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Evaluating Nutrition Knowledge and Literacy in Turkish Nursing Students: Implications for Curriculum Development

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Abstract

Assessing the nutritional knowledge and nutrition literacy of nursing students can help nursing programs identify educational gaps and develop strategies to enhance nutrition education. This study aimed to evaluate the levels of nutrition knowledge and nutrition literacy among nursing students. Data were collected using an Information Form, Anthropometric Measurements, the Nutrition Knowledge Level Scale for Adults, and the Evaluation Instrument of Nutrition Literacy on Adults. Descriptive statistics and nonparametric tests were applied to analyze the data. The mean nutrition knowledge score was 56.6 ± 6.8, with 50.5% of students demonstrating a good level of knowledge. The total nutrition literacy score averaged 28.6 ± 4.4, and 91.6% of students were classified as having sufficient nutrition literacy. No significant differences were observed between students' demographic characteristics and their nutrition knowledge or literacy scores ($p > 0.05$). A statistically significant positive correlation was found between nutrition knowledge and overall nutrition literacy, including its subdomains ($p < 0.05$). Nutrition knowledge and nutrition literacy were positively associated among nursing students. To enhance students' understanding of nutrition, improve literacy, and contribute to the prevention of non-communicable diseases, nutrition-focused courses should be integrated into nursing curricula.

Keywords: Nutrition knowledge, Nursing students, Nutrition literacy

Introduction

Diet-related non-communicable diseases (NCDs) represent the leading cause of mortality worldwide. Adequate nutrition literacy and nutrition knowledge are recognized as important factors in reducing the risk of such diet-related diseases. Nurses and nursing students, in particular, play a pivotal role in enhancing the public's understanding of nutrition and promoting healthier dietary behaviors. Despite this, the relationship between nursing students' nutrition literacy and their nutrition knowledge remains underexplored. Evidence from this study indicates that these two factors are positively correlated, suggesting that improving students' nutrition knowledge and literacy may contribute to the prevention of NCDs.

Poor dietary quality and unhealthy eating habits are major contributors to chronic illnesses, including obesity, diabetes, cardiovascular disease, and various cancers. Over the past decade, dietary risks have increasingly been recognized as a significant public health concern.

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In 2019 alone, dietary risk factors were associated with approximately 7.9 million deaths and 187.7 million disability-adjusted life years. Non-communicable diseases accounted for 74.4% of total global mortality in 2019, reflecting a 20.5% increase from 2009 and resulting in 7.1 million more deaths. Although the World Health Organization has recommended numerous policies to address NCDs, only about one-third of these policies were implemented as of 2020, highlighting the need for more effective preventive strategies. Promoting both environmental approaches and healthy dietary behaviors is critical, with enhancing nutrition literacy and knowledge among populations being a key strategy.

Nutrition literacy, a specialized component of health literacy, refers to an individual's ability to obtain, comprehend, and apply basic nutritional information to make informed dietary decisions. Individuals with sufficient nutrition literacy possess essential knowledge about nutrients and food groups, can interpret food labels, and understand portion control. Enhancing nutrition knowledge is particularly important for the prevention and mitigation of nutrition-related NCDs. Nurses, as frontline healthcare professionals, have a crucial role in assessing the nutrition literacy and knowledge levels of the populations they serve and providing appropriate guidance and education.

Nurses are instrumental in promoting health, improving quality of life, and delivering nutritional care. They frequently engage with patients and can identify at-risk behaviors, allowing them to provide tailored nutritional guidance. In addition, nurses are increasingly involved in NCD prevention and management, which requires both high nutrition literacy and the ability to integrate nutritional knowledge into personal and professional practice. However, studies indicate that nurses themselves are at risk for overweight and obesity, emphasizing the need to strengthen nutrition literacy and knowledge beginning at the undergraduate level.

In Turkey, research examining nutrition literacy and knowledge among nursing students is limited. As nursing students represent the younger population and future healthcare workforce, ensuring they have strong nutrition knowledge is critical for shaping a healthier society. Accordingly, this study aimed to assess both nutrition literacy and nutrition knowledge among nursing students and to investigate the relationship between these two factors.

