법 및 정보 등을 터득하는데 어려움을 겪는 장애유형도 있어 영양섭취 부족, 영양불균형 등의 식생활 문제와 더불어 '비만과 저체중'이라는 양극화된 체중 문제에 직면해 있는 것으로 보고되고 있다[13, 14].

이처럼 장애인은 대표적인 영양취약집단 중 하나이지만 영양정책 및 식생활관리사업의 제도적 사각지대에 놓여 있는 소외계층으로 그동안 국민건강증진종합계획이나 국민영양관리기본계획 등의 국가보건정책 수립 시 장애인의 영양지원 및 식생활 관리에 대한 고려는 거의 배제되어 있거나 극히 제한적인 논의만 언급되어 왔을 뿐이다[15-18]. 일부 수행된 장애인의 식생활 및 영양 관련 연구들의 경우도 대부분 질적연구나 실태를 파악하는 정도에 그칠 뿐 적극적인 식생활 지원제도 도입의 필요성과 구체적인 지원방안을 도출하기엔 한계가 있었다. 이에 본 연구는 전국의 지자체 및 사회복지서비스 기관에서 장애인, 노인, 저소득층 등을 포함한 취약계층 대상의 영양관리사업 및 복지사업을 담당하고 있는 공무원과 사회복지사, 영양사 등의 실무자들을 대상으로 설문조사를 실시하여 장애인의 식생활 및 영양 상태에 대한 현장에서의 인식과 장애인 식생활 지원제도의 필요도를 파악하고, 장애인의 식생활 지원 및 관리를 위한 방안과 시사점을 도출해 보고자 한다.

METHODS

Ethics statement

Informed written consent was obtained from each participant. The study protocol was approved by the Institutional Review Board of Chungbuk National University (approval number: CBNU-202010-HRHR-0171).

1. 연구 설계

본 연구는 탐색적 조사연구로 설계되었으며, 장애인 식생활 지원제도 도입에 대한 필요성과 지원방안에 대한 방향성을 파악하기 위하여 2021년 3월 2일부터 3월 15일까지 설문조사를 실시한 횡단면 조사 기반 연구이다. 따라서 단면연구의 STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) 보고 지침을 참고하여 기술하였다 (https://www.strobe-statement.org/).

2. 조사 대상

설문조사 대상에는 전국 시·군·구청 및 보건소의 영양관리사업 담당자, 시·군·구청의 취약계층 지원 및 복지사업 담당자(장애인복지과, 노인복지과, 주민복지과 등), 찾아가는 동주민센터의 복지플래너, 장애인, 노인, 저소득층 대상 복지서비스기관(장애인복지관, 노인복지관, 종합복지관, 장애인지원센터 등)의 사회복지사 및 영양사가 포함되었고, 자발적 표본추출에 의해 조사가 이루어졌다.

연구목적, 설문조사 대상, 설문조사 내용 등에 관한 정보가 담긴 설문조사 안내문과 설문조사지 샘플을 조사 시작 전에 해당 기관에 우편, 팩스, 이메일 등을 통해 사전 발송하였고, 관련 담당자들이 직접 웹 링크(web link)를 이용해 온라인 설문조사에 참여하도록 요청하였다. 모든 설문조사는 무기명으로 진행되었으며, 총 140명이 자발적으로 설문조사에 참여하였다. 이 중 8명은 설문조사 대상자가 아니거나 설문조사에 끝까지 참여하지 않은 중간 종결자로 최종 분석에서는 모두 제외하였다. 총 132명의 설문조사 응답자가 분석대상에 포함되었고 담당업무에 따라 '① 지자체의 장애인 및 기타 취약계층 지원 및 복지사

https://doi.org/10.5720/kjcn.2024.00009

업 담당자(찾아가는 동주민센터의 복지플래너 포함)', '② 지자체의 영양관리사업 담당자(보건소 포함)', '③ 장애인 및 기타 취약계층 대상 사회복지서비스 기관의 사회복지사 및 영양사' 3개 그룹으로 분류하였다.

3. 설문조사 내용

설문조사는 타당도와 신뢰도가 이미 검증되었거나 신뢰할 만한 공공기관의 조사를 활용하여 응답자들의 일반적 특성, 장애인의 식생활 및 영양 상태에 대한 주관적 인식, 장애인 지원제도 및 정책별 필요도, 장애인 식생활 지원제도 도입의 필요성 및 지원방안에 대한 방향성 등을 묻는 총 20개의 폐쇄형·개방형 설문문항으로 구성하였다. 구체적으로 장애인의 생활실태과 복지욕구를 파악하기 위한 국가단위 조사인 보건복지부 장애인 실태조사[19]와 취약계층 식품지원제도 개선방안에 관한 한국농촌경제연구원의 정책연구보고서[20, 21]를 활용하여 조사문항의 시안이 개발되었으며, 연구진 간의 교차 검토 및 전문가 자문을 통해 대상자에 맞게 일부 수정·보완이 이루어졌다. 장애인 식생활 지원제도에 관한 아이디어나 가설을 추출하기 위한 탐색적 조사연구로 진행된 관계로 별도의 신뢰도 검증은 이루어지지 않았다.

1) 일반적 특성

조사대상자의 연령대, 성별, 현재 담당업무[동주민센터 복지플래너, 보건소 영양관리사업 담당자, 사회복지서비스 기관(복지관, 복지센터, 지원센터 등)의 영양사, 지방자치단체의 영양관리사업 담당자, 지방자치단체의 취약계층 지원 및 복지사업 담당자, 사회복지서비스 기관의 취약계층 지원 및 복지사업 담당자], 해당 업무의 대상 취약계층(복수 응답: 저소득층, 고령자, 장애인, 한부모가정, 북한이탈주민, 결혼이민자, 기타), 해당 업무가 취약계층을 직접 방문·대면하는 업무에 해당하는지 여부, 해당 업무에서의 총 근무경력, 현재 소속기관의 행정구역 등에 대해 조사하였다.

2) 장애인의 식생활 및 영양 상태에 대한 인식

조사대상자의 장애인의 식생활 및 영양 상태에 대한 인식을 알아보기 위해 장애인의 식생활 및 영양 상태를 어떻게 평가하고 있는지(매우 좋다, 좋은 편이다, 나쁜 편이다, 매우 나쁘다), 식생활 및 영양 관리에서 장애인의 가장 큰 어려움 및 문제점은 무엇이라고 생각하는지(경제적 어려움으로 충분한 양의 양질의 식사를 하지 못한다, 건강하고 균형잡힌 식생활을 실천하기 위한 영양정보 및 조리법에 대해 잘 알지 못한다, 장애로 인하여 식재료 구입에 어려움이 있다, 장애로 인하여 누군가의 도움 없이는 조리 및 취사, 식사 준비가 힘들다, 음식을 씹거나 삼키는 등 음식 섭취에 어려움이 있다, 기타)에 대해 조사하였다. 이어서 15가지의 장애유형(지체, 뇌병변, 시각, 청각, 언어, 안면, 신장, 심장, 간, 호흡기, 장루·요루, 뇌전증, 지적, 자폐성, 정신) 중 식생활 및 영양 관리에서 가장 어려움이 크거나 도움을 필요로 하는 장애유형은 무엇이라고 생각하는지(복수 응답)에 대해서도 응답하도록 하였다.

3) 장애인 지원제도 및 정책별 필요도, 식생활 지원제도 도입의 필요성 및 지원방안

기본소득 보장, 주거 보장, 식생활 보장, 의료 보장, 보육 및 교육 보장, 직업교육 및 고용 보장, 이동권 보장, 장애인 건강관리, 의사소통과 정보접근 참여 보장, 장애인 인권보장 및 차별금지와 같이 선행연구에서 우선순위가 높았던 10가지 지원제도 및 정책별 필요도는 0점부터 10점으로 구성된 리커트 척도(Likert scale)를 이용하여 조사하였다. 이어서 향후 장애인을 위한 식생활 지원제도의 도입이 필요하다고 생각하는지(매우 필요하다, 필요한 편이다, 필요하지 않은 편이다, 전혀 필요하지 않다), 장애인을 위한 식품 및 식생활 지원 프로그램이 도입된다면 우선적으로 어떤 방식으로 지원되어야 한다고 생각하는지[복수 응답: 식품 및 음식을 직접 구매할 수 있는 바우처 제공, 필수식품 및 식재료 지원, 밀키트/쿠킹박스 배달, 밑반찬 및 도시락 배달, 지정 장소에서 무료급식 제공(복지관, 복지센터, 공공기관 급식소 등), 식사 준비 및 식사 보조 서비스, 맞춤형 식생활교육 및 영양관리 프로그램 운영, 기타], 장애인 식생활 지원 정책 및 제도의 활성화를 위한 전략적 우선순위 및 접근방안은 무엇이라고 생각하는지[지원을 위한 법적·제도적 근거 마련, 전담부서 설치 및 전담인력의 배치, 지원제도 창구의 통합 및 일원화, 전달체계의 개선, 대상자의 수요와 요구를 고려한 맞춤형 프로그램 및 서비스 개발, 지원대상자 및 지원범위(지원물량 및 품목 등)의 확대, 기타]에 대해서도 응답하도록 하였다. 추가적으로 장애인의 식생활 지원 및 영양 관리를 위한 정책 및 제도에 대한 추가적인 제언을 개방형으로 자유롭게 기술하도록 하였다.

4. 자료 분석 방법

조사대상자의 일반적 특성은 기술통계를 사용하여 빈도와 백분율로 제시하였고, 카이제곱 검정(chi-square test) 또는 피셔의 정확 검정(Fisher's exact test)을 실시하여 담당업무에 따른 3개 하위그룹별 분포의 차이에 대한 유의성을 검증하였다. 장애인의 식생활 및 영양 상태에 대한 인식, 장애인 식생활 지원제도 도입의 필요성 및 지원방안과 같은 객관식 조사문항의 경우도 빈도분석 및 카이제곱 검정을 통해 범주형 변수들의 분포 특성을 파악하였다. 0–10점 리커트 척도로 조사된 장애인 지원제도 및 정책별 필요도는 평균과 표준편차로 제시하였고, 담당업무에 따른 3개의 하위그룹에 대해서는 일원배치 분산분석(one-way analysis of variance)을 수행하여 그룹 간의 평균에 차이가 있는지 검정하였다. 모든 통계분석은 SAS ver 9.4 (SAS Insti-

tute)를 이용하였고, 통계적 유의성은 유의수준 5% ($P < 0.05$)에서 판단하였으며 모든 검정은 양측으로 진행되었다.

RESULTS

1. 응답자의 일반적 특성

설문조사에 참여한 132명의 응답자 중 지자체의 취약계층 지원 및 복지사업 담당자는 33.3% (n = 44), 지자체 및 보건소의 영양관리사업 담당자는 25.8% (n = 34), 장애인 및 기타 취약계층 대상 사회복지서비스기관의 사회복지사 및 영양사는 40.9% (n = 54)의 분포를 보였다(Table 1). 전체 응답자의 40.9%는 30대인 것으로 나타났으며, 이어서 40대(25.8%), 20대(21.2%), 50대 이상(12.1%) 순으로 높은 분포를 보였다. 전체 응답자의 75.0%는 여성이었고, 지자체 및 보건소의 영양관리사업 담당자 그룹에서 여성의 비율(97.1%)이 상대적으로 더 높은 것으로 나타났다($P = 0.003$).

전체 응답자의 72.0%는 취약계층을 직접 방문하거나 대면하는 업무를 맡고 있는 것으로 조사되었고, 현재 담당하고 있는 주 대상 취약계층으로 장애인(64.4%), 저소득층(40.9%), 노인(14.4%) 순으로 높게 나타났다. 지자체의 취약계층 지원 및 복지사업 담당자 그룹과 사회복지서비스 기관의 사회복지사 및 영양사 그룹의 경우 현재 담당하고 있는 주 대상 취약계층으로 장애인의 비율이 상대적으로 더 높은 반면($P < 0.001$), 지자체의 영양관리사업 담당자 그룹의 경우 저소득층의 비율이 더 높게 나타났다($P < 0.001$). 전체 응답자의 62.9%는 해당 업무에서의 근무경력이 3년 이상이었으나, 지자체의 취약계층 지원 및 복지사업 담당자 그룹의 경우 다른 그룹에 비해 상대적으로 더 짧은 근무경력을 가지고 있는 것으로 나타났다($P = 0.004$). 현재 소속기관의 행정구역은 서울 30.3%, 6개 광역시 17.4%, 제주를 포함한 9개 도 지역 52.3%의 분포를 보였다.

2. 장애인의 식생활 및 영양 상태에 대한 인식

장애인의 식생활 및 영양 상태에 대해 전체 응답자의 68.9%가 "나쁜 편이다" 또는 "매우 나쁘다"라고 평가하였으며, 특히 지자체의 영양관리사업 담당자 그룹에서 장애인의 식생활 및 영양 상태에 대한 부정적인 평가 비율이 상대적으로 더 높게 나타났다(85.3%, $P = 0.026$) (Table 2). 식생활 및 영양 관리에서 장애인이 직면하는 주요 어려움으로는 전체 응답자의 53.8%가 장애로 인해 식재료 구입, 조리 및 식사 준비가 타인의 도움 없이는 어려운 점을 가장 큰 문제로 지적하였고, 그 다음으로 건강하고 균형 잡힌 식생활을 위한 영양 정보 및 조리법에 대한 지식 부족(23.5%)과 경제적 어려움(16.7%)이 주요 어려움으로 인식되었다.

장애유형 중 식생활 및 영양 관리에서 가장 어려움이 크거나 도움을 가장 필요로 하는 장애유형(복수 응답)으로는 뇌병변(63.6%), 지체(55.3%), 지적(54.5%), 자폐성(34.8%), 시각(29.5%), 정신장애(17.4%) 순으로 높은 응답률을 보였다. 특히, 지자체의 취약계층 지원 및 복지사업 담당자 그룹의 경우 뇌병변장애를($P = 0.003$), 지자체의 영양관리사업 담당자 그룹의 경우 지체장애를($P = 0.012$), 사회복지서비스 기관의 사회복지사 및 영양사 그룹의 경우 지적장애($P = 0.007$)나 자폐성장애($P < 0.001$)와 같은 정신적 발달장애 유형을 식생활 및 영양 관리에 더 취약한 장애유형으로 인식하고 하는 있는 것으로 나타났다.

3. 장애인을 위한 지원제도 및 정책별 필요도

리커트 척도(0–10점)로 조사된 10가지의 장애인 지원제도 및 정책별 필요도는 '1순위: 의료비 보장' (7.76 ± 2.51)이 가장 높았고, 이어서 '2순위: 장애인 인권보장 및 차별금지' (7.74 ± 2.62), '3순위: 장애인 건강관리' (7.60 ± 2.52), '4순위: 이동권 보장' (7.45 ± 2.44), '5순위: 식생활 보장' (7.44 ± 2.52) 순으로 필요도가 높은 것으로 조사되었다(Table 3). 담당업무에 따른 3개 하위그룹별 분석에서도 그룹 간 약간의 순위 변동은 있었지만, 대부분 '의료비 보장'과 '장애인 인권보장 및 차별금지', '장애인 건강관리' 영역에서 좀 더 높은 필요도를 보였다. '식생활 보장'에 대한 필요도는 하위그룹별 분석에서도 4–5순위 정도를 유지했으며, '기본소득 보장'이나 '주거 보장', '보육 및 교육 보장', '의사소통과 정보접근 참여 보장' 등에 비해 상대적으로 필요도가 더 높은 것으로 조사되었다.

4. 장애인 식생활 지원제도 도입의 필요성과 지원 방식의 우선순위

장애인을 위한 식생활 지원제도 도입의 필요성에 대해서는 전체 참여자의 97.0%가 "매우 필요하다" (44.7%) 또는 "필요한 편이다" (52.3%)라고 응답했으며 특히, 사회복지서비스 기관의 사회복지사 및 영양사 그룹의 경우 61.1%가 "매우 필요하다"라고 응답하였다($P < 0.001$, Table 4).

장애인을 대상으로 한 식품지원제도 및 식생활 지원 프로그램 도입 시 가장 필요한 지원 방식으로는 전체 응답자의 52.3%가 '밑반찬 및 도시락 배달'이라고 응답하였고, 이어서 '식사 준비 및 식사 보조 서비스' (41.7%), '맞춤형 식생활 교육 및 영양관리 프로그램 운영' (25.8%), '필수식품 및 식재료 지원' (24.2%) 순으로 높은 응답률을 보였다. '밀키트(meal kit)·쿠킹박스(cooking box) 배달' (18.9%)이나, '지정 장소에서 무료급식 제공' (18.2%), '식품 및 음식을 직접 구매할 수 있는 바우처 제공' (17.4%)에 대해서는 상대적으로 낮은 선호도를 보였다. 담당업무에 따른 3개 하위그룹별 분석에서도 그룹 간의 유의한 차이는 나타나지 않았으며, 모든 그룹에서 '밑반찬 및 도시락 배달'과 '식사 준비 및 식사 보조 서비스'의 필요성을 더 높게 인식하고 있는 것으로 나타났다.

https://doi.org/10.5720/kjcn.2024.00009

Table 1. General characteristics of the survey participants

Variable	All (n = 132)	Responsibilities			*P*-value
		Local government officials in charge of support and welfare services for PWD and other vulnerable groups (n = 44)	Local government and public health center officials in charge of nutrition management projects (n = 34)	Social workers and dietitians in private welfare institutions for PWD or other vulnerable groups (n = 54)	
Age (year)					0.139
20–29	28 (21.2)	13 (29.5)	7 (20.6)	8 (14.8)	
30–39	54 (40.9)	19 (43.2)	16 (47.1)	19 (35.2)	
40–49	34 (25.8)	7 (15.9)	6 (17.6)	21 (38.9)	
≥ 50	16 (12.1)	5 (11.4)	5 (14.7)	6 (11.1)	
Sex					0.003
Male	33 (25.0)	14 (31.8)	1 (2.9)	18 (33.3)	
Female	99 (75.0)	30 (68.2)	33 (97.1)	36 (66.7)	
Responsible for face-to-face contact with vulnerable groups					0.532
Yes	95 (72.0)	29 (65.9)	25 (73.5)	41 (75.9)	
No	37 (28.0)	15 (34.1)	9 (26.5)	13 (24.1)	
Target group in charge (multiple responses)					
PWD					< 0.001
Yes	85 (64.4)	32 (72.7)	4 (11.8)	49 (90.7)	
No	47 (35.6)	12 (27.3)	30 (88.2)	5 (9.3)	
Low-income earners					< 0.001
Yes	54 (40.9)	18 (40.9)	26 (76.5)	10 (18.5)	
No	78 (59.1)	26 (59.1)	8 (23.5)	44 (81.5)	
Older adults					0.154
Yes	19 (14.4)	9 (20.5)	6 (17.6)	4 (7.4)	
No	113 (85.6)	35 (79.5)	28 (82.4)	50 (92.6)	
Other groups[1)]					< 0.001
Yes	31 (23.5)	9 (20.5)	18 (52.9)	4 (7.4)	
No	101 (76.5)	35 (79.5)	16 (47.1)	50 (92.6)	
Total work experience in the field (year)					0.004
< 1	22 (16.7)	11 (25.0)	7 (20.6)	4 (7.4)	
1–2	27 (20.5)	14 (31.8)	7 (20.6)	6 (11.1)	
3–5	31 (23.5)	9 (20.5)	7 (20.6)	15 (27.8)	
6–9	22 (16.7)	7 (15.9)	7 (20.6)	8 (14.8)	
≥10	30 (22.7)	3 (6.8)	6 (17.6)	21 (38.9)	
Administrative division of the affiliated institution					0.076
Seoul	40 (30.3)	15 (34.1)	4 (11.8)	21 (38.9)	
Six metropolitan cities	23 (17.4)	7 (15.9)	9 (26.5)	7 (13.0)	
Nine provinces	69 (52.3)	22 (50.0)	21 (61.8)	26 (48.1)	

n (%).
PWD, persons with disabilities.
[1)]Includes single-parent families, North Korean defectors, and marriage immigrants.

5. 장애인 식생활 지원 정책 및 제도의 활성화를 위한 우선순위 전략

장애인 식생활 지원 정책 및 제도의 활성화를 위한 우선순위 전략 및 접근 방법으로는 '대상자의 수요와 요구를 고려한 맞춤형 프로그램 및 서비스 개발' (37.1%)과 '전담부서 설치 및 전담인력의 배치' (23.5%), '지원제도 창구의 통합 및 일원화' (11.4%), '지원을 위한 법적·제도적 근거 마련' (11.4%), '지원대상자 및 지원범위의 확대' (8.3%), '전달체계의 개선' (8.3%) 순으

Table 2. Perception of the nutritional status of persons with disabilities

Variable	All (n = 132)	Responsibilities			*P*-value
		Local government officials in charge of support and welfare services for PWD and other vulnerable groups (n = 44)	Local government and public health center officials in charge of nutrition management projects (n = 34)	Social workers and dietitians in private welfare institutions for PWD and other vulnerable groups (n = 54)	
Perception of the nutritional status of PWD					0.026
Good or very good	41 (31.1)	19 (43.2)	5 (14.7)	17 (31.5)	
Bad or very bad	91 (68.9)	25 (56.8)	29 (85.3)	37 (68.5)	
Principal challenges of PWD in dietary and nutritional management					0.825
Inability to afford a good quality or satisfactory meal because of financial difficulties	22 (16.7)	8 (18.2)	7 (20.6)	7 (13.0)	
Insufficient information about nutrition and recipes to practice a healthy and balanced diet	31 (23.5)	9 (20.5)	8 (23.5)	14 (25.9)	
Difficulty in purchasing ingredients, cooking, and preparing meals without assistance because of their disability	71 (53.8)	25 (56.8)	18 (52.9)	28 (51.9)	
Other difficulties (e.g., difficulty in eating food, such as with chewing or swallowing)	8 (6.1)	2 (4.5)	1 (2.9)	5 (9.3)	
Major disability types that require the most assistance with dietary and nutritional management (multiple responses)					
Brain lesion					0.003
Yes	84 (63.6)	36 (81.8)	22 (64.7)	26 (48.1)	
No	48 (36.4)	8 (18.2)	12 (35.3)	28 (51.9)	
Physical disability					0.012
Yes	73 (55.3)	23 (52.3)	26 (76.5)	24 (44.4)	
No	59 (44.7)	21 (47.7)	8 (23.5)	30 (55.6)	
Intellectual disorder					0.007
Yes	72 (54.5)	21 (47.7)	13 (38.2)	38 (70.4)	
No	60 (45.5)	23 (52.3)	21 (61.8)	16 (29.6)	
Autistic disorder					< 0.001
Yes	46 (34.8)	7 (15.9)	6 (17.6)	33 (61.1)	
No	86 (65.2)	37 (84.1)	28 (82.4)	21 (38.9)	
Visual disability					0.511
Yes	39 (29.5)	15 (34.1)	11 (32.4)	13 (24.1)	
No	93 (70.5)	29 (65.9)	23 (67.6)	41 (75.9)	
Mental disorder					0.582
Yes	23 (17.4)	9 (20.5)	4 (11.8)	10 (18.5)	
No	109 (82.6)	35 (79.5)	30 (88.2)	44 (81.5)	
Renal disease					0.535
Yes	17 (12.9)	4 (9.1)	6 (17.6)	7 (13.0)	
No	115 (87.1)	40 (90.9)	28 (82.4)	47 (87.0)	
Other disability types					0.200
Yes	35 (26.5)	15 (34.1)	10 (29.4)	10 (18.5)	
No	97 (73.5)	29 (65.9)	24 (70.6)	44 (81.5)	

n (%).
PWD, persons with disabilities.

https://doi.org/10.5720/kjcn.2024.00009

Table 3. Need for support policies and systems for persons with disabilities

Variable	All (n = 132)	Responsibilities			*P*-value
		Local government officials in charge of support and welfare services for PWD and other vulnerable groups (n = 44)	Local government and public health center officials in charge of nutrition management projects (n = 34)	Social workers and dietitians in private welfare institutions for PWD and other vulnerable groups (n = 54)	
Needs for 10 types of basic support policies and systems for PWD (0–10 points)					
Guarantee of medical expenses	7.76 ± 2.51 (1st)	6.64 ± 2.89 (1st)	8.88 ± 1.63 (2nd)	7.96 ± 2.31 (2nd)	< 0.001
Guarantee of human rights and prohibition of discrimination against PWD	7.74 ± 2.62 (2nd)	6.39 ± 3.00 (2nd)	8.94 ± 1.74 (1st)	8.09 ± 2.28 (1st)	< 0.001
Health care for PWD	7.60 ± 2.52 (3rd)	6.34 ± 2.82 (3rd)	8.79 ± 1.68 (3rd)	7.87 ± 2.28 (3rd)	< 0.001
Mobility rights guarantee	7.45 ± 2.44 (4th)	6.23 ± 2.68 (4th)	8.53 ± 1.69 (6th)	7.78 ± 2.25 (5th)	< 0.001
Food and dietary security	7.44 ± 2.52 (5th)	6.05 ± 2.94 (5th)	8.59 ± 1.65 (4th)	7.85 ± 2.08 (4th)	< 0.001
Guarantee of communication, access to information, and participation	7.31 ± 2.42 (6th)	5.91 ± 2.69 (6th)	8.44 ± 1.64 (7th)	7.74 ± 2.07 (6th)	< 0.001
Vocational education and job guarantee	7.25 ± 2.53 (7th)	5.77 ± 2.62 (9th)	8.59 ± 1.73 (4th)	7.61 ± 2.29 (8th)	< 0.001
Guarantee of childcare and education	7.17 ± 2.51 (8th)	5.89 ± 2.69 (7th)	8.24 ± 1.86 (8th)	7.56 ± 2.31 (9th)	< 0.001
Basic income guarantee	7.14 ± 2.71 (9th)	5.73 ± 3.05 (10th)	8.18 ± 2.08 (9th)	7.63 ± 2.31 (7th)	< 0.001
Housing guarantee	7.07 ± 2.68 (10th)	5.80 ± 3.07 (8th)	8.03 ± 2.11 (10th)	7.50 ± 2.28 (10th)	< 0.001

Mean ± SD.
PWD, persons with disabilities.

로 높은 응답률을 보였다(Table 5). 담당업무에 따른 3개 하위그룹별 분석에서도 통계적으로 유의한 차이는 나타나지 않았다.

6. 실효성 있는 장애인의 식생활 지원 및 관리를 위한 정책 및 제도에 대한 제언

장애인의 식생활 지원 및 영양 관리를 위한 정책 및 제도의 실효성을 높이기 위한 추가적인 제언(개방형 문항)에는 총 132명 중 63명이 응답하였다. 대부분의 응답자들은 정책 및 제도의 활성화를 위한 우선순위 전략으로 앞서 언급된 주요 의견들을 재차 강조하였으며, 다음과 같은 세 가지의 핵심 의견이 도출되었다.

- 장애인의 생애주기 및 장애특성을 고려한 다양한 지원방식의 필요성

"식생활과 관련된 행동과 습관은 어릴 때부터 형성되고 성장 후 쉽게 변화하기 어렵기 때문에 장애아동부터 이러한 상담과 교육 및 지원이 필요할 것으로 보입니다."

"보건소에서 진행하고 있는 영양플러스 사업을 모티브로 하여 장애인의 생애주기에 따른 식생활 지원이 필요합니다."

"지적, 자폐성 장애는 교육 및 사업 진행 시 장애특성을 반영하여 전달 교육보다는 지원인력을 파견하고 직접 체험하고 실습할 수 있도록 하는 교육방식이 필요합니다."

"장애유형별 맞춤형 서비스 개발이 이루어져야 합니다."

"장애유형 및 정도에 따라 식품의 구매와 조리, 음식 섭취 능력에 차이가 있을 수 있습니다. 각 그룹의 특성에 맞게 식품 구매 바우처, 간편식 배달, 섭취 보조인력 투입, 식생활 교육 등 현실성 있게 사업이 만들어져야 하며, 일률적인 하나의 방식보단 장애특성에 맞춘 여러가지 방식들로 지원이 이루어지면 좋겠습니다."

- 적극적인 장애인 식생활 지원 및 사업추진을 위한 법적 근거 및 추진체계 마련의 필요성

"장애인의 식생활 관리는 생계, 치료, 삶과 생활유지를 위한 필수적 요소이므로 복지수준의 장애인 식생활 지원법 제정이 필요합니다."

- 체계적인 식생활 지원 및 관리를 위한 전담기관 및 전문인력 구성의 필요성

"장애인의 자립능력 향상을 위해서는 식생활 관리가 필수

Table 4. Needs and priorities for nutritional and dietary support policies and programs for persons with disabilities

Variable	All (n = 132)	Responsibilities			*P*-value
		Local government officials in charge of support and welfare services for PWD and other vulnerable groups (n = 44)	Local government and public health center officials in charge of nutrition management projects (n = 34)	Social workers and dietitians in private welfare institutions for PWD and other vulnerable groups (n = 54)	
Need for nutritional and dietary support policies and programs for PWD					< 0.001
Very much needed	59 (44.7)	10 (22.7)	16 (47.1)	33 (61.1)	
Needed	69 (52.3)	30 (68.2)	18 (52.9)	21 (38.9)	
Not needed or not very much needed	4 (3.0)	4 (9.1)	0 (0.0)	0 (0.0)	
Priorities for support measures when introducing nutrition and food assistance programs for PWD[1)]					
Delivery service of pre-cooked side dishes or lunch boxes	69 (52.3)	26 (59.1)	20 (58.8)	23 (42.6)	0.180
Providing meal preparation support services (e.g., preparing meals, cooking and serving, and grocery shopping)	55 (41.7)	17 (38.6)	16 (47.1)	22 (40.7)	0.744
Providing customized dietary education and nutrition management programs for PWD	34 (25.8)	8 (18.2)	9 (26.5)	17 (31.5)	0.324
Providing essential food assistance	32 (24.2)	12 (27.3)	6 (17.6)	14 (25.9)	0.575
Ready-to-cook meal kit or cooking box delivery services	25 (18.9)	9 (20.5)	7 (20.6)	9 (16.7)	0.857
Providing free meals at designated locations	24 (18.2)	6 (13.6)	4 (11.8)	14 (25.9)	0.155
Providing vouchers to purchase food or meals	23 (17.4)	10 (22.7)	6 (17.6)	7 (13.0)	0.448

n (%).
PWD, persons with disabilities.
[1)]Multiple responses; The values indicate the proportion of responses corresponding to “yes” in a “yes/no” format.

적입니다. 이러한 필수적인 식생활의 개선 및 체계적인 지원을 위한 관리체계가 필요합니다.”

“식사준비에서부터 영양관리까지 전문인력과 전담기관의 신설이 필요합니다. 기존 복지업무와 병행하는 경우 전문성 및 효율성이 떨어질 수 있습니다.”

“현장에서는 사회복지사들이 대부분 장애인의 식생활 업무를 지원하고 있는 것이 현실입니다. 장애인의 식생활 지원은 학교급식이 정착되는 과정처럼 전문적인 지식을 갖춘 영양사들의 책임 하에 진행되어야 할 것으로 생각합니다.”

“장애인 시설에 전문적인 영양관리 전담인력의 배치가 필요합니다.”

첫 번째 의견으로는 총 13명(지자체의 취약계층 지원 및 복지사업 담당자 2명, 지자체의 영양관리사업 담당자 5명, 장애인 및 기타 취약계층 대상 사회복지서비스 기관의 사회복지사 및 영양사 6명)이 일괄적인 지원방식보다는 장애인의 생애주기, 장애유형 및 장애정도 등을 고려한 다양한 맞춤형 지원방식을 발굴해야 한다고 제시하였다. 두 번째 의견으로는 총 11명(지자체의 취약계층 지원 및 복지사업 담당자 4명, 지자체의 영양관리사업 담당자 1명, 장애인 및 기타 취약계층 대상 사회복지서비스 기관의 사회복지사 및 영양사 6명)이 장애인 식생활 지원 및 사업추진을 위하여 별도의 법적 근거 및 체계적인 추진체계가 필요하다고 언급하였다. 세 번째로, 총 8명(지자체의 취약계층 지원 및 복지사업 담당자 4명, 지자체의 영양관리사업 담당자 2명, 장애인 및 기타 취약계층 대상 사회복지서비스 기관의 사회복지사 및 영양사 2명)의 대상자가 체계적이고 실효성 있는 식생활 지원 및 관리를 위한 전담기관과 전문 인력의 구성과 배치가 필요하다는 의견을 제시하였다.

https://doi.org/10.5720/kjcn.2024.00009

Table 5. Priority strategies for implementing and strengthening nutritional and dietary support policies and systems for persons with disabilities

Variable	All (n = 132)	Responsibilities			*P*-value
		Local government officials in charge of support and welfare services for PWD and other vulnerable groups (n = 44)	Local government and public health center officials in charge of nutrition management projects (n = 34)	Social workers and dietitians in private welfare institutions for PWD and other vulnerable groups (n = 54)	
Priority strategies for implementing and strengthening nutritional and dietary support policies and systems for PWD					0.099
Development of customized programs and services considering the needs of beneficiaries	49 (37.1)	11 (25.0)	11 (32.4)	27 (50.0)	
Establishment of a dedicated department and placement of dedicated personnel	31 (23.5)	12 (27.3)	9 (26.5)	10 (18.5)	
Integration of support systems for PWD	15 (11.4)	7 (15.9)	3 (8.8)	5 (9.3)	
Establishment of legal and institutional frameworks for support	15 (11.4)	5 (11.4)	7 (20.6)	3 (5.6)	
Expanding beneficiaries and the scope of support	11 (8.3)	2 (4.5)	3 (8.8)	6 (11.1)	
Well-designed support delivery systems	11 (8.3)	7 (15.9)	1 (2.9)	3 (5.6)	

n (%).
PWD, persons with disabilities.

DISCUSSION

본 연구는 국내 영양정책 및 식생활관리사업에서 제도적 사각지대에 놓여 있는 주요 영양취약집단인 장애인의 식생활 지원 필요성과 적절한 지원 방안을 모색하기 위해 전국 지자체 및 사회복지서비스 기관에서 장애인, 노인, 저소득층 등의 취약계층을 대상으로 영양관리 및 복지 사업을 담당하고 공무원 및 실무자들을 대상으로 설문조사를 실시하였다. 본 연구의 설문조사 결과와 그간의 도출된 주요 연구 결과를 중심으로 논의를 해보면 다음과 같다.

첫째, 설문조사 참여자들의 3분의 2 이상이 장애인의 식생활 및 영양 상태에 대해 전반적으로 부정적인 인식을 가지고 있었다. 특히, 장애인을 대상으로 한 업무 경험이 상대적으로 더 많은 두 그룹에 비해, 지자체 및 보건소의 영양관리사업 담당자 그룹에서 장애인의 식생활 및 영양상태에 대한 부정적인 인식이 더 높게 나타났다. 해당 그룹은 실질적으로 식품영양학 전공자, 영양사, 간호사 등의 비율이 높을 것으로 추정되며, 응답자의 전문 분야와 업무 특성상 장애로 인한 식생활 관리의 어려움과 문제를 더욱 심각하게 인식하는 경향이 반영된 것으로 보인다.

설문조사 참여자들이 인식한 장애인의 식생활 및 영양 관리에서의 주요 어려움으로는 장애로 인해 식재료 구입, 조리 및 식사 준비가 타인의 도움 없이는 어려울 수 있다는 점과 건강한 식생활을 위한 영양 정보 및 조리법에 대한 지식 부족이 가장 두드러지게 나타났다. 또한, 가장 취약한 장애유형으로는 거동이 불편하거나 일상생활에 제한이 있는 신체적 장애(예: 지체, 뇌병변, 시각장애 등)와 지적, 자폐성장애와 같이 비교적 장애정도가 심각한 정신적 장애가 식생활 관리에 더 큰 취약성을 지닌 유형으로 인식되었다.

선행연구에 의하면 장애인의 식생활 및 영양학적 문제는 신체적, 정신적 장애로 인한 장보기와 식사준비와 같은 일상생활에서의 사회적·물리적 제약과 장애(질환)로 인한 음식섭취의 제한, 영양 및 식생활관리에 관한 교육 및 정보의 부족, 그리고 소득감소 및 장애로 인한 추가비용 지출과 같은 경제적 이중부담 등의 복합적인 취약상태와 관련되어 있는 것으로 보고되었다[22–24]. 특히, 낮은 소득이나 고용 불안과 같은 경제적 취약성은 장애인 가구가 직면하는 식생활 관리의 어려움에 주요한 기여요인으로 작용한다. 미국 농무부의 데이터에 따르면 장애로 인해 노동력을 상실한 성인(18–64세)이 포함된 가구의 33.0%가 균형 잡힌 식사를 하지 못하거나 충분한 양의 식품을 섭취하지 못하는 등의 가구 식품불안정에 노출된 것으로 보고되었다. 또한, 장애로 인해 취업에 문제가 없는 성인 장애인이 포함된 가구에서도 22.4%가 식품불안정에 직면해 있었다[25]. 국내 연구에서는 국민건강영양조사 자료를 이용하여 장애와 가구 식품불안정성 간의 연관성을 분석한 결과 비장애인으로만 구성된 가

구에 비해 장애를 가지고 있는 가족구성원이 포함된 가구에서 식품안정성이 확보되지 못할 가능성이 더 높은 것으로 나타났다. 식품불안정성의 가능성은 특히 장애인 여성이 가구주인 가구, 가족구성원에 19–64세 연령대의 성인 장애인이 있는 가구, 경제 활동을 하지 않는 장애인 가족구성원이 있는 가구에서 더 높았고, 장애유형과 중증도에 따라서는 정신적 장애, 신체 내부기관의 장애, 1–3등급의 중증장애를 가지고 있는 가족구성원이 있는 가구에서 두드러졌다[11].

또한, 식사의 질적 특성을 평가한 연구에 따르면, 주요 영양소별 적정 섭취 비율(nutrient adequacy ratio, NAR)과 평균 영양소 적정 섭취 비율(mean adequacy ratio, MAR)을 이용하여 장애인과 비장애인의 식사의 질을 비교 결과, 장애인의 식사는 에너지, 단백질, 리보플라빈, 나이아신, 칼슘, 인 등 개별 영양소의 적정 섭취 비율뿐만 아니라 평균 적정 섭취 비율 측면에서도 전반적으로 식사의 질이 비장애인보다 더 낮은 것으로 나타났다[14]. 지적장애나 경계선 지능을 가지고 있는 대상자와 일반 인구집단 간의 식사의 질을 비교한 국외 연구에서도 지적장애나 경계선 지능을 가지고 있는 대상자는 대조군에 비해 전반적으로 식사의 질이 더 낮은 것으로 분석되었다. 특히, 그들은 가당음료, 가공육, 기타 건강에 해로운 식품들을 더 많이 섭취하고 생선과 견과류 등은 더 적게 섭취하는 경향을 보였으며, 경미한 지적 장애와 경계선 지능을 가지고 있는 대상자의 경우 체질량지수도 더 높게 나타났다[13].

장애인의 취약한 식생활 문제는 장애인의 생활실태 및 건강상태, 복지욕구 등을 파악하기 위해 전국 17개 시·도의 재가 등록장애인 7,000여 명을 대상으로 3년마다 실시하고 있는 장애인실태조사 결과에서도 부분적으로 확인할 수 있다. 해당 조사 결과(2020)에 의하면 '지난 일주일 동안 영양을 고려하여 식품을 골고루 섭취하였는지'에 대한 설문문항에 대해 '예'라고 응답한 장애인은 40.2%에 불과하였다[19]. 그리고 본 연구의 참여자들이 인식하고 있는 것과 대체로 유사한 양상으로 지체, 뇌병변장애와 같은 신체기능의 장애와 지적, 정신장애와 같은 정신적 장애유형에서 식품을 골고루 섭취하였다고 응답한 비율이 타 장애에 비해 상대적으로 더 낮은 것으로 조사되었다. 장애인 삶패널조사(2023) 결과에서도 '장보고, 음식을 만들고, 식사하는 것이 감당하기 힘들 때도 있다'고 응답한 비율이 타 장애에 비해 뇌병변장애에서 상대적으로 더 높았고, 패스트푸드(라면, 햄버거 등)를 일주일에 평균 '3회 이상' 섭취한다고 응답한 비율은 정신장애와 지적·자폐성장애에서 더 높은 것으로 조사되었다[26]. 특히, 발달장애의 경우 제한된 음식 선호도를 갖는 경우가 많으며, 식감 및 식품 온도에 대한 과민증, 특정 음식만 반복적으로 먹는 등의 심한 편식과 선별적 섭식장애 문제를 가지고 있을 가능성이 높다는 연구결과도 있었다[27].

두번째 논의는 설문조사에 참여한 응답자의 97.0%에 이르는 대부분이 장애인을 위한 식생활 지원에 대한 필요성을 강하게 인식하고 있다는 것이다. 현재 우리나라의 취약계층 식품지원 제도 및 관련사업으로는 농림축산식품부에서 시행하고 있는 저소득가구 학생 대상의 우유 무상급식 지원과 아침식사 결식률이 높은 대학생에게 양질의 아침식사를 천원에 제공하여 청년층의 건강한 식습관 형성을 지원하기 위한 천원의 아침밥 사업, 경제적 취약계층의 영양보충적 지원 정책의 일환으로 국내산 농축산물 구매를 지원하는 농식품바우처(또는 꾸러미 배송) 시범사업 등이 있다. 또한, 보건복지부의 관련 사업으로는 저소득층에 대한 최저 생활비 보장을 위한 국민기초생활보장제도 생계급여가 있고, 영양위험요인(빈혈, 저체중, 성장부진, 영양섭취상태 불량 중 1가지)을 가진 기준 중위소득 80% 이하의 임신부, 출산부, 수유부 및 영유아 대상자에게 영양교육 및 상담, 보충식품패키지를 제공하는 영양플러스 사업과 기초생활보장 수급권자 및 차상위계층 등의 저소득층에게 할인된 가격으로 정부양곡을 지원하는 정부양곡할인지원 등도 있다. 아동급식지원의 경우 경제적 빈곤이나 부모의 질병, 사망, 가출 등 가족기능의 결손으로 결식 우려나 급식지원이 필요한 취학·미취학 아동에게 식사를 제공하거나 식사를 할 수 있도록 급식카드 등을 지원하고 있다. 노인급식지원 사업은 크게 복지관 내 경로식당 운영을 통한 직접적인 무료급식 지원과 도시락 및 밑반찬 배달을 통해 거동이 불편한 재가노인에 대한 식사를 제공하는 두 가지 형태로 구분할 수 있다. 대부분 지방정부가 자체적으로 사업을 추진하고 있으며 사회복지기관 및 시설 위탁 등을 통해 민간영역에서 직접 식사를 제공하는 형태로 많이 운영되고 있다[20, 21, 28].

하지만 이러한 식품지원제도 및 보충영양관리사업들이 시행되고 있음에도 현장의 다양한 관계자들이 장애인 식생활 지원 제도의 필요성을 공통되게 인식하고 있다는 연구결과는 현재 추진되고 있는 제도 및 사업들이 장애인과 같은 특수한 영양취약계층을 충분히 고려하지 못하고 있음을 시사한다고 할 수 있다. 그동안 추진된 식품지원제도 및 보충영양관리사업의 지원대상으로는 사실상 소득수준을 최우선 필요조건으로 고려해 왔고, 상당수의 제도에서 국민기초생활보장제도의 선정 기준에 준하여 지원 대상을 선정함에 따라 중복 수혜 문제뿐만 아니라 이로 인한 제도의 광범위한 사각지대가 발생하기도 하였다[20]. 특히, 가구의 식품안정성 보장이 낮고 식생활 관리 역량 측면에서 신체적, 정신적, 사회적 제약과 어려움이 존재하는 장애인의 경우 그동안 이러한 식품지원제도의 혜택을 보장할 수 있는 장치가 많이 미흡하였다.

물론, 현재 제도 하에서 일부 저소득 장애인은 기존 식품지원제도의 수혜대상에 포함될 수 있다. 그러나 일반적인 선정기준을 적용해 비장애인과 동일한 기준으로 장애인을 식생활 지원 대상으로 선정하는 데는 여러 한계가 존재한다. 장애인 가구의 높은 식품불안정성은 주로 재정 자원의 감소, 가계 지출 증가, 가계 예산 관리 능력의 저하와 밀접하게 관련되며 특히, 장애로 인한 추가적인 의료비, 보조기기 구입 및 유지비, 활동 지

https://doi.org/10.5720/kjcn.2024.00009

원 서비스 비용, 특수 식단 비용 등의 경제적 부담으로 인해 장애인은 비장애인에 비해 식품불안정을 피하기 위해 2–3배의 더 많은 소득이 필요하다는 연구결과가 있다[29]. 실제로 장애수당과 장애인 복지 혜택이 일반 복지 혜택보다 더 크지만, 이러한 추가비용 부담으로 인해 실질적인 지원효과가 감소할 수 있다. 또한, 장애인 식생활 지원의 필요성은 단순히 낮은 소득이나 지출 증가, 고용불안과 같은 빈곤 위험을 넘어 인구통계학적 특성을 고려하더라도 여전히 높게 평가된다[25]. 특히, 신체적 장애로 인해 식료품 구매 및 음식 준비에 어려움을 겪는 장애인구의 경우, 이러한 제한으로 인해 상대적으로 비싸고 영양가가 낮은 가공식품이나 편의식품을 더 자주 선택하게 되는 등 식품 선택의 제한과 식사의 질적 관리 측면에서 어려움이 큰 것으로 보고되었다. 또한, 장애인에 대한 사회적 차별과 낙인은 특히 정신적 장애를 가진 장애인이 식생활 지원을 받는데 필요한 사회적 및 물질적 자원에 접근하는 데 부정적인 영향을 미치는 요인으로 작용하기도 한다[30].

그동안 한국에서는 「노인·장애인 등 사회복지시설의 급식안전 지원에 관한 법률」에 따라 2022년부터 영양사가 없는 소규모 노인·장애인 사회복지시설의 급식 위생 및 영양관리를 지원하기 위해 사회복지급식관리지원센터를 설치·운영하고 있으며, 2026년까지 전국 모든 시·군·구에 이를 확대하려는 고무적인 진전도 있었다[31]. 그러나 여전히 장애인복지시설에 거주하는 장애인뿐만 아니라 지역사회에서 자립하고자 하는 장애인의 안정적인 식생활 안전망을 구축하는 것은 중요한 과제로 남아 있다.

세번째는 장애인을 대상으로 하는 식품 및 식생활 지원제도의 지원(제공)방식에 대한 논의이다. 본 연구의 참여자들은 '밑반찬 및 도시락 배달'이나 '식사 준비 및 식사 보조 서비스'에 대한 필요성을 최우선적으로 꼽았으며, 이는 스스로 식사 준비가 어려울 수 있는 장애인 수혜자의 경우 식재료 전처리나 별도의 조리과정 없이 섭취가 바로 가능한 음식 형태의 지원이나, 직접적으로 식사 준비 및 식사 보조 서비스를 제공할 수 있는 인력 지원이 현실적으로 가장 필요하다고 인식하고 있기 때문으로 보여 진다.

취약계층을 대상으로 식생활을 지원하기 위한 적절한 지원방식에 대해 설문조사를 수행한 이전 연구에서도 노인과 장애인의 경우는 조리된 반찬이나 도시락을 해당가구에 배달하거나, 식품조리 등의 식사준비 서비스 형태로 지원받는 것을 더 선호하는 것으로 조사되었다. 특히, 신체적인 여건상 거동이 불편하고 조리능력이 없는 경우는 도시락 또는 밑반찬 배달 형태의 지원이 적합하며, 신체적인 불편이 없고 조리능력이 있으며 식품공급처에 대한 접근성이 용이한 도시나 중심지역에 거주하는 경우는 식품구매권(바우처 등) 형태의 지원이 적합할 수 있다고 제안하였다[20]. 하지만 장애인의 경우 생애주기 및 인구 사회학적 특성에 따른 고려뿐만 아니라, 장애유형 및 장애정도에 따른 신체적, 정신적, 발달적 특성과 식생활 관리능력, 식품 구매 및 공공 급식시설에 대한 접근성 등을 종합적으로 고려한 다양한 지원방식으로 세분화하여 제공할 필요가 있다.

마지막으로 장애인 식생활 지원 정책 및 제도의 활성화를 위한 전략 및 방법으로는 대상자의 수요와 요구를 고려한 맞춤형 프로그램 및 서비스 개발에 대한 우선순위가 가장 높은 것으로 나타났다. 장애의 원인과 유형이 복잡·다양하고 장애로 인한 각기 다른 건강상태와 이차장애 문제를 가질 수 있으므로 장애인의 건강 및 식생활 요구는 특수하고 개별적인 다양성을 조건으로 할 수밖에 없다. 따라서 장애인의 건강한 식생활을 지원하기 위한 정책 및 제도는 장애유형의 다양성과 고령화, 복합만성질환 이환과 같이 다각화된 장애인의 건강수요와 요구를 반영한 맞춤형 프로그램 및 서비스로 발굴·제공되어야 한다. 여기에는 장애인의 건강한 식생활 및 영양 관리를 위한 식생활지침의 개발, 영양상태 취약 장애인 및 그 가족에 대한 밀착전담 관리, 개별화된 건강상태 평가 및 영양요구 평가를 기반으로 하는 보충영양 지원 프로그램, 건강상태 및 섭취기능 등을 고려한 맞춤형·특수 식단의 개발 및 보급, 장애인과 그 가족, 활동보조사 등을 모두 포괄하는 적절한 영양 및 식생활 관리 방법에 대한 체계적인 교육, 지역사회 돌봄 자원과 연계한 통합적인 식생활 지원 및 모니터링 등이 포함될 수 있다. 또한, 장애인의 식생활 및 영양 실태에 관한 체계화된 조사 및 통계 구축, 정책적 활용을 위하여 국민건강영양조사나 국민식생활실태조사에 준하는 국가단위의 실태조사도 함께 추진되어야 한다[26–28]. 하지만 무엇보다 이러한 정책 및 제도의 일관성과 지속성, 안정적인 재정확보의 근거를 마련하기 위한 장애인 식생활 지원법안의 제·개정이 선행되어야 하며, 체계적인 전담조직과 전문인력의 구성, 기존의 식생활 관리 지원조직 및 보건의료·돌봄 자원 등과 연계한 촘촘한 전달체계의 구축도 필요하다.

Limitations

본 연구는 다음과 같은 제한점을 가지고 있다. 첫째, 본 연구에서 수집한 설문자료는 자발적 표본추출 방법에 의해 전국 지자체 및 사회복지서비스 기관에서 취약계층 대상으로 영양관리사업 및 복지사업을 담당하고 있는 공무원 및 실무자 132명을 대상으로 하였기 때문에 표본 선정에 있어서 대표성을 가진다고 할 수 없으며, 본 연구 결과를 일반화하는데 어느 정도 제한이 있을 수 있다. 특히, 설문조사 참여자를 장애인 식생활 전문가로 제한하지 않았기 때문에 응답자들이 객관적이고 전문적인 지식을 바탕으로 장애인의 식생활에 대한 의견을 제시했다고 단언할 수 없다. 또한, 설문조사 당시에는 사회복지급식관리지원센터가 설치되기 이전인 관계로 장애인 사회복지시설 급식분야의 전문가 및 실무자 의견을 충분하게 수렴하지 못했을 가능성이 있다. 둘째, 자기기입식 온라인 설문조사를 통해 직접적인 면대면 조사가 갖는 시공간적 한계와 부정적인 심리적 영향을 최소화할 수 있었지만, 전문가 의견수렴을 위한 조사방법으

로 많이 활용되는 델파이 조사방법(Delphi method)이나 표적집단면접(focus group interview) 등에 비해서는 해당 내용에 대한 보다 심도 있는 논의를 하는 데 있어서 한계가 있었음을 부인할 수 없다. 마지막으로 연구의 주요 도구가 설문지법으로 제한되었기 때문에 응답자의 일반적 특성 및 외향성, 친화성, 성실성, 정서적 안정성, 경험에 대한 개방성 등의 성격 특성에 의한 응답 편향(response bias)의 가능성을 배제할 수 없다.

Conclusion

장애인 사회복지시설의 급식 영양관리를 체계적으로 지원하기 위해 사회복지급식관리지원센터가 설치되는 등의 발전적인 진전이 이루어졌고, 이러한 기반 위에 장애인의 식생활 지원과 관리의 중요성이 널리 인식된 만큼 이제는 더 나아가 시설에 거주하는 장애인뿐만 아니라 지역사회에 거주·자립 중인 장애인까지 모두 포괄할 수 있는 식생활 안전망의 구축이 필요하다. 수요자 중심의 실제적 필요와 요구를 충족시킬 수 있는 통합적인 식생활 지원 정책 및 제도가 적극적으로 추진되어야 할 것이다.

CONFLICT OF INTEREST

There are no financial or other issues that might lead to conflict of interest.

FUNDING

This work was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (No. 2019R1I1A1A01063639 and 2022R1I1A3070074) and the Korea government (MSIT) (No. 2021R1C1C2008683).

DATA AVAILABILITY

The data that support the findings of this study are available from the authors upon reasonable request.

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Instructions for authors

KJCN
Korean Journal of Community Nutrition

Revised in October 15, 2024

1. GENERAL INFORMATION

The *Korean Journal of Community Nutrition* (KJCN), the official journal of the Korean Society of Community Nutrition, is a peer-reviewed, open access journal. It is published bimonthly in February, April, June, August, October and December. KJCN aims to publish original research articles and reviews covering all aspects of community nutrition. The journal also welcomes research notes and educational materials that provide a wide range of findings of community nutrition field. Topics of interest include nutrition throughout the life cycle, nutrition assessment, nutrition education, nutritional epidemiology, dietary behavior, clinical nutrition, international nutrition, nutrition policy, food service management, food culture and other topics related to the improvement of human nutritional status.

2. AUTHORS' QUALIFICATIONS

It is essential that at least one author of the manuscript is a member of the Korean Society of Community Nutrition. Exceptions will be made when the Editorial Committee invites authors and when researchers affiliated with institutions outside Korea submits.

3. TYPES OF MANUSCRIPTS

1) **Research articles:** Research articles are reports of original research in the area of community nutrition.
2) **Reviews:** Reviews provide concise and precise updates on the latest progress made within the scope of the journal. Systematic reviews should follow the PRISMA guidelines.
3) **Research notes:** Research notes discuss new ideas, research methods, or policy issues relevant to community nutrition.
4) **Educational materials:** Educational materials describe contents of nutrition education program, its application or new approaches to nutrition education.

4. RESEARCH AND PUBLICATION ETHICS

1) **Duplicate publication:** The manuscript must be original and not published or submitted for publication in other scientific journals.
2) **Authorship:** All authors listed in a manuscript must have contributed substantially to the research design, collection and analysis of data, or preparation of the manuscript. And they should agree to be responsible for investigating and solving research-related problems.
3) **Protection of human subjects:** Research carried out on human subjects must be in compliance with the Helsinki Declaration, and authors should specify that it was reviewed and approved by an Institutional Review Board (IRB).
4) **Conflicts of interest:** Authors must disclose any financial or personal relationships with the company or organization sponsoring the research.
5) **Adherence to the ethics guidelines:** Authors should adhere to the research ethics regulations and guidelines of Korean Society of Community Nutrition. For the policies on the research and publication ethics not stated in these instructions, international standards of publication ethics for editors and authors (http://publicationethics.org/international-standards-editorsand-authors) can be applied.
6) **Copyright:** Copyright of the published article belongs to the Korean Society of Community Nutrition. A copyright transfer form should be signed by all author(s) and sent when the manuscript is submitted.
7) **Preprints:** The journal does not accept research articles that have been shared as preprints.

5. CONSIDERATION OF SEX/GENDER

In all studies, sex (a biological variable) or gender (a socio, cultural, and psychological trait) should be factored into research designs and analyses and reported in a manuscript as follows.

- Sex and gender should be described separately and correctly.
- Both sexes/genders should be included in the human studies, and the differences between the sexes/genders should be analyzed and reported.
- If only one sex/gender is reported, or included in the

study, the reason the other sex/gender is not reported or included should be explained based on reasonable and scientific basis.

6. SUBMISSION

A manuscript file without authors' information must be submitted through our online submission system (https://submit-kjcn.or.kr) by the corresponding author. In addition, authors should remember to upload the author's information separately. This includes the title page, copyright transfer agreement signed by all authors, IRB approval, and author checklist. You can upload these documents to the "Attachment" section on the submission site.

7. PEER REVIEW

A submitted manuscript without authors' information is sent to two independent reviewers selected by an editor-in-chief or an editor. Reviewers review the manuscript in detail according to the KJCN review guidelines. The editor-in-chief then makes an initial decision based on the reviewers' comments and notifies the corresponding author of the decision within six weeks of receipt of a manuscript. One additional reviewer can be appointed when the two reviewers' comments are not in agreement.

8. MANUSCRIPT PREPARATION

1) **General:** Text must be written in Korean or English using MS Word program. The designated font style for English is Times New Roman in 11-point and the text should be 200%-spaced or double-spaced. Each page must be numbered beginning with the abstract page. Manuscripts are to have line numbers in the left margin.
2) **Title page:** The title page should include the following:
   - The type of manuscript (research articles, reviews, research notes, and educational materials)
   - The running head summarizing in Englisgh (50 characters or less including spaces)
   - Titles should be written in sentence case (only the first word of the text and proper nouns are capitalized). For observational studies (cross-sectional, case-control, or prospective cohort), clinical trials, systematic reviews, or meta-analyses, the subtitle should include the study design.
   - The names and affiliations, positions of all authors

A corresponding author should be marked with "†" at the end of the name. If some of the authors have different affiliations, superscript 1), 2), 3) should be placed at the end of each author's name in this order and the same number should be placed in front of the affiliation. 1), 2), 3) are attached in the same order, even if they belong to the same organization but have different positions.

The position of the researcher (professor, lecturer, student, researcher, etc.) should be listed in front of the affiliation. If there is no position and title, only the name is given. For minors who are not currently affiliated, submit the final affiliation, position, and school year separately.

<Example>
Youngok Kim[1)], Jin-Sook Yoon[2)†], Kil-dong Hong[3)], Na-ra Kim[4)]
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[2)]Professor, Department of Food and Nutrition, Keimyung University, Daegu, Korea
[3)]Student, Graduate School of Education, Keimyung University, Daegu, Korea
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- ORCID (https//orcid.org/)
  All authors should register their affiliation and position at ORCID. When author identification is required, this information can be used. ORCID numbers of all authors should be indicated without blinding.

<Example>
Kil-Dong Hong https://orcid.org/****-****-****-****

• Funding

When there is no funding associated with the manuscript, “None” should be stated.

<Example>

This research was supported by a grant from the National Research Foundation of Korea (Grant No. ***).

3) Arrangement of research articles: Each manuscript should be divided into the following sections in the order: Title page, Abstract, Introduction, Methods, Results, Discussion, Conflict of Interest, Acknowledgments, References, followed by Tables and Figures. These section headings and subheadings should be written in English. In case of educational materials, the contents of the results and discussion can be composed of contents, evaluation, and implications. In the case of a review, unlike the structure of a research articles, it can be described as an introduction, body, and conclusion. However, a scoping review or a systematic review should follow the structure of the research articles.

The journal encourages authors to describe the study according to the reporting guidelines relevant to their research design, such as those outlined by the EQUATOR Network (http://www.equator-network.org/home/) and the United States National Institutes of Health/ National Library of Medicine (http://www.nlm.nih.gov/services/research_report_guide.html).

• Ethics Statement

Authors should present an “Ethics statement” immediately after the heading “Methods”. In case of reviews, research notes and educational materials, “Ethics statement” should be presented after introduction section.

<Example>

The informed written consent was obtained from each participant. The study protocol was approved by the Institutional Review Board of *** (approval number).]

<Example>

Obtainment of informed consent was exempted by the institutional review board.

• Study Design

Authors should present the study design (e.g., descriptive analysis, randomized controlled trial, cohort study, or meta-analysis) and any reporting guidelines referenced in the "Methods" section.

<Example>

This was a cross-sectional study. It was described according to the STROBE statement (https://www.strobe-statement.org/).

• Discussion

Authors should interpret the results and provide the Limitations and Conclusion in the latter part of the “Discussion” section.

• Conflict of Interest

<Example>

There are no financial or other issues that might lead to conflict of interest.

<Example>

Kildong Hong has been an editor since 2021. However, he was not involved in the review process of this manuscript. Otherwise, there was no conflict of interest.

• Acknowledgments

Describe the person who helped write the thesis or research but was not appropriate as an author.

<Example>

We thank the physicians who performed the sample collection.

• Data Availability

Authors should provide a data availability statement. Providing access to research data is optional.

<Example>

The data that support the findings of this study are openly available in [repository name e.g “KNHANES”] at http://doi.org/[doi].

4) Abstract: A structured abstract of 250~300 words must be written in English under the following headings: Objectives, Methods, Results, and Conclusion. Abstracts should be accompanied by keywords in English.

5) Keywords: A Three to five keywords are recommended with one or two words except for technical terms. The terminology should be listed, in principle, in MeSH (www.nlm.nih.gov/mesh/MBrowser.html). Keywords are written in lowercase letters except for proper nouns,

and keywords are separated by a semicolon (;).

6) **Abbreviations:** All abbreviations must be defined in parentheses at first mention in the text. Abbreviations used in a table or figure should be defined in their respective table footnote or figure legend.

7) **Numbers and measurements:** Numbers should be presented in Arabic numerals. For most measurements, the International System of Units (SI) is recommended. The unit symbol should be placed after the numerical value and a space should be left between the numerical value and the unit symbol except %, ˚C.

8) **References**

- References should be numbered consecutively in the order in which they appear in the text using Arabic numerals in brackets.
- When more than one reference is cited at the same point in the text, they are included in the same bracket as below.

<Example>
[1-3] or [4, 7]

- When the authors' names of the references are inserted in the text, the last names of the authors are given in English. When the reference has two authors, both authors' names should be joined by '&,' and when the reference has more than two authors, the first author's name should be given followed by *'et al'*.

<Example>
Kim [2], Park & Lee [5], Brown *et al*. [7]

- Reference list should be given in English in numerical order corresponding to the order of citation in the text.
- References should follow the National Library of Medicine (NLM) style guide (http://www.nlm.nih.gov/citingmedicine).
- Abbreviations of journal names should be written according to the international rules for the abbreviation (https://www.ncbi.nlm.nih.gov/journals) or KoreaMed (https://www.koreamed.org/JournalBrowserNew.php).
- Master's thesis and doctoral dissertation should be cited less than three.

(1) Journal articles

① *Published journal articles*

Authors. Article title. Journal title Year of publication; Volume(Issue): Start page-Last page.

<Example> Mo YJ, Kim SB. Sodium related recognition, dietary attitude and education needs of dietitians working at customized home visiting health service. Korean J Community Nutr 2014; 19(6): 558-567.

When an article has more than six authors, the names of the first six authors should be given followed by 'et al.'

<Example> Yon MY, Lee HS, Kim DH, Lee JY, Nam JW, Moon GI et al. Breast-feeding and obesity in early childhood - based on the KNHANES 2008 through 2011-. Korean J Community Nutr 2013; 18(6): 644-651.

② *Forthcoming journal articles*

Authors. Article title. Journal title Year of publication. Forthcoming.

<Example> Kim YS, Lee HM, Kim JH. Sodium-related eating behaviors of parents and its relationship to eating behaviors of their preschool children. Korean J Community Nutr 2015. Forthcoming.

(2) Books

① *Entire books*

Authors. Title. Edition. Publisher; Year of publication. p. Start page-Last page.

<Example> Park YS, Lee JW, Seo JS, Lee BK, Lee HS, Lee SK. Nutrition education and counselling. 5th ed. Kyomunsa; 2014. p. 32-55.

<Example> Ministry of Health and Welfare (KR), The Korean Nutrition Society. Dietary reference intakes for Koreans 2020: Minerals. Ministry of Health and Welfare; 2020. p. 25-46.

② *Book chapter*

Chapter authors. Chapter title. In: Editor names, editors. Book title. Edition. Publisher; Year of publication. p. Start page-Last page.

<Example> Tamura T, Picciano MF, McGuire MK. Folate in pregnancy and lactation. In: Bailey LB, editor. Folate in Health and Disease. 2nd ed. CRC press; 2010. p. 111-131.

③ *Translated books*

Translators. Translated title(translated version). Edition. Original language originally written by authors. Publisher; Year of publication. p. Start page-Last page.

<Example> Mo SM, Kwon SJ, Lee KS. Do you know dining table of children? (translated version). 1st ed. Japanese original written by Adachi M. Kyomunsa; 2000. p. 20-22.

(3) Scientific reports

Authors. Report title. Performing organization; Year of publication Month of publication. Report No. Report number.

<Example> Lee YM. A study on development of food safety and nutrition education program for preschooler. Ministry of Food and Drug Safety; 2013 Nov. Report No. 13162consumer110.

(4) Thesis and dissertaion

Author. Title. [Book type]. Publisher; Year of publication. master's thesis for master degree, dissertation for doctoral degree

<Example> Ahn SY. The perception of sugar reduction in nutrition teachers or dieticians in charge of school meals and their use of added sugar in Seoul. [master's thesis]. Sookmyung Women's University; 2014.

(5) Conference papers

Authors of paper. Title of paper. Proceedings of Conference title; Year Month Day; Place of conference: p. Start page-Last page.

<Example> Shim JE. Infant and child feeding practices for development of healthy eating habits. Proceedings of 2014 Annual Conference of the Korean Society of Community Nutrition; 2014 Nov 14; Seoul: p. 195-213.

(6) Articles in magazine or newspaper

① *Magazine articles*

Author. Article title. Magaxine title. Year Month: Page.

<Example> Lee BM. Nutrition treatment of hereditary metabolic diseases. Nutrition and Dietetics. 2013 Dec: 12-19.

② *Newspaper articles*

Author or Organization. Article title. Newspaper title. Year Month Day; Section: Page.

<Example> Lee JH. Sodium reduction need to readjust policy. Food and Beverage News. 2014 Sep 29; Sect. A: 1.

(7) Materials on the internet

① *Web sites*

Author or Organization. Title [Internet]. Publisher; Year [cited Year Month Day]. Available from: electronic address

<Example> The Korean Society of Community Nutrition. Nutrient story [Internet]. The Korean Society of Community Nutrition; 2007 [cited 2015 May 12]. Available from: http://www.dietnet.or.kr/

② *Web page*

Author or Organization. Title [Internet]. Publisher; Year [updated Year Month Day; cited Year Month Day]. Available from: electronic address

<Example> Ministry of Food and Drug Safety. Winter food poisoning, be careful of norovirus [Internet]. Ministry of Food and Drug Safety; 2014 Nov 14 [updated 2014 Dec 11; cited 2015 Feb 1]; Available from: http://www.mfds.go.kr/fm/article/view.do?articleKey=1245&searchTitleFlag=1&boardKey=4&menuKey=167&currentPageNo=1

9) Tables and Figures: Tables and Figures must be written in English, and limited to a maximum of 10 altogether. Each table and figure should be prepared on a separate page and placed at the end of the text according to the order cited in the text. Citation of tables or figures in the text is as Table 1 or Fig. 1. Vertical lines are not used in tables. A title should be placed at the top of a table or at the bottom of a figure. The footnotes of the table are presented on Arabic numerals as superscripts 1), 2), 3). In case of indicating levels of significance, *P*-values should be presented in the body of each table, and if necessary, symbols can be used as *, **, ***, etc. To indicate the result of multi-range tests, letters such as a, b, c, etc. can be used.

9. PUBLICATION

Once the review process is completed, the manuscript cannot undergo any modifications in their contents or changes of the authors. PDF page proofs will be emailed

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The code of research ethics of the Korean Society of Community Nutrition

Enactment Jan 21, 2008
1st revision April 19, 2010
2nd revision March 28, 2014
3rd revision February 28, 2020

I. GENERAL RULES

1. Title

This code is titled as 'The Code of Research Ethics of the Korean Society of Community Nutrition.'

2. Purpose

The purpose of the code is to establish the standard for the research ethics observed by the members of the Korean Society of Community Nutrition and the contributors to the Korean Journal of Community Nutrition, and determine the establishment and operation of the Committee on the Research Ethics (hereafter the 'Committee') for fair and systematic verification in the case of the scientific misconduct.

II. ETHICS CODE FOR A RESEARCHER

3. Integrity of Researcher

A researcher should conduct research and publish research results with research integrity.

4. Inclusion of Scientific Misconduct

(1) Fabrication refers to the act of creating, documenting, or reporting the data or the research results that do not exist.
(2) Falsification refers to the act of creating the documentation that do not match study results by manipulating the research materials, equipment, or procedures or changing or omitting data or research results.
(3) Plagiarism refers to steal others' ideas, procedures, results, or records without legitimate authorization.
(4) The improper authorship refers to the act which confers authorship on the person without any academic contribution due to gratitude or seniority, or does not reward with authorship without proper cause to the person who academically contributes or devotes the research contents or results.
(5) It includes the acts which seriously exceed generally accepted criteria.

5. Prohibition of Duplicate Submission or Duplicate Publication of Research Product

A researcher should not submit or publish the same research results in two different places.

6. Authorship

Contributors who have made substantive intellectual contributions to a paper are given credit as author and authorship is based on the following four criteria.
(1) Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
(2) Drafting the work or reviewing it critically for important intellectual content; AND
(3) Final approval of the version to be published; AND
(4) Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

7. Record of Published Work

(1) An author should accept the credit for only the accomplishments of the research he/she conducted or contributed to and take responsibility for them.

(2) The order of the authors (including translators) of articles or other publications should be determined with fairness according to the extent of the contribution to research regardless of relative positions. Simply being in a particular position should not guarantee a credit as a co-author, the first author, or a corresponding author. Neither the act of not crediting the sufficient contribution to research with authorship can be justified. When the contribution to research is low, a statement of appreciation is expressed in a footnote, a preface, or an acknowledgement.

8. Citation and Reference

(1) An author who cites academic materials should make efforts to describe them accurately and state their sources clearly. The materials that are obtained from personal communication can be cited with the permission from the researcher who provides information.

(2) When an author cites or makes a reference to others' words, he/she should state the fact in a footnote, and distinguish them from his/her original thoughts or results of interpretation.

9. Role and Ethics for a Journal Editor

(1) An editor should request a reviewer with expertise in the field, objectivity, and impartial judgment for the evaluation of submitted manuscripts.

(2) An editor should not disclose the information about the author or the content of the manuscript until the submitted manuscript is decided to be published.

10. Role and Ethics for a Reviewer

(1) A reviewer should evaluate the manuscript under review with commitment and impartiality within a specified period and notify a journal editor of results.

(2) A reviewer should notify a journal editor immediately of the intention to resign from reviewing a manuscript when he/she believes oneself to be unsuitable for reviewing the manuscript.

(3) A reviewer should evaluate a manuscript with objective criteria and impartiality without consideration of one's academic beliefs or personal relationship with its author. A reviewer should not reject a manuscript without logical reasons or on the reason that it is in conflict with his/her own view or interpretation, and rate a manuscript without reading it thoroughly.

(4) A reviewer should respect an author's personality and individuality as an intellectual and use comments in a polite and gentle manner as much as possible, and should not use degrading or insulting expressions.

(5) A reviewer should maintain confidentiality of a manuscript under review and should not cite the content of a manuscript prior to its publication.

III. ESTABLISHEMENT AND OPERATION OF THE COMMITTEE

11. Function of the Committee

The Committee reviews and decides the issues below related to the research ethics of the members of the Korean Society of Community Nutrition.

1. The establishment of the research ethics
2. The prevention and investigation on the scientific misconduct
3. Whistleblower protection and confidentiality
4. Verification on the violation of the research ethics, process of the verification results and follow-up measures
5. Restoration in the honor of the examinee
6. Other issues imposed by the chair of the Committee

12. Organizing Principles of the Committee

The Committee consists of 5 members. The committee is chaired by the President of the Society and the Editor-in-chief serves as the associate chair of the committee. The other three are appointed by the President of the Society with the recommendation from the Executive Board.

13. Report and Receipt of the Scientific Misconduct

The whistle-blower may provide the information to the secretariat of the editorial board in the Korean Society of Community Nutrition directly or through the telephone, written document or e-mail on the real name. However, if the contents and evidence of the misconduct are specific, the report provided by an anonymous informant is considered as the case by the real-name person.

14. Authority for Verification and Recommendation of the Committee

The Committee is authorized to conduct an investigation about the allegation of the violation of the ethics code using a wide range of evidence from informants, the person under investigation, witnesses, and reference materials. The committee reviews and decides the status of violation of the ethics code based on the results of investigation, and recommends appropriate sanctions to the president based on the decision.

15. Verification Process of the Committee

The verification process for the act of violation of research ethics proceeds in the order of preliminary inquiry, investigation, and judgment. The investigation should be completed within 6 months. However, when the investigation is unlikely to be completed within the time frame, the investigation period may be extended with the committee chair's approval. When an informant or the person under investigation disagrees with the decision, he/she may file an appeal within 30 days from receiving notification, and the Committee may conduct reinvestigation if necessary.

16. Assurance of Opportunity to Be Heard

The member who is alleged to violate the Code of Research Ethics should be given a written notice of the overview of the issue under investigation. He/she is guaranteed to have an opportunity to submit a letter of explanation, and as long as he/she whishes, an opportunity to attend one or more of the Committee meetings in the investigation procedure and provide an oral explanation.

17. Confidentiality Duty for a Member of the Committee

A member of the Committee shall not disclose the identification of the reporter and the member suspected of the research ethics violation until the final decision is confirmed by the society.

18. Disciplinary Procedures and Content

In the event of proposed disciplinary measures by the Ethics Committee, the committee chair convenes the Executive Board and makes a final decision on the status and the content of discipline. The member who is determined to have violated the Code of Research Ethics may be given disciplines including warning, ban on manuscript submission for a specified period, and suspension or cancellation of membership depending on the severity of the issue, and the article may be retracted and the results may be disclosed if necessary.

19. Revision of the Code of Research Ethics

Revision procedure of the Code of Research Ethics follows the revision procedure of the code of the Society.

Author's checklist

Revised in October 15, 2024

Authors' quick submission checklist

(※ Please include the checklist when submitting the manuscript to the submission site.)

Category		Items to review	Check
Title page	1. Title	- Spelling and typographical errors in paper titles. - Titles should be written in sentence case, with only the first word of the text and proper-nouns capitalized. The study design should be included in the title or subtitle. e.g., Development and Effectiveness Evaluation of the STEAM Education Program on Food Groups for Kindergarteners -> Development and effectiveness evaluation of the STEAM education program on food groups for kindergarteners: a non-randomized controlled study e.g., Program Evaluation using the RE-AIM Framework: A Systematic Review and Application to a Pilot Health Promotion Program for Children -> Evaluation of the pilot health promotion program for children: a systematic review	
	2. Author Information	- Include all author titles and affiliations, and indicate the position before the affiliation	
	3. Submission	- The title page, the copyright transfer agreement, and IRB approval are all included when submitting your paper to the submission site by uploading them to the 'Attachment' section. - Remove the cover page including author information from the submitted paper before submitting	
	4. ORCID	- ORCID should be stated for all authors e.g., Gildong Hong: https://orcid.org/https://orcid.org/0000-0000-0000-0000	
	5. Funding	e.g., This research was supported by a grant from the National Research Foundation of Korea (Grant No. 000). - When there is no funding associated with the manuscript, 'None.' should be stated.	
Abstract	1. Structure	- Objectives-Methods-Results-Conclusion	
	2. Keywords	- Three to five keywords are recommended with one or two words except for technical terms. - The terminology should be listed, in principle, in MeSH (www.nlm.nih.gov/mesh/MBrowser.html). - Keywords are written in lowercase letters except for proper nouns, and keywords are separated by a semicolon (;).	
	3. Abbreviations	- Abbreviations should only be used if they are repeatedly used throughout the abstract. If an abbreviation is not used after it has been defined, use the full name instead - Define an abbreviation the first time it appears in the abstract	
Main body	1. Structure	- Title page, Abstract, Introduction, Methods (including ethics statement), Results, Discussion, Conflict of Interest, Acknowledgments, Data Availability References, Tables, and Figures - Include 'Study Design' in Method, subheadings in Results, and 'Limitations' and 'Conclusion' in Discussion - Upload tables and figures as a single file and do not separate them	
	2. Statistical software	- Enter the correct type and version of statistical software e.g., IBM SPSS Statistics 25 (IBM Corp.) e.g., SAS 9.4 (SAS Institute)	
	3. Ethics Statement	- Authors should present an "Ethics Statement" immediately after the heading "Methods". In case of reviews, research notes and educational materials, "Ethics statement" should be presented after introduction section e.g., The informed written consent was obtained from each participant. The study protocol was approved by the Institutional Review Board of *** (approval number: ***). *IRB approval statement will be included in the final version, but do not include specific IRB information (e.g., institution name) when submitting. e.g., Obtainment of informed consent was exempted by the institutional review board.	

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Category		Items to review	Check
	4. Conflict of Interest	- Conflict of interest must be stated. e.g., There are no financial or other issues that might lead to conflict of interest. e.g., Gildong Hong has been an editor since 2021. However, he was not involved in the review process of this manuscript. Otherwise, there was no conflict of interest. *Author information will be included in the final version but do not include it when submitting.	
	5. Acknowledgments	- List individuals who contributed to the writing or research, but do not meet the criteria for authorship. e.g., We thank the physicians who performed the sample collection. *This information will be included in the final version, but do not include it when submitting.	
	6. Data Availability	- Authors should provide a data availability statement. Providing access to research data is optional. e.g., The data that support the findings of this study are openly available in [repository name e.g "KNHANES"] at http://doi.org/[doi].	
	7. References	- Notation method: [1], [2, 5], [15-20], etc. without spaces before square brackets, when adding commas between references, add a space after commas. e.g., research on something [1] or Kim & Lee's research [2, 5] - References in the text should be listed in numerical order - The number of citations for the type of dissertation should not exceed 3. - Verify that the reference adheres to the KJCN guidelines	
	8. Other indications such as units	- Write numbers and units with a space (50 kg, 600 kcal), but attach % and °C. - g/dl (X), g/dL (O) - When indicating P-value, use capital, italic P: e.g., *P*-value - Use a en-dash "–" to indicate a range of numbers: e.g., 20–25 - Use comma notation to separate thousands (this also applies to text and tables): For example, 65,450,000.	
	9. Tables, figures	- Capitalize only the first letter of table and figure titles - Capitalize only the first letter of variables in the table - Use lowercase 'n' in tables and figures. - Additional checklists for tables and figures can be found in the section below.	

*Examples shown in the tables are based on recent publication, 2024.

GUIDELINE FOR TABLES AND FIGURES

Please adhere the following guidelines for tables and figures.

1. To indicate the total number of items outside of the table's body, include it in parentheses at the end of the table's title. For example, "Sociodemographic characteristics of children (n = 80)"
2. The table heading should provide a descriptive title for the values presented, rather than simply using "Mean ± SD" as the title.
3. When describing the contents of the table in the text:
   ① To present an average value, use Mean ± SD or Mean ± SE, and be mindful of spacing (e.g., 22.0 ± 2.3, with a space before and after the '±' symbol)
   ② Units should be written in parentheses within the table (e.g., Energy (kcal/day)) instead of next to it (Energy, kcal/day)
4. Footnotes or legends explanations for tables or figures should be written in English
5. The footnotes or legends should be arranged in the following order: Values displayed as statistical outcomes, statistical analysis method, indication of significance, etc.
   ① The presentation of values of statistical outcomes, such as n (%), Mean ± SD, n (%) or Mean ± SD, etc, are displayed in the first line of the footnote without comment numbers.
   ② Statistical analysis method and significance indication - Both statistical analysis methods and significance are discussed. - Post-hoc analysis results can only be presented when the ANOVA test yields significant results.
   ③ The full name of any abbreviations used in the title or table body should be provided in the footnote.
   ④ Any other content that requires explanation should be accompanied by corresponding comment numbers, following the submission guidelines. Verify that the comment numbers match the numbers indicated in the table body.

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투고규정

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(2024년 10월 15일 개정)

1. 학회지의 특성

본 학회지는 대한지역사회영양학회의 학술지로서, 전문가 심사를 거친 논문만을 게재하고, 논문 전문은 학회 홈페이지를 통해 공개된다. 학회지는 2개월마다(2월, 4월, 6월, 8월, 10월, 12월) 발행되며, 발행일은 발간월의 마지막날이다. 생애주기영양, 영양판정,영양교육, 영양역학, 식행동, 임상영양, 국제영양, 영양정책,급식및 외식 관리, 식문화와 기타 지역사회영양학 분야의 연구논문(research articles), 종설(reviews), 연구단보(research notes), 교육자료(educational materials) 등을 게재할 수 있다.

2. 투고 자격

저자 중 적어도 1명이 대한지역사회영양학회 회원이어야 투고할수 있으며, 비회원의 경우 편집위원회에서 위촉 또는 국외 기관에 소속된 저자가 투고할 시 가능하다.

3. 원고의 종류

1) **연구논문:** 지역사회영양학 분야의 새로운 논문
2) **종설:** 특정 주제에 대하여 간결하고 정확하게 최신문헌 및 견해를 기술한 논문, 체계적인 문헌고찰은 PRISMA 가이드라인을 따라야 함
3) **연구단보:** 지역사회영양학과 관련된 새로운 아이디어, 연구방법, 정책적 이슈 등에 대한 토의 보고
4) **교육자료:** 영양교육 프로그램의 내용과 활용, 또는 새로운 교육 접근방법 등에 관한 논문

4. 연구 및 출판윤리

1) **이중게재:** 원고는 다른 학회지에 발표되거나 투고되지 않은것이어야 한다.
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3) **피험자 보호:** 연구의 대상이 사람인 경우 헬싱키 선언에 입각하여 피험자를 보호하여야 하며, 연구를 수행하기 전 기관생명윤리위원회(Institutional Review Board; IRB)의 승인을 받아야 한다.
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7) **프리프린트(preprint):** 본 학회지는 프리프린트로 사전 공유된 연구논문을 허용하지 않는다.

5. 성(SEX)/젠더(GENDER)에 대한 고려

논문에서 결과에 영향을 줄 수 있는 인자로 생물학적 성(sex) 또는 사회문화적 성인 젠더(gender)를 인식하고 이에 대한 아래 내용을 논문에 포함하여야 한다.

- 성별 기술에서 성(sex)과 젠더(gender)를 구분하여 올바르게 기술한다.
- 연구 대상에 남성과 여성을 대상으로 포함하여 연구하고 그 결과를 비교분석하여 논문을 발표한다.
- 단일 성을 대상으로 연구한 경우는 학술적으로 타당한 근거를 제시한다.

6. 논문투고

교신저자는 온라인투고시스템(https://submit-kjcn.or.kr)으로 저자정보가 삭제된 원고파일을 제출한다. 저자정보가 포함 된 표지, 모든 저자의 서명이 작성된 IRB 승인서 사본, 저자체크리스트는 온라인 투고사이트 '첨부파일'에 업로드 한다.

7. 전문가 심사

편집이사 또는 편집위원은 저자정보가 삭제된 투고논문을 두 명의 전문가에게 심사하도록 보내고, 심사자는 대한지역사회영양학회지의 심사규정에 따라 심사한다. 편집이사는 심사자의 의견에 따라 첫 번째 결정을 내리고 6주 안에 교신저자에게 알린다.

두 명의 심사자의 의견이 다를 때에는 또 다른 심사자에게 심사하도록 한다.

8. 원고 작성법

1) 원고 작성: 원고는 MS 워드를 사용하여 한글 또는 영문으로 작성한다. 글자 크기는 11 point, 행간은 200% 또는 2줄 간격으로 하며, 영문 글꼴은 Times New Roman으로 한다. 영문초록을 1쪽으로 하여 쪽번호를 표기하며, 원고 왼쪽 여백에 줄 번호를 매긴다.

2) 표지: 다음의 내용을 포함한다.

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- 저자, 소속 및 직위를 국문과 영문으로 기재, 단 영문논문의 경우 영문으로만 기재

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〈예〉

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- 교신저자의 성명, 주소 및 전화번호, 팩스번호, 전자우편주소를 영문으로 기재. 전화와 팩스번호는 국가코드도 표기

〈예〉

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〈예〉

Kil-Dong Hong https://orcid.org/****-****-****-****

- 연구지원내역(Funding)

  해당하는 내용이 없더라도 'None.' 으로 기재한다.

〈예〉

This research was supported by a grant from the National Research Foundation of Korea (Grant No. ***).

3) 원고의 구성: 원고의 부제목은 모두 영문으로 작성하고, 구성은 다음과 같다. Title page, Abstract, Introduction, Methods, Results, Discussion, Conflict of Interest, Acknowledgments, Data Availability, References, Tables, Figures 순으로 한다. 단, 교육자료의 경우 결과와 고찰의 내용을 콘텐츠(Contents), 평가(Evaluation), 시사점(Implications) 등의 내용으로 구성할 수 있다. 종설의 경우 연구논문의 구성과 달리 서론, 본론, 결론의 구성으로 기술할 수 있다. 그러나 주제범위 고찰(scoping review)이나 체계적 고찰(systematic review)은 연구논문의 구성을 따라야 한다.

  본 학회지는 EQUATOR 네트워크(http://www.equator-network.org/home/)와 미국국립보건원/국립의학도서관(http://www.nlm.nih.gov/services/research_report_guide.html)에서 안내하는 보고지침에 따라 원고를 구성하도록 권장한다.

- 연구윤리(Ethics Statement)

  저자는 "방법(Method)" 연구윤리에 관해 영문으로 기술

해야 한다. 부제목 바로 아래에 제시하며 종설, 연구노트, 교육자료 등의 경우에는 서론 뒤(본론 전)에 제시한다.

〈예〉
The informed written consent was obtained from each participant. The study protocol was approved by the Institutional Review Board of *** (approval number: IRB승인번호).
〈예〉
Obtainment of informed consent was exempted by the institutional review board.

• 연구설계(Study design)
저자는 "방법(Methods)" 연구설계에 연구설계(기술분석, 무작위 대조연구, 코호트 연구 또는 메타 분석 등) 및 참고한 보고지침을 제시한다.

〈예〉 This was a cross-sectional study. It was described according to the STROBE statement (https://www.strobe-statement.org/).

• 고찰(Discussion)
저자는 결과를 해석하고 "고찰(Discussion)"의 후반부에 Limitations 및 Conclusion을 제시한다.

• 이해상충(Conflict of Interest)

〈예〉
There are no financial or other issues that might lead to conflict of interest.
〈예〉
Kildong Hong has been an editor since 2021. However, he was not involved in the review process of this manuscript. Otherwise, there was no conflict of interest.

• 감사의 글(Acknowledgments)
논문작성이나 연구를 도왔지만 저자로서 적절하지 않은 분 등을 기술한다.

〈예〉
We thank the physicians who performed the sample collection.

• 데이터가용성(Data Availability)
저자는 데이터가용성에 대한 설명을 작성해야하며, 데이터에 대해 접근을 허용하는 것은 선택사항이다.

〈예〉
The data that support the findings of this study are openly available in [repository name e.g "KNHANES"] at http://doi.org/[doi].

4) **영문초록:** 영문초록은 목적(Objectives), 연구방법(Methods), 결과(Results), 결론(Conclusion)의 소제목으로 구분하여 250~300단어로 작성한다. 초록 아래쪽에 주제어(Keywords)를 영문으로 표기한다.
5) **키워드:** 전문 용어를 제외한 1~2개의 단어로 구성된 3~5개의 키워드를 기재한다. 해당 키워드는 MeSH(https://meshb.nlm.nih.gov/search) 에 검색되는 단어로 작성한다. 키워드는 고유명사를 제외하고 모두 소문자로 표기하며, 구분 기호는 세미콜론(;)으로 작성한다.
6) **약어:** 제일 처음 나오는 곳에 완전한 이름을 먼저 표기한 후 괄호 안에 약어를 표기하며, 표 또는 그림에 사용된 약어는 각주 또는 그림 설명에서 설명한다.
7) **수량 및 단위:** 수량은 아라비아 숫자로, 도량단위는 SI 단위를 권장한다. %, ℃를 제외한 모든 단위는 숫자와 띄어쓴다.
8) **참고문헌**
• 본문 중에는 인용된 순서대로 [ ] 안에 번호로 기재한다.
• 본문의 한 문장에서 여러 개의 참고문헌을 인용할 때에는 다음과 같이 기재한다.

〈예〉 Kim [3]은, Park & Lee [5]는, Brown 등[7]은

• 본문 중에 참고문헌의 저자를 기재하는 경우 영문 last name을 표기한다. 저자가 2명일 경우에는 두 저자 사이에 &를 삽입하고, 3인 이상일 때는 제 1저자만 표기하고 "등"을 쓴다.

〈예〉 Kim [3]은, Park & Lee [5]는, Brown 등[7]은

• 참고문헌 목록은 인용된 순서에 따라 아라비아 숫자와 함께 영문으로 표기한다.
• The National Library of Medicine (NLM) 표준체제(http://www.nlm.nih.gov/citingmedicine)를 따라 작성한다.
• 학회지명은 약어로 표기하되 국제 약어 관례(PubMed 등재지 검색 사이트 http://www.ncbi.nlm.nih.gov/journals) 또는 KoreaMed 등재지 검색 사이트(http://www.koreamed.org/JournalBrowserNew.php)를 참고한다.
• 학위논문은 필요한 경우 3개 이내로 인용한다.

(1) 학술지

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9) 표 또는 그림

표와 그림은 영문으로 작성하며, 합하여 10개 이내로 하고, 한 장에 하나씩 작성하여 인용된 순서대로 본문 뒤에 첨부한다. 본문에 인용할 때는 Table 1 또는 Fig. 1 등으로 표기한다. 표 작성 시에는 종선은 사용하지 않는 것을 원칙으로 하며, 표의 제목은 표의 상단에, 그림의 제목은 그림의 하단에 기재한다. 각주는 1), 2), 3) 등으로 나타내고 하단에 그 내용을 표시한다. 단, 통계분석의 유의성 표시는 표 본문에 *P*-values를 제시하는 것으로 하고, 필요한 경우 *, **, *** 등으로, 다중 범위 검정에서는 a, b, c 등으로 사용한다.

9. 출판

심사가 끝난 논문은 내용이나 저자를 바꿀 수 없다. 교신저자는 교정본 PDF 파일을 e-mail로 받으면 3일 이내에 교정하여 보내야 한다. 원하는 저자에 한하여 게재된 논문의 별쇄본 20부를 제공한다. 저자는 게재된 논문의 게재료로 원고 편집비, 참고문헌 교정비, 파일 가공비 등 소요되는 비용을 부담한다. 단, 심사과정이 시작된 이후 논문을 철회한 경우에는 논문의 심사 단계에서 발생한 심사료 비용을 부담한다. 본 규정에 명시되지 아니한 사항은 편집위원회의 심의를 거쳐 결정한다.

논문투고와 출판 관련 모든 문의사항은 편집사무실로 연락한다.

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제정 2008. 1. 21
1차 개정 2010. 4. 19
2차 개정 2014. 3. 28
3차 개정 2020. 2. 28

제1장 총칙

제1조 (명칭)
이 규정은 “대한지역사회영양학회 연구윤리규정”이라 한다.

제2조 (목적)
이 규정은 대한지역사회영양학회 회원 및 대한지역사회영양학회지 투고자가 지켜야 할 연구윤리의 기준을 확립하고, 연구부정행위 발생 시 공정하고 체계적인 검증을 위한 연구윤리위원회(이하 “위원회”라 한다)의 설치 및 운영에 관한 사항을 규정함을 목적으로 한다.

제2장 연구자의 윤리규정

제3조 (연구의 진실성)
연구자는 연구의 진실성을 준수하여 연구를 수행하고 그 결과를 발표하여야 한다.

제4조 (연구부정행위의 범위)
연구부정행위는 다음 각 호와 같다.
1. 위조란 존재하지 않는 데이터나 연구 결과를 만들어 내고 이를 기록하거나 보고하는 행위를 의미한다.
2. 변조란 연구자료, 장비 또는 과정을 조작하거나, 데이터나 연구 결과를 변경하거나 생략하여 연구 기록이 연구결과와 부합하지 않게 하는 행위를 의미한다.
3. 표절이란 정당한 권한 없이 타인의 아이디어, 과정, 결과 또는 기록을 도용하는 것을 의미한다.
4. 부당한 논문저자 표시란 연구내용 또는 결과에 대하여 학문적으로 공헌 또는 기여를 한 사람에게 정당한 이유없이 논문저자 자격을 부여하지 않거나, 학문적으로 공헌 또는 기여를 하지 않은 자에게 감사의 표시 또는 예우 등을 이유로 논문저자 자격을 부여하는 행위를 말한다.
5. 기타 통상적으로 용인되는 범위를 심각하게 벗어난 행위를 포함한다.

제5조 (연구물의 중복 투고 및 이중 게재금지)
연구자는 연구결과를 중복 투고 및 이중 게재 하지 않아야 한다.

제6조 (저자됨)
저자는 출판하는 논문의 연구에 지적인 공헌을 한 자로서 다음 각 호의 자격을 모두 충족하여야 한다.
1. 연구의 구상이나 설계 또는 자료의 수집이나 분석이나 해석을 하는 데 있어서 상당한 공헌을 한 자
2. 논문의 초안을 작성하거나 주요 내용을 검토한 자
3. 출간될 원고를 최종 승인한 자
4. 연구의 정확성이나 무결성과 관련된 문제를 적절히 조사하고 해결하는 것에 책임이 있음을 동의한 자

제7조 (출판 업적의 명기)

① 저자는 자신이 행하거나 기여한 연구에 대해서만 업적을 인정받으며 그에 대한 책임을 진다.

② 논문이나 기타 출판의 저자(역자 포함)의 순서는 상대적 지위에 관계없이 연구에 기여한 정도에 따라 공정하게 정해져야 한다. 단순히 특정 직책으로 인하여 공동저자, 제1저자, 또는 교신저자가 될 수 없다. 연구에 충분히 기여했음에도 저자로 인정되지 않는 행위 또한 정당화될 수 없다. 연구에 대한 기여도가 낮을 경우 각주, 서문, 사의 등에서 사사의 글로 표시한다.

제8조 (인용 및 참고 표시)

① 저자가 학술 자료를 인용할 경우에는 정확하게 기술하도록 노력해야 하고 출처를 명확히 밝혀야 한다. 개인적인 접촉으로 얻은 자료의 경우에는 정보를 제공한 연구자의 동의를 받은 후 인용할 수 있다.

② 저자가 타인의 글을 인용하거나 참고할 경우에는 각주를 통해 인용 및 참고 여부를 밝혀야 하며, 선행연구의 결과인 부분과 저자의 독창적인 견해 또는 해석의 결과인 부분이 구분될 수 있도록 하여야 한다.

제9조 (논문 편집위원회의 역할및 윤리)

① 편집위원은 투고된 논문을 해당 분야의 전문적 지식과 객관적이고 공정한 판단 능력을 지닌 심사위원에게 평가 하도록 의뢰하여야 한다.

② 편집위원은 투고된 논문의 게재가 결정될 때까지는 저자에 대한 사항이나 논문의 내용을 공개하지 않아야 한다.

제10조 (논문 심사위원의 역할및 윤리)

① 심사위원은 심사 대상 논문을 심사규정이 정한 기간 내에 성실하고 공정하게 평가하고 결과를 편집위원에게 통보하여야 한다.

② 심사위원은 자신이 논문의 내용을 평가하기에 적임자가 아니라고 판단될 경우에는 편집위원에게 즉시 사퇴의사를 통보하여야 한다.

③ 심사위원은 심사 대상 논문을 개인적인 학술적 신념이나 저자와의 사적인 친분 관계를 떠나 객관적 기준에 의해 공정하게 심사하여야 한다. 충분한 근거를 명시하지 않은 채 논문을 탈락시키거나, 심사자 본인의 관점이나 해석과 상충된다는 이유로 논문을 탈락시켜서는 안 되며, 심사 대상 논문을 제대로 읽지 않은 채 평가하지 않아야 한다.

④ 심사위원은 전문 지식인으로서의 저자의 인격과 독립성을 존중하여야 하고, 평가의견은 가급적 정중하고 부드러운 표현을 사용하며 저자를 비하하거나 모욕적인 표현을 해서는 안 된다.

⑤ 심사위원은 심사 대상 논문에 대한 비밀을 지켜야 하며, 논문이 게재된 학술지가 출판되기 전에 논문의 내용을 인용해서는 안 된다.

제3장 연구윤리위원회의 설치와 운영

제11조 (위원회의 기능)

위원회는 대한지역사회영양학회 회원의 연구윤리와 관련된 다음 각 호의 사항을 심의, 의결한다.

1. 연구윤리 확립에 관한 사항
2. 연구부정행위의 예방, 조사에 관한 사항
3. 제보자 보호와 비밀유지에 관한 사항
4. 연구윤리 위반 검증 및 검증결과 처리와 후속조차에 관한 사항
5. 피조사자 명예회복 조치에 관한 사항
6. 기타 위원회 위원장이 부여하는 사항

제12조 (위원회의 구성)

위원회는 위원 5인 이상으로 구성하며, 위원장은 학회장으로 하고 부위원장은 편집이사로 하며 그 외 3인은 상임 이사회의 추천을 받아 학회장이 임명한다.

제13조 (연구부정행위의 제보 및 접수)

제보자는 대한지역사회영양학회 편집위원회 사무국에 직접 또는 전화, 서면, 전자우편 등으로 제보할 수 있으며 실명으로 제보해야 한다. 단, 익명제보라 하더라도 구체적인 연구부정행위의 내용과 증거를 포함하여 제보한 경우 이를 실명제보에 준한다.

제14조 (위원회의 검증 및 심의 권한)
위원회는 윤리규정 위반으로 보고된 사안에 대하여 제보자, 피조사자, 증인, 참고인 및 증거자료 등을 통하여 폭넓게 조사를 실시할 수 있고, 그러한 조사 결과에 따라 윤리규정 위반여부를 심의·판정한다.

제15조 (위원회의 검증 절차)
연구윤리 위반행위에 대한 검증절차는 예비조사, 본조사, 판정의 단계로 진행하며 모든 조사 일정은 6개월 이내에 종료되어야 한다. 단, 이 기간 내에 조사가 이루어지기 어렵다고 판단될 경우에는 위원장의 승인을 거쳐 조사 기간을 연장할 수 있다. 제보자 또는 피조사자가 판정에 불복할 경우에는 통보를 받은 날로부터 30일 이내에 이의신청을 할 수 있으며, 윤리위원회에서 이를 검토하여 필요한 경우 재조사를 실시할 수 있다.

제16조 (소명기회의 보장)
연구윤리규정 위반으로 보고된 회원에게는 조사대상이 된 사안의 개요를 서면 통지하고 정해진 기간 내에 소명서를 제출할 기회를 보장하고 본인이 희망하는 경우 본 조사 절차 중 1회 이상 윤리위원회의 회의에 출석하여 구술로 해명할 수 있는 기회를 주는 등 충분한 소명 기회를 주어야 한다.

제17조 (연구윤리위원의 비밀 보호 의무)
연구윤리위원은 제보자의 신원을 노출시켜서는 안 되며, 학회의 최종 결정이 내려질 때까지 연구윤리규정 위반으로 보고된 회원의 신분을 공개해서도 안 된다.

제18조 (징계의 절차 및 내용)
위원회의 징계 건의가 있을 경우, 위원장은 상임이사회를 소집하여 징계 여부 및 징계 내용을 최종적으로 결정한다. 연구윤리규정을 위반했다고 판정된 회원에 대해서는 사안의 경중을 고려하여 경고, 일정기간의 논문투고금지, 회원자격의 정지 또는 박탈 등의 징계를 할 수 있으며, 필요한 경우 논문 게재 취소와 그 결과를 공개할 수 있다.

제19조 (연구윤리규정의 개정)
연구윤리규정의 개정 절차는 본 학회의 규정 개정절차에 준한다.

자가점검표

(2024년 10월 15일 개정)

[논문 투고 전 저자 확인사항]
(※ Check 후 투고사이트에 함께 제출합니다.)

구분		확인사항	Check
논문표지	1. 제목	- 논문제목 철자 및 오타 - 영문 제목은 기본적으로 소문자로 작성(단, 문장의 첫 단어와 고유 명사는 대문자로 작성) 관찰 연구(단면조사연구, 환자-대조군 연구 또는 전향적 코호트 연구), 임상 연구, 체계적 문헌고찰 또는 메타 분석의 경우; 제목 또는 부제목에 연구디자인 제시 예) Development and Effectiveness Evaluation of the STEAM Education Program on Food Groups for Kindergarteners -〉 Development and effectiveness evaluation of the STEAM education program on food groups for kindergarteners: a non-randomized controlled study 예) Program Evaluation using the RE-AIM Framework: A Systematic Review and Application to a Pilot Health Promotion Program for Children -〉 Evaluation of the pilot health promotion program for children: a systematic review	
	2. 저자정보	- 저자, 소속 및 직위를 국문과 영문으로 기재, 단 영문논문의 경우 영문으로만 기재, 영문 기재시 소속 앞으로 직위 표기 - 저자 중 1인 이상은 학회 회원일 것. 단, 비회원의 경우 편집위원회에서 위촉 또는 국외 기관에 소속된 저자가 투고할 시 가능	
	3. 제출	- 논문표지는 본 체크리스트 및 저작권이전동의서, IRB승인서와 함께 투고사이트 '첨부파일'에 업로드 (투고사이트에 논문 제출시 동시 제출, 투고논문에는 표지부분 삭제)	
	4. ORCID	- 모든 저자의 ORCID 기술 예) Gildong Hong: https://orcid.org/0000-0000-0000-0000	
	5. Funding (연구지원내역)	예) This research was supported by a grant from the National Research Foundation of Korea (Grant No. 000). - 해당하는 내용이 없더라도 'None.' 으로 기재	
영문초록	1. 작성순서	- Objectives-Methods-Results-Conclusion 의 순서	
	2. 키워드	- 전문 용어를 제외한 1~2개의 단어로 구성된 3~5개의 키워드 기재 - 키워드는 MeSH (https://meshb.nlm.nih.gov/search)에 검색되는 단어로 작성 - 키워드는 고유명사를 제외하고 모두 소문자로 표기하며, 구분 기호는 세미콜론(;)으로 작성	
	3. 약어사용	- 약어를 정의하고, 그 약어가 논문에서 더 이상 사용되지 않는다면 약어 사용할 필요 없음. 전체 명칭 (full name)으로 작성 - 약어를 두 번 이상 본문에서 사용할 경우, 맨 처음 약어가 등장할 때 전체 명칭에 대해 약어 정의	
논문본문	1. 작성순서	- 원고의 부제목은 모두 영문으로 작성 Title page, Abstract, Introduction, Methods, Results, Discussion, Conflict of Interest, Acknowledgments, Data Availability, References, Tables, Figures 순서로 작성 - Method의 Study design, Results의 소제목, Discussion의 Limitations, Conclusion 반드시 작성 - 투고 시 표, 그림을 포함하여 하나의 파일로 업로드	
	2. 통계 패키지 정보 기입	- 종류 및 버전 정확히 기입 예) IBM SPSS Statistics 25 (IBM Corp.) 예) SAS 9.4 (SAS Institute)	
	3. Ethics Statement (연구윤리)	- 저자는 "방법(Method)" 부제목 바로 아래에 연구윤리에 관해 영문으로 기술. 종설, 연구노트, 교육자료 등의 경우에는 서론 뒤(본론 전)에 영문으로 제시. 예) The informed written consent was obtained from each participant. The study protocol was approved by the Institutional Review Board of *** (approval number: ***). *IRB 기관표시는 최종본에 기재(투고시 내용 삭제후 업로드) 예) Obtainment of informed consent was exempted by the institutional review board.	
	4. Conflict of Interest (이해상충)	예) There are no financial or other issues that might lead to conflict of interest. 예) Gildong Hong has been an editor since 2021. However, he was not involved in the review process of this manuscript. Otherwise, there was no conflict of interest. *저자정보는 최종본에 기재(투고시 내용 삭제후 업로드)	

(continued to the next page)

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구분		확인사항	Check
	5. Acknowledgments (감사의 글)	– 논문작성이나 연구를 도왔지만 저자로서 적절하지 않은 분 등을 기술. 예) We thank the physicians who performed the sample collection. *관련내용은 최종본에 기재(투고시 내용 삭제후 업로드)	
	6. Data Availability (데이터가용성)	– 저자는 데이터가용성에 대한 설명을 작성해야하며, 데이터에 대해 접근을 허용하는 것은 선택사항 예) The data that support the findings of this study are openly available in [repository name e.g "KNHANES"] at http://doi.org/[doi].	
	7. 참고문헌	– 표기방법: 대괄호[ ] 앞 띄어쓰기 없이 [1], [2, 5], [15–20] 등 표기, 문헌 사이 쉼표 추가시, 쉼표 뒤 띄어쓰기 예) ~에 관한 연구[1] 또는 Kim & Lee의 연구[2, 5] – 본문 내 참고문헌의 인용이 번호순으로 되어 있는지 확인 – 학위 논문 인용은 3개 이내로 제한 – 참고문헌 표기 규정에 맞는지 확인	
	8. 단위 등 기타 표시	– 숫자와 단위 띄어쓰기(50 kg, 600 kcal), 단, %, ℃ 붙임 – g/dl(X), g/dL(O) – P값 표기 시 : P 대문자, 기울임체 : 예) *P*–value – 숫자 등의 범위 표기 시 '–'를 사용: 예) 20–25 – 천 단위 쉼표 표기(본문, 표에도 적용): 예) 65,450,000	
	9. 표, 그림	– 표와 그림 제목: 첫 글자만 대문자 – 표에서 변수들 영문 표기시 : 첫 글자만 대문자 – 표와 그림에서 n을 소문자로 표기 – 투고규정에 따르며 그 외 형식은 별첨한 가이드라인에 따름	

*예시는 2024년도 최근 게재논문을 참고.

[논문 투고 전 저자 확인사항_표와 그림]

표와 그림 작성 시 다음의 사항을 유의하여 주시기 바랍니다.

1. 자료의 전체 수를 표 본문의 내용 밖으로 표시하고자 할 때는 표 제목 끝의 괄호 안에 제시
   예) Sociodemographic characteristics of children (n = 80)

2. 표 본문의 제목줄(table head)은 가능하면 제시된 값을 설명하는 것으로 하고, 단순히 Mean ± SD 등 만을 제목으로 하는 것을 지양함

3. 표 본문의 내용 작성 시
- 평균값을 제시하는 경우 Mean ± SD, Mean ± SE 으로 사용, 띄어쓰기 확인
  예) 22.0 ± 2.3 : ' ± ' 앞뒤로 띄어쓰기
- 표에서 단위는 괄호 안에 넣어서 표기
  예) Energy (kcal/day) (O)
  Energy, kcal/day (X)

4. 표와 그림을 설명하는 주석은 모두 영문으로 표기

5. 주석의 기술 순서는 가능하면 자료의 형태, 통계분석 방법 및 유의성 표시, 기타의 순서로 작성함
   1) 자료의 형태 제시
      예) n (%), Mean ± SD, n (%) or Mean ± SD 등 주석 번호 없이 첫줄에 제시
   2) 통계분석 방법 및 유의성 표시
      ① 통계적 유의성 뿐 아니라 통계분석 방법도 함께 제시함
      ② 사후검정 결과는 분산분석 등의 유의확률 제시가 선행되어야 함
   3) 약어를 사용한 경우 전체 명칭(full name)을 주석으로 제시함
   4) 기타 설명이 필요한 내용은 이후 투고규정에 따라 순서대로 번호를 달고 각주로 제시하며 표 본문에 표기한 번호와의 일치여부 확인