

Knowledge of atopic dermatitis and food allergies, as well as health information literacy, among North Korean refugee mothers: a descriptive survey study

In-Sook Lee¹, Jeong-Hee Jeon²¹Associate Professor, Department of Nursing, Hannam University, Daejeon; ²Visiting Professor, College of Nursing, Ewha Womans University, Seoul, Korea

Purpose: This study investigated knowledge of atopic dermatitis and food allergies, as well as health information literacy, among North Korean refugee mothers with preschool-age children and explored how these variables were related to participants' characteristics. **Methods:** A descriptive study design was used. Data from 130 North Korean refugee mothers were collected between January and March 2023. **Results:** The mean scores were 14.48 of 30 for atopic dermatitis knowledge; 2.77 of 10 for food allergy knowledge, and 56.95 of 80 for health information literacy. Significant differences were observed in knowledge of atopic dermatitis based on breastfeeding duration ($F=4.12$, $p=.009$), and in knowledge of food allergies based on mixed feeding ($F=3.11$, $p=.049$). Health information literacy showed significant relationships with education level ($F=3.76$, $p=.026$), occupation ($F=3.99$, $p=.021$), checking nutritional information ($t=2.91$, $p=.004$), mixed feeding ($F=4.50$, $p=.014$), and atopic dermatitis diagnosis ($t=6.86$, $p=.001$). Significant positive correlations were observed between atopic dermatitis knowledge, food allergy knowledge, and health information literacy. **Conclusion:** Personalized educational programs should be implemented to improve awareness of allergies and health information literacy among North Korean refugee mothers, which would help them find, evaluate, and understand health-related information. These programs should focus on providing nutrition and dietary education to promote healthy growth in children and prevent diseases.

Key words: Hypersensitivity; Knowledge; Health literacy; Refugees; Democratic People's Republic of Korea

Corresponding author

In-Sook Lee

Department of Nursing, Hannam University, 70 Hannam-ro, Daedeok-gu, Daejeon 34430, Korea
TEL: +82-42-629-8472
FAX: +82-42-629-8472
E-MAIL: is2009@hnu.kr

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INTRODUCTION

Allergic diseases, triggered by a variety of causes, are on the rise globally, with the age of onset progressively decreasing [1]. A recent study utilizing the National Health and Nutrition Examination Survey in South Korea revealed that the overall prevalence of allergic diseases in children under 6 years old was 23.5%, with allergic rhinitis, atopic dermatitis, and asthma being the most common in that order [2]. While the exact cause of allergic diseases like atopic dermatitis remains unknown, environmental factors such as the family's socioeconomic status [3] and the atmospheric environment [4] have been reported to be associated with atopic dermatitis. This suggests that both genetic and environmental factors

contribute to the development of atopic disease.

Atopic dermatitis has a stronger correlation with food than other allergic diseases. Foods such as eggs, milk, soybeans, and peanuts are commonly identified as primary triggers. By avoiding or limiting these foods, the incidence of allergies can potentially be reduced [5]. However, improper dietary restrictions, such as not providing suitable alternative foods, can lead to malnutrition and hinder growth in rapidly developing infants and young children. Therefore, if there are concerns about growth issues due to allergic diseases, it is crucial to provide alternative foods and consider appropriate nutritional management [6].

It is crucial to recognize that a baby's illness not only adversely impacts their health, but also places an additional bur-

den on the caregiver [7]. As primary caregivers, parents must acquire knowledge about diseases and health to effectively protect and nurture infants and toddlers. Given that young children cannot independently alter their environment or lifestyle, the role of parents in preventing food allergies and atopic dermatitis is paramount [8]. A child's nutritional intake and eating behavior are significantly influenced by the mother's eating habits and the dietary guidance provided to the child [9]. However, women who have defected from North Korea often maintain eating habits that were established in the past [10], and 68% of respondents who reported not knowing what a nutritional information table looks like also reported having poor eating habits [11]. Furthermore, incorrect health knowledge and inappropriate health practices, including misuse of drugs (self-diagnosis and treatment, use of folk remedies) formed in North Korea and third countries, persist and are expected to impact children's health [12]. Therefore, it is necessary to study children's food allergies, particularly atopic diseases which are food-related allergies, in relation to the mother's knowledge and attitude towards allergies.

Allergic diseases, which are prevalent in infancy and closely linked to dietary intake [3], lack systematic studies specifically targeting mothers of young children. Consequently, it is crucial to evaluate the understanding of food allergies and atopic diseases among North Korean mothers with preschool-aged children. This will facilitate early management and the development of effective strategies to combat allergic diseases.

It is essential for the mothers of children with allergies to have accurate information about their allergies, since they need to share the causes of the child's allergies with teachers when they engage in communal activities at places like day-care centers or kindergartens.

Health literacy refers to the capacity to acquire, process, comprehend, and communicate health-related information in order to make informed decisions about personal health issues [13]. This ability is shaped by factors such as social and cultural backgrounds, education, language skills, and the healthcare system. These factors, in turn, impact health behaviors, health status, and the outcomes and costs of patient treatment [14]. Consequently, individuals with low health literacy levels may lack knowledge about health and diseases, exhibit lower rates of preventive health behaviors, experience poorer health conditions, struggle to acquire and understand health-related information, and face difficulties in accessing appropriate healthcare services. This often leads to worse treatment outcomes [13]. Furthermore, health literacy plays a pivotal role in achieving health goals. Health professionals can cater to the needs of individuals with low literacy levels by providing health education and information using available community resources, such as language interpretation [14]. Many

individuals with low health literacy levels feel embarrassed, which leads them to conceal or withhold their health issues from healthcare providers. This hinders the recognition of their specific needs [13]. Therefore, addressing communication barriers due to low health literacy is crucial for improving access to appropriate healthcare services and health management. Health literacy is often lower in populations with low education levels, immigrants, the elderly, and low-income groups [15]. For instance, married immigrant women residing in Korea have significantly lower health literacy compared to native Koreans. This results in difficulties in understanding medical services and consultations [16]. The health literacy of North Korean defectors is notably low. It has been reported that the differences in medical terminology and medical systems between North and South Korea are the causes of this issue. Moreover, their health literacy does not improve even after residing in South Korea for a long period [17]. Additionally, Oh's study [18] discussed the collaboration of various support systems to ensure that health literacy, which is affected by language differences between North and South Korea, does not negatively impact individual health levels.

Considering these factors, health literacy is a crucial element for North Korean defector mothers as they adapt to a new society and raise their children. It plays a pivotal role in enabling effective communication with schools and healthcare institutions, thereby ensuring the healthy growth and development of their children.

Since atopic dermatitis or food allergy symptoms usually begin in infancy [1], creating programs for North Korean defector mothers with preschool children to address food allergies and atopic dermatitis would be highly beneficial. To achieve this, it is essential to start by conducting a survey about knowledge and the current status of food allergies and atopic dermatitis, including diagnosis, symptom experiences, and disease prevalence. Additionally, assessing their level of health information literacy is crucial.

Previous studies conducted in South Korea on food allergies or atopic diseases have primarily focused on the relationship between allergic diseases and nutritional intake in children, utilizing data from the National Health and Nutrition Survey [2]. Other research has explored customized meal management for school-aged children with atopic dermatitis [19], the impact of food intake during pregnancy or lactation on child allergies [20], and the influence of indoor environmental factors on atopic dermatitis [21]. In terms of demographic characteristics, one study [22] examined the use of medical institutions by children with allergic diseases, taking into account their socioeconomic status. The participants of these studies were predominantly children, adolescents, or parents of children, with most research investigating the prev-

allence of allergies and atopic dermatitis, as well as their risk factors, in these groups. However, there is a dearth of studies exploring the relationships between atopic dermatitis knowledge, food allergy knowledge, and health information literacy, specifically targeting North Korean women with preschool children.

This study aimed to identify and analyze the degree of knowledge and health information literacy concerning food allergies and atopic dermatitis, with the ultimate goal of assisting North Korean refugee women, who may not have easy access to health-related education or disease management treatments, in practicing healthy child-rearing. Consequently, the study was designed to provide the fundamental educational resources necessary to effectively support North Korean refugee women in fulfilling their roles as mothers.

The purpose of this study was to identify the prevalence of allergies and the level of knowledge of atopic dermatitis, knowledge of food allergies, and health information literacy among North Korean refugee women with preschool children, in order to facilitate the healthy growth and development of their children. It is intended to be used as basic data for an educational program. The objectives were as follows: (1) to identify the levels of knowledge of atopic dermatitis, knowledge of food allergies, and health information literacy among North Korean refugee mothers; (2) to analyze differences in knowledge of atopic dermatitis, knowledge of food allergies, and health information literacy according to participants' general characteristics; and (3) to analyze the correlation between participants' knowledge of atopic dermatitis, knowledge of food allergies, and health information literacy.

METHODS

Ethics statement: This study was approved by the Institutional Review Board (IRB) of Hannam University (No. 22-03-08-1222). Informed consent was obtained from all participants.

1. Study Design

This descriptive survey study examined the status of family's allergy, the level of knowledge of atopic dermatitis and food allergy, and the level of health information literacy among North Korean refugee mothers with preschool-aged children, and analyzed the correlations between major variables. This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines [23].

2. Participants

The target population for this study constituted North Korean refugee mothers registered with local community centers (Hana centers) for North Korean defectors, these centers are regional adaptation support centers located in Seoul, Gyeonggi-do, and Daejeon. Participants were selected based on their understanding of the study's objectives, methods, and questionnaires, and their voluntary agreement to participate. The selection criteria included (1) being a mother (over 18 years old) of a preschool-aged child; (2) the ability to communicate in Korean; and (3) the absence of any chronic disability or disease. The sample size was determined with consideration for potential invalid data resulting from errors or omissions inherent in self-report questionnaires. Using the G*Power 3.1 program and the correlation method, a sample size of 111 was calculated. This calculation was based on a significance level of .05, an effect size of .15, and a power of .95. To account for a potential dropout rate of 20%, the sample size was increased to 134. Out of the 140 North Korean refugee women who met the selection criteria, data from 130 respondents were analyzed. Ten questionnaires were excluded due to insincere responses.

3. Study Tools

1) Status of allergies

In this study, we utilized the tool developed by Oh et al. [24] to assess the current status of allergies. This tool, which was based on the Korean version of the International Study of Asthma and Allergies in Childhood (ISAAC). These items include questions about the prevalence and symptoms of allergies in the respondent, their family, and their children, as well as concerns arising from food allergies. For the purposes of this study, the terminology was adapted to ensure it was easily understandable for North Korean defectors.

2) Knowledge of allergies

(1) Atopic dermatitis

The level of knowledge of atopic dermatitis was measured using a tool developed by Chae [25] and modified by the researchers considering the level of participants' understanding. This tool is a self-report questionnaire composed of 30 items, which include 5 questions about the definition of atopic dermatitis, 2 questions about its causes, 5 questions about exacerbating factors, 4 questions about prevention, 10 questions about treatment and management, and 4 questions about nutritional management. Each item is scored on a binary scale (1 for a correct answer, 0 for an incorrect answer or an "I don't know" response), yielding a total score that could range from 0 to 30. Higher total scores indicate a greater understanding of atopic dermatitis. Items that are negatively keyed are scored

in reverse.

Instrument reliability was measured using Cronbach's α , which was .82 in the study by Chae [25] and .92 in this study.

(2) Food allergies

The level of food allergy knowledge was assessed using the Food Allergy Knowledge Scale, a tool developed by Oh et al. [24]. This instrument encompasses both food allergy knowledge and related education and counseling experience. The scale is a 10-item self-report questionnaire divided into three subscales: four questions pertain to basic food allergy knowledge, four questions address food allergy management, and two questions concern laws and regulations related to food allergies. Each item is scored on a binary scale (1=correct answer, 0=incorrect answer or lack of knowledge), with total scores ranging from 0 to 10. Higher total scores indicate a greater level of food allergy knowledge. Cronbach's α , as a measure of the instrument's reliability, was .85 in this study.

3) Health information literacy

Health information literacy was measured using the health information literacy scale, originally developed by Chew et al. [26], and later revised by Lee and Lee [27]. This scale measures several abilities, including the capacity to navigate healthcare system environments, the comprehension of medical form completion, the ability to adhere to medication instructions, the skill to interact effectively with healthcare providers, and the aptitude to read and understand reservations. The scale was further modified to use terms that North Korean refugee mothers could easily comprehend. It is a 16-item questionnaire, utilizing a 5-point Likert-type scale that ranges from 1 (not at all, 0%) to 5 (always, 100%). The total score can range from 16 to 80, with a higher score indicating a greater level of health information literacy. Cronbach's α was .76 in the study by Lee and Lee [27], and .84 in this study.

4. Data Collection

Data collection took place between January to March 2023, utilizing self-report questionnaires that were distributed to the participants. Before the collection process began, permissions were secured from the directors of the South-North Hana Centers. These centers form a network that offers medical counseling and resettlement support to North Korean refugees. The purpose of the study was explained to the directors before obtaining their consent. Participants were recruited through both online and offline posters. The identities of the participants were kept confidential from the directors of the individual centers. The survey was conducted in either the conference or counseling room of each center, with the assis-

tance of the working-level staff members. The women were informed about the purpose of the study and reassured about their anonymity and the confidentiality of their responses. They were also informed that the survey results would be used solely for academic purposes, and that they had the right to withdraw from the study at any time. The principal investigator and a pre-trained assistant handed out the questionnaires for the participants to fill out directly, and then collected them immediately after completion. If any participant needed assistance while filling out the questionnaire, either the research director or the assistant would help them. If any participant reported discomfort during the process, they were allowed to rest in a comfortable armchair. The principal investigator was responsible for assessing the condition of the participants and deciding whether they could continue. The questionnaire took approximately 15 to 20 minutes to complete. Upon completion, each participant was given a small token of appreciation as a thank you for their participation.

5. Data Analysis

The data were analyzed using the SPSS 23.0 program (IBM Corp.). The results of the analysis, which focused on differences in the dependent variables (knowledge of atopic dermatitis and food allergy, health information literacy) based on the general characteristics of the women, were presented as frequency, percentage, mean, and standard deviation. We conducted the t-test and analysis of variance, supplemented by the Scheffe post hoc test. If the assumption of normality was not met, we employed the Kruskal-Wallis tests. Pearson's correlation was utilized to analyze the correlations between variables.

RESULTS

1. Participants' General Characteristics and Differences in the Variables according to Their General Characteristics

In total, 45.4% of the participants were in their 40s, and 61.5% had completed high school. The most common occupation among the participants was currently on leave or unemployed, accounting for 62.3%. Additionally, a significant majority (86.9%) of the participants had lived in South Korea for more than 5 years. Within the group, 43.8% had a family member who smoked, and 61.5% checked nutritional ingredients when purchasing food. Furthermore, 61.5% of the participants had one child, and 75.4% breastfed their children. Among those who breastfed (75.4%, 98 participants), 42.9% breastfed for more than 6 months to 12 months, while 31.6% continued only breastfeeding not mixed feeding for more

than 6 months. Furthermore, 10.0% of the group had children diagnosed with atopic dermatitis, and 31.5% had children diagnosed with or suspected of having a food allergy. Among the 54 participants whose children showed food allergy symptoms, 39 (72.2%) had restricted their child's food intake. There were differences in participants' knowledge of atopic dermatitis depending on the breastfeeding period; specifically, those who breastfed for 3 months or less had significantly lower knowledge levels ($F=4.12, p=.009$).

Participants' knowledge of food allergies also showed significant differences based on whether they had engaged in mixed feeding. Among those who had engaged in mixed feeding, those who breastfed exclusively for 6 months or less had significantly lower knowledge than those who breastfed for more than 6 months ($F=3.11, p=.049$).

Furthermore, there were significant differences in the participants' health information literacy based on their education level, occupation, whether they checked the nutrition label when purchasing food, whether they had engaged in mixed feeding, and whether they or their child had been diagnosed with atopy. Participants who graduated from elementary school or lower had significantly lower health information literacy scores compared to those with a college education or higher ($F=3.76, p=.026$). There was a significant difference based on occupation, but this difference was not confirmed in the post-test ($F=3.99, p=.021$). Participants who checked the nutrition facts label had significantly higher scores than those who did not ($t=2.91, p=.004$). A significant difference was also observed based on whether participants had engaged in exclusive breastfeeding, although no difference was found in the post hoc test ($F=4.50, p=.014$). Participants whose children were diagnosed with atopic dermatitis had significantly lower scores than those who had no family members diagnosed with atopic dermatitis ($F=6.86, p=.001$). Those whose children were diagnosed with or suspected of having a food allergy had significantly lower health information literacy scores than their counterparts ($t=-4.08, p<.001$) (Table 1).

2. Other Allergy Status of Participants' Children

In addition to atopic dermatitis and food allergy, other allergy diagnoses that children received were rhinitis (19.2%), urticaria (14.6%), both rhinitis and asthma (3.1%), drug allergy (1.5%), and asthma (0.8%). Particularly when a child had a food allergy, participants were concerned about the child's discomfort in daily life, psychological stress, malnutrition, schoolwork, and friendships (Table 2).

3. Knowledge of Atopic Dermatitis and Food Allergies and Health Information Literacy

The overall mean score for knowledge of atopic dermatitis was 14.48 ± 6.01 out of 30 points ($0.48\pm 0.20/1$). The average knowledge score for food allergies was 2.77 ± 2.09 out of a possible 10 points. The average score for health information literacy was 56.95 ± 12.06 out of a possible 80 points ($3.56\pm 0.75/5$) (Table 3).

4. Correlations between Allergy Knowledge and Health Information Literacy

The correlation analysis revealed the following results: (1) the knowledge of atopic dermatitis was positively correlated with food allergy knowledge ($r=.53, p<.001$) and health information literacy ($r=.29, p=.001$); and (2) food allergy knowledge was positively correlated with health information literacy ($r=.38, p<.001$) (Table 4).

DISCUSSION

This study was conducted to provide basic educational data that could assist North Korean refugee mothers in fostering the growth and development of their children. To this end, levels of knowledge of atopic dermatitis and food allergies were examined among North Korean refugee mothers with preschool-age children, as well as their level of health information literacy.

The mean score for atopic dermatitis knowledge was 14.48 out of a possible 30 points. In the study of Chae [25], which focused on the parents of children at childcare centers in South Korea, the overall score was 19.5 points. Furthermore, the knowledge scores for the subscales differed from those reported in this study.

This study is distinct from previous research because it focused on women who had defected from North Korea and had limited access to medical information, making it difficult for them to acquire knowledge about atopic dermatitis compared to South Korean women. Inadequate management is expected when atopic dermatitis occurs in children. The results indicate the need for educational interventions. Particularly concerning is the low level of knowledge regarding nutritional management, which could potentially harm children in their growth and development stages. It is crucial for children to maintain a balanced nutrient intake, and the more foods that are restricted due to allergic diseases, the greater the impact on nutrient intake. Therefore, it is necessary to educate these women about the potential for growth retardation that can result from such restrictions.

The frequency of allergy diagnoses, excluding atopic dermatitis, in children was as follows: rhinitis at 19.2%, urticaria at 14.6%, combined rhinitis and asthma at 3.1%, drug allergy

Table 1. General Characteristics, Differences in Knowledge of Atopic Dermatitis, Knowledge of Food Allergies, and Health Literacy according to General Characteristics (N=130)

Variables	Categories	n (%)	Knowledge				Health literacy	
			Atopic dermatitis		Food Allergy		M±SD	t or F or χ^2 (p)
			M±SD	t or F or χ^2 (p)	M±SD	t or F or χ^2 (p)		
Age ^{a)} (year) (21.0-56.0)	< 40	40 (30.8)	0.48±0.20	0.04	0.25±0.21	0.49	3.55±0.67	0.19
	< 50	59 (45.4)	0.48±0.20	(.965)	0.29±0.22	(.615)	3.60±0.78	(.829)
	≥ 50	31 (23.8)	0.49±0.21		0.29±0.19		3.50±0.82	
Education level	≤ Elementary school	6 (4.6)	0.57±0.13	2.36	0.33±0.25	1.76	3.02±0.37 ^a	3.76
	Middle-high school	80 (61.5)	0.45±0.20	(.098)	0.25±0.21	(.176)	3.49±0.70	(.026)
	≥ College or university	44 (33.8)	0.48±0.20		0.32±0.21		3.77±0.84 ^b	a < b
Occupation	Self-employment	11 (8.5)	0.50±0.17	0.21	0.29±0.17	1.27	3.57±0.76	3.99
	Employees	38 (29.2)	0.46±0.18	(.808)	0.23±0.19	(.283)	3.28±0.60	(.021)
	Unemployed or leave of absence	81 (62.3)	0.49±0.21		0.30±0.22		3.69±0.79	
Duration of residency in South Korea ^{b)} (year) (2 months-2 years)	≤ 5	17 (13.1)	0.49±0.23	1.49	0.30±0.25	0.32	3.32±0.54	2.14
	5-10	65 (50.0)	0.48±0.20	(.220)	0.28±0.21	(.813)	3.72±0.74	(.098)
	10-15	32 (24.6)	0.44±0.21		0.25±0.22		3.42±0.79	
	> 15	16 (12.3)	0.57±0.14		0.29±0.16		3.43±0.84	
Smoking in family member	Yes	57 (43.8)	0.48±0.21	-0.33	0.28±0.21	0.10	3.60±0.78	0.58
	No	73 (56.2)	0.49±0.19	(.744)	0.28±0.21	(.923)	3.53±0.74	(.564)
Checking the nutrition facts label on food	Yes	80 (61.5)	0.49±0.22	0.84	0.30±0.22	1.25	3.70±0.80	2.91
	No	50 (38.5)	0.47±0.16	(.404)	0.25±0.20	(.213)	3.34±0.63	(.004)
Number of children	1	80 (61.5)	0.49±0.20	0.21	0.28±0.21	-0.13	3.60±0.74	0.82
	≥ 2	50 (38.5)	0.48±0.20	(.838)	0.28±0.22	(.895)	3.49±0.77	(.416)
Breastfeeding	Yes	98 (75.4)	0.50±0.20	1.61	0.30±0.20	1.93	3.61±0.79	1.69
	No	32 (24.6)	0.43±0.19	(.110)	0.22±0.21	(.056)	3.39±0.61	(.096)
Breastfeeding duration (month) (n=98)	< 3	5 (5.1)	0.21±0.23 ^a	4.12	0.10±0.10	2.31	3.38±0.53	0.52
	3-6	13 (13.3)	0.50±0.18 ^b	(.009)	0.27±0.22	(.082)	3.42±0.75	(.669)
	6-12	42 (42.9)	0.53±0.17 ^b	a < b	0.34±0.19		3.64±0.83	
	> 12	38 (38.8)	0.50±0.22 ^b		0.29±0.21		3.69±0.79	
Exclusive breastfeeding duration (month) (n=98)	None (mixed feeding)	54 (55.1)	0.49±0.19	2.84	0.29±0.20	3.11	3.41±0.77	4.50
	≤ 6	13 (13.3)	0.41±0.23	(.063)	0.19±0.22 ^a	(.049)	3.83±0.66	(.014)
	> 6	31 (31.6)	0.56±0.20		0.35±0.20 ^b	a < b	3.89±0.79	
Atopic dermatitis diagnosis	Child	13 (10.0)	0.51±0.21	1.08	0.26±0.21	0.04	2.98±0.41 ^a	6.86
	Family member (including mother)	44 (33.8)	0.51±0.15	(.344)	0.28±0.22	(.961)	3.45±0.75	(.001)
	None	73 (56.2)	0.46±0.22		0.28±0.20		3.73±0.74 ^b	a < b
Child food allergy diagnosis or suspected allergy	Yes	41 (31.5)	0.51±0.14	1.10	0.27±0.21	-0.14	3.21±0.61	-4.08
	No	89 (68.5)	0.47±0.22	(.276)	0.28±0.21	(.890)	3.71±0.76	(< .001)
Restriction of food if an allergy is diagnosed (n=54)	Yes	39 (72.2)	0.48±0.17	0.00	0.24±0.21	-0.57	3.22±0.61	-1.04
	No	15 (27.8)	0.48±0.20	(1.000)	0.28±0.21	(.570)	3.42±0.71	(.304)

^{a)}M±SD 42.9±7.6 years; ^{b)}M±SD 113.1±51.4 months; M, mean; SD, standard deviation.

at 1.5%, and asthma alone at 0.8%. In a study by Ji and Son using data from the National Health and Nutrition Examination Survey in South Korea [2], the frequency of allergic diseases in children under the age of 6 was reported as allergic rhinitis

(53.6%), atopic dermatitis (27.0%), diagnosis of two or more allergic diseases (14.9%), and asthma (4.5%). This discrepancy is believed to be due to the results of a self-reported questionnaire survey completed by mothers who defected from

North Korea. It is essential for individuals experiencing allergy symptoms to seek medical attention from qualified healthcare providers to ensure an accurate diagnosis and appropriate treatment. However, given that North Korean refugees have limited access to medical care [10], the actual rate of allergy diagnosis may have been underestimated.

Significant differences were observed in participants' knowledge of atopic dermatitis based on the duration of breastfeeding, with the group breastfeeding for ≤ 3 months scoring significantly lower than the other groups. It is well-established that breastfeeding can reduce the prevalence of atopic dermatitis and asthma among allergic diseases when it continues for more than 6 months, as it delivers antigens to children [28]. This study reinforces the findings of previous research, un-

derscoring the importance of education about atopic dermatitis and the potential long-term benefits of breastfeeding. Furthermore, a study by Lee [7] found that North Korean defector women who were planning pregnancy and those with one infant had the least demand for breastfeeding, indicating a need for breastfeeding education. Therefore, incorporating education on the importance and potential benefits of breastfeeding into atopic dermatitis treatment management and nutritional management could potentially enhance children's long-term health.

Participants with an elementary school education or lower scored 3.02 points, significantly lower than the 3.77 points scored by participants with a community college education or higher. These results suggest that an effective education plan, tailored to the level of education, could help raise awareness of atopic dermatitis prevention and treatment. Allergic diseases are likely to persist into adulthood if appropriate treatment is delayed or if a treatment plan is not followed during childhood. Moreover, childhood allergic diseases can last a lifetime, including into old age, and can decrease quality of life due to frequent flare-ups and worsening symptoms. Therefore, prevention and management are essential. Even if symptoms of an allergic disease appear in childhood, effective early management can reduce the severity of symptoms, thereby minimizing disruptions to daily life, such as work and school, due to allergic diseases in adulthood [29]. Comprehensive education and support are vital for North Korean defector women who are struggling to adapt to a new society.

Table 2. Other Allergy Status of Participants' Children (N=130)

Variables	Categories	n (%)
Allergy diagnosis in children (excluding atopy dermatitis)	None	79 (60.8)
	Rhinitis	25 (19.2)
	Asthma	1 (0.8)
	Urticaria	19 (14.6)
	Drug allergy	2 (1.5)
	Rhinitis+asthma	4 (3.1)
Concerns (if a child has food allergy)	Malnutrition	26 (20.0)
	Relationship with friends	12 (9.2)
	Schoolwork	21 (16.2)
	Inconvenience in daily life	44 (33.8)
	Psychological stress	27 (20.8)

Table 3. Knowledge of Atopic Dermatitis, Knowledge of Food Allergies, and Health Information Literacy (N=130)

Variables	Categories (Number of items)	M±SD	Range	Point
				M±SD
Knowledge of atopic dermatitis	Total (30)	14.48±6.01	0-25	0.48±0.20
	Definition (5)	2.76±1.55	0-5	0.55±0.31
	Causes (2)	0.78±0.57	0-2	0.39±0.29
	Exacerbating factors (5)	2.63±1.53	0-5	0.53±0.31
	Prevention (4)	1.72±1.25	0-4	0.43±0.31
	Treatment and management/care (10)	5.35±2.23	0-10	0.54±0.22
	Nutritional management (4)	1.22±1.04	0-3	0.31±0.26
Knowledge of food allergies	Total (10)	2.77±2.09	0-7	0.28±0.21
Health information literacy	Total (16)	56.95±12.06	37-80	3.56±0.75

M, mean; SD, standard deviation.

Table 4. Correlations between Knowledge of Atopic Dermatitis, Knowledge of Food Allergies, and Health Information Literacy (N=130)

Variables	Atopic dermatitis knowledge	Food allergy knowledge
	r (p)	r (p)
Knowledge of food allergies	.53 (< .001)	
Health information literacy	.29 (.001)	.38 (< .001)

This can enhance their understanding of allergic conditions, promote prevention of allergen exposure, encourage symptom prevention, and facilitate appropriate treatment adherence, all of which contribute to the healthy growth and development of their children. Local community organizations that support North Korean defectors should ensure these women are connected with specialized institutions to address any challenges they may encounter in accessing services. By implementing such strategies and providing comprehensive education and support, these women can better manage allergic conditions, reduce health-related stress, and ultimately achieve successful adaptation in their new society.

The mean score for food allergy knowledge was 2.77 out of 10 points, lower than the 3.98 points reported in a study by Oh et al. [24] targeting parents at daycare centers in Jeju, Korea. This indicates a lower level of understanding compared to previous studies [24], irrespective of whether the child was suspected or diagnosed with a food allergy. This finding underscores the need for tailored nutrition education for North Korean mothers raising children with food allergies. Additionally, significant differences were noted based on whether the participants practiced mixed feeding. The group that exclusively breastfed for less than 6 months demonstrated significantly lower rates. A previous study [7] revealed that North Korean defector women expressed a high demand for education on newborn health management, but a very low demand for breastfeeding education. This suggests that these women may not fully comprehend the significance of breastfeeding. Therefore, it is crucial to equip them with accurate knowledge about the benefits of breastfeeding and the correct information about food allergies. Specifically, for mothers of children with suspected or diagnosed food allergies, a personalized nutrition management and education program should be developed. This program should include strict limitations on foods that trigger specific food allergies and appropriate substitute foods for balanced nutritional management of children.

In this study, 31.5% of the participants reported that their children had been diagnosed with a food allergy or were suspected to have one. Only 10 individuals (7.7% of the total participants) in this group had received an actual diagnosis from a medical doctor. Oh et al. [24] conducted a study on preschool children in certain areas who had experienced food allergies. They found that out of 387 children, 65 had experienced food allergies, and 29 children (7.5% of total participants) were diagnosed with a specific food allergy by a doctor. This is similar to the 7.7% diagnosis rate in our study. Kim [30] reported that out of 7,591 children registered at child meal management support centers in one area of Seoul, 271 (3.6%) indicated they had food allergies. Among them, 91 (33.6%)

were diagnosed by a doctor, while the rest were self-diagnosed based on parental experience. Even when food allergy symptoms were suspected, less than a third of symptomatic participants received a hospital diagnosis. It's crucial to recognize that a lack of awareness and education about breastfeeding and food allergies among North Korean defector women could potentially lead to incorrect self-diagnosis by parents, which could ultimately harm children's health. Without proper knowledge and understanding of the potential risks associated with food allergies, parents may make decisions based on misinformation or inadequate understanding. This could result in inappropriate feeding practices or delayed identification of allergenic triggers, potentially compromising the child's health and well-being. By ensuring access to reliable educational resources, facilitating communication with health-care professionals experienced in allergy management, and promoting a supportive environment for learning and sharing experiences among North Korean defector women, we can mitigate the risk of incorrect self-diagnosis and promote optimal health outcomes for their children. For parents who cannot clearly distinguish between food intolerance and food allergies, there is a risk of unnecessarily restricting food due to dietary problems that require professional medical diagnosis. Therefore, it is important to raise awareness about suspected food allergy cases and encourage medical consultation to ensure accurate diagnosis and appropriate management.

If a child exhibited allergic reactions to certain foods, the proportion of participants who had restricted their children's food was 55.6% (54 people) among those with allergy symptoms. This is a similar result to the proportion (55.4%) of South Korean parents in the study by Oh et al. [24]. When considering growth development, dietary restrictions can potentially lead to growth and developmental issues due to nutritional imbalances. Therefore, it is crucial to educate children about consuming alternative foods and adhering to dietary restrictions, based on a doctor's diagnosis. If a food allergy is present, it is important to accurately identify not only the food causing the allergy but also the various food groups containing the allergenic food. This will allow dietary restrictions that do not impede the child's growth and development. Furthermore, among most concerned about their child's food allergy, 33.8% were worried about the discomfort it caused in their child's daily life. Followed by other concerns included psychological stress (20.8%), malnutrition (20.0%), difficulties at school (16.2%), and problems with friendships (9.2%). According to Oh [18], children face the most restrictions in their daily lives due to food allergies. The study highlights the need for children to be especially cautious about their eating habits and outings, as well as for them to be alert to the onset of symptoms. The research also found that children often experi-

ence emotional distress due to concerns about developing symptoms and the lack of understanding from others regarding the severity of food allergies. The health issues of children who cannot manage their own health can make child-rearing challenging and increase the parental burden of managing allergies. As such, food allergies can affect the quality of life of not only the children themselves but also all family members, including their parents [30].

Participants' score for health information literacy was 56.95 out of 80 points. This was similar to the average score of 50.84 out of 80 for migrant workers' health information literacy in a study by Lee and Lee [27]. In this study, there were remarkable differences in participants' responses. The highest-scoring question pertained to difficulties in understanding written instructions, while the lowest-scoring question related to having someone to assist with reading hospital materials. There is a difference with the previous study by Lee and Lee [27], which showed that participants had high comprehension of instructions but struggled with understanding instructions written on medicine bags/bottles. This can be attributed to the fact that the participants in this study were primarily North Korean defectors who share the same language and have resided in South Korea for an average period of over 10 years. Compared to migrant workers in the previous study [27], it is believed that they may face relatively fewer difficulties in reading Korean instructions.

In a study by Kim et al. [31], it was noted that Koreans' health information literacy was higher than that of Europe or other Asian countries, but they found it relatively difficult to evaluate health information and were exposed to indiscriminate health information. In this study, the participants had no problem scheduling the appointment time at the hospital, but there were not many acquaintances who could help when it was difficult to read and interpret various materials in the hospital. This reflects the characteristics of North Korean defectors. Moreover, the participants had a high literacy score in understanding written information and instructions for taking medicine. However, in a previous study, the health literacy of North Korean defectors was very low, and it was difficult for them to judge the accurate and appropriate information they needed, even if they had a certain level of literacy and education [12].

It is worth noting that although the participants scored high in literacy skills regarding understanding written information and medication instructions, this does not guarantee their accurate comprehension and execution of healthcare information. While they may have access to information through various mediums, it cannot be verified whether they truly understand and follow medical instructions correctly. To address these challenges effectively, it is essential to provide tailored

support for North Korean defector women in navigating the healthcare system.

This study identified significant differences in health information literacy based on the participants' level of education, corroborating the findings of previous studies [27,31] that higher education levels correspond to increased health information literacy. Furthermore, while no difference was observed in the participants' occupation in the post-test, a significant difference was noted in relation to occupation. Kim et al.'s study [31] reported variations in health information literacy due to job characteristics in South Korea. Specifically, technical workers, agricultural workers, fishery workers, and self-employed individuals scored less than 30 out of 50, indicating lower health information literacy compared to office workers. Unemployed individuals, in particular, reported limited literacy skills in areas pertaining to disease treatment and health promotion. In contrast to previous studies, this study found that office workers had lower health information literacy scores than the unemployed and self-employed. This discrepancy is likely due to the inclusion of all types of office workers in the survey, such as production workers, service workers, part-time workers, and office workers. However, given that over 60% of the female North Korean defectors who participated in this study were unemployed, it is crucial to accurately assess their understanding of educational content related to disease treatment and health promotion, and to provide them with tailored information.

The health information literacy of the participants who examined the nutrition facts label was significantly higher than that of those who did not. It is likely that individuals who scrutinize the nutrition facts label have a heightened interest in and awareness of nutrition, are more educated about healthy eating habits, are more familiar with nutritional information, and may have superior access to and education about nutritional information. However, further analysis is required to interpret these results as indicative of a higher ability to comprehend and utilize the information.

The health information literacy of breastfeeding participants demonstrated significant differences based on whether they received exclusive breastfeeding or not. It is hypothesized that the lower health information literacy in the group that only received mixed feeding could be attributed to a lack of awareness about the importance of breastfeeding and a deficiency in processing accurate breastfeeding information due to low literacy levels. However, as the survey results did not account for the individual characteristics and circumstances of the participants, caution must be exercised when interpreting these findings.

Additionally, the research indicates that participants with a history of their children being diagnosed with, or suspected of

having, atopic dermatitis or food allergies demonstrated significantly lower health information literacy. This finding partially aligns with the results from a previous study [31], which suggested that individuals with family members in poor health tend to have lower health literacy compared to those with family members in good health. Although a definitive causal relationship between health literacy and health status cannot be established, it is important to note that low health literacy may result in the inaccurate interpretation of health information, which could potentially have adverse effects on an individual's overall well-being.

Therefore, efforts to improve health literacy are crucial for the effective management of children's atopic dermatitis and food allergies, thereby fostering their healthy development. It is vital to create programs that are tailored to the sociocultural and educational characteristics and needs of the participants, in order to boost their comprehension and use of medical information. By concentrating on improving comprehension of healthcare information through targeted interventions, such as educational programs, simplified materials, and interactive communication strategies, we can equip North Korean defector women with the knowledge and skills necessary for improved healthcare decision-making for both themselves and their families.

Intervariable correlation analysis revealed a positive association between a greater understanding of allergies and higher health information literacy. Health literacy has been demonstrated to positively impact various health outcomes, such as health-related knowledge and skills, and disease management [32]. Additionally, higher health literacy among parents has been linked to increased knowledge about asthma and improved asthma control in children [33]. Given the characteristics of North Korean defectors, who often rely heavily on self-diagnosis, self-prescription, and folk remedies [12], it is predicted that they may face health risks when allergies arise in themselves or their children. These risks may stem from the use of unscientific medical services or reliance on folk remedies. Therefore, the findings of this study hold significant implications regarding the relationship between low knowledge and low health information literacy among North Korean refugee women. The results of this study could be utilized to devise an effective educational plan aimed at enhancing the health information literacy of the participants. They could also be used to prepare educational intervention plans for the healthy growth and development of children. Educational support should be provided to help North Korean defectors learn appropriate health information independently, manage their health through proper medical service use, and raise healthy children.

In the meantime, numerous domestic and international stu-

dies have been conducted on children's food allergies and health information literacy. However, there is a lack of research confirming the relationship between atopic dermatitis and health information literacy, including knowledge of food allergies, particularly targeting North Korean refugee mothers. This study aims to provide foundational data to assist North Korean refugee mothers in overcoming the challenges of adapting to a new society and the dual burden of child-rearing [34]. It also aims to aid in the development of healthy children. This study is significant because it is the first to report levels of knowledge of atopic dermatitis, knowledge of food allergies, and health information literacy, as well as the relationships between these variables, among North Korean refugee mothers.

Previous studies have found that North Korean refugee women often lacked access to health information, had limited support systems, and experienced difficulties when trying to use medical institutions [12]. This study underscores the need to develop education programs specifically tailored for North Korean defector mothers, taking into account their unique characteristics. In particular, there is a pressing need for educational interventions designed to boost health information literacy among those with lower levels of education and those who are unemployed. To effectively address these needs, it is vital to devise educational strategies that are customized to the distinct challenges North Korean defector mothers face. These strategies should take into account factors such as limited educational backgrounds and employment status. By offering targeted support and resources, we can equip these women with the necessary knowledge and skills to enhance their health literacy. Additionally, it is crucial to acknowledge that language barriers may also contribute to lower health literacy among this population.

By implementing these educational strategies, we can promote better understanding and utilization of medical information among North Korean defector mothers. This will not only improve their personal health but also empower them to make informed decisions about their families' healthcare needs. However, the study's data collection was limited to some North Korean defector mothers, which may affect the generalizability of the findings to all members of this population. Moreover, the assessment of allergy symptoms relied on self-reporting, necessitating caution in interpreting and extrapolating the results. This study was cross-sectional and did not aim to establish a causal relationship between specific factors and the incidence of atopic dermatitis or food allergies. Factors that could influence child allergies, such as birth order, were not considered, and major symptoms of food allergies were not investigated. Furthermore, the study did not explore the types of substitute foods used in the event of an

allergy. Based on these considerations, the following are suggestions for future research.

First, the prevalence of allergies can be influenced by several factors, including the number of participants surveyed, the region or age of the study population, and the time the survey was conducted. Therefore, it is crucial to examine the prevalence of allergies in relation to socioeconomic indicators. These indicators include variables such as household income, spousal living status, as well as health-related characteristics such as smoking and drinking habits, subjective health status, and physical activity levels. Second, future studies could potentially conduct a comparative analysis that includes North Korean fathers. Third, it is recommended to develop a program specifically for North Korean refugee mothers, taking into account their social and cultural characteristics and health information literacy, and subsequently verify the program's effectiveness.

CONCLUSION

This study aimed to identify the knowledge of atopic dermatitis and food allergies, as well as health information literacy, among North Korean refugee mothers. These individuals often have limited access to health information and lack a support system. The goal was to gather foundational data to aid in the development of a parenting education program tailored to their specific needs. The participants' understanding of atopic dermatitis was found to be limited, particularly in relation to its causes and nutritional management. Their knowledge of food allergies was also notably low. In terms of health information literacy, adherence to instructions was relatively high, but the support system for comprehending health information was markedly deficient. There were significant positive correlations between knowledge of atopic dermatitis, food allergies, and health information literacy. This suggests that an increase in health information literacy could potentially lead to more effective and appropriate responses to managing atopic dermatitis and food allergies. Enhancing health information literacy could therefore assist these individuals in making more informed choices and decisions regarding health care.

Based on these research results, it is necessary to develop tailored education and support programs. These programs should aim to foster an environment where North Korean refugee women can comfortably integrate into a new society, and effectively nurture their children's healthy growth and development. Furthermore, it is crucial to bolster the support system that aids their comprehension of health information. The insights gained from this study can assist women who have immigrated to South Korea—either as North Korean ref-

ugee mothers or as immigrants from other countries—in identifying suitable support and enhancement plans. These findings are anticipated to serve as valuable contributions toward formulating health policies and improving medical services for vulnerable members of our society.

ORCID and ResearcherID

In-Sook Lee <https://orcid.org/0000-0003-4156-9685>
<https://researcherid.com/rid/JHT-0304-2023>
Jeong-Hee Jeon <https://orcid.org/0000-0002-8045-7064>
<https://researcherid.com/rid/JHT-4813-2023>

Authors' contribution

Conceptualization: all authors; Data collection, Formal analysis: all authors; Writing-original draft: all authors; Writing-review and editing: all authors; Final approval of published version: all authors.

Conflict of interest

No existing or potential conflict of interest relevant to this article was reported.

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Data availability

Please contact the corresponding author for data availability.

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