Study questions

The research specifically addressed the following questions: What is the level of nutrition literacy among nursing students? What is the level of their nutrition knowledge? And is there a relationship between nutrition literacy and nutrition knowledge in this population?

This study employed a cross-sectional and descriptive design and was conducted between January and March 2022 at the Faculty of Health Sciences, Department of Nursing. The target population included 690 nursing students enrolled in the program. Using G*Power software (Version 3.1.9.6), the sample size was calculated based on an anticipated small-to-medium correlation ($|\rho| = 0.20$) between nutrition literacy and nutrition knowledge, with a two-tailed test, alpha of 0.05, and statistical power of 95%, resulting in a minimum required sample of 262 participants. To account for potential incomplete responses, the sample was increased by 20%, yielding a target of 314 students. After excluding five participants who submitted incomplete responses, the final sample consisted of 309 nursing students. Post-hoc power analysis indicated that, with the final sample and an assumed effect size of $|\rho| = 0.45$, the study achieved 99% power.

Participants were included if they were enrolled nursing students, proficient in Turkish, and voluntarily agreed to participate. Those who failed to complete the data collection tools or withdrew from the study at any point were excluded.

Ethical approval was obtained from the Trakya University Faculty of Medicine Non-Invasive Scientific Research Ethics Committee (decision number 25/23, dated 27.12.2021) prior to data collection. Participants were informed about the study objectives, methods, confidentiality, and voluntary nature of participation through an online Google survey. Consent was obtained electronically; only students who selected the "I consent to participate in this study voluntarily" option were included. Participants were also informed that they could withdraw from the study at any time without providing a reason. All procedures were conducted in accordance with the Declaration of Helsinki.

Data were collected using a combination of an information form, anthropometric measurements, the Nutrition Knowledge Level Scale for Adults (NKLSA), and the Evaluation Instrument of Nutrition Literacy on Adults (EINLA). The instruments were administered online via Google Forms to avoid physical contact, in line with pandemic-related social distancing measures. The academic staff assisted in clarifying any questions through course WhatsApp groups.

The information form, developed based on previous literature, gathered socio-demographic data including age, gender, academic year, and prior nutrition courses taken. Additionally, participants were asked about their dietary habits, including main meal and snack consumption patterns, through seven structured questions.

Anthropometric data were self-reported by participants following instructions provided in the survey. Body Mass Index (BMI) was calculated using the standard formula (weight in kilograms divided by height in meters squared). BMI classifications followed World Health Organization criteria: underweight (<18.50 kg/m²), normal weight (18.50–24.99 kg/m²), overweight (25.00–29.99 kg/m²), and obese (≥30.00 kg/m²).

Nutritional knowledge among participants was assessed using the first part of the Nutrition Knowledge Level Scale for Adults, which was developed by Batmaz and Güneş in 2018 and validated for Turkish populations. This section, titled "Basic Nutrition Information," consists of 20 items. Responses are scored on a five-point Likert scale, with "strongly agree" assigned 4 points, "agree" 3 points, "undecided" 2 points, "disagree" 1 point, and "strongly disagree" 0 points. Items 1, 3, 6, 8, 13, 16, 19, and 20 are reverse scored. The total score ranges from 0 to 80, with scores below 45 considered "poor," 45–55 as "medium," 56–65 as "good," and above 65 as "very good."

Nutrition literacy was evaluated using the Evaluation Instrument of Nutrition Literacy on Adults, developed by Cesur *et al.* and adapted for Turkish use. This instrument contains 35 items, each scored as 1 for a correct answer and 0 for an incorrect response, yielding a total score between 0 and 35. Nutrition literacy levels are categorized as "insufficient" (0–11), "borderline" (12–23), or "sufficient" (24–35). The scale is divided into five domains. The first domain, "General Nutrition Information," includes 10 questions scored as insufficient (0–3), borderline (4–7), or sufficient (8–10). The second domain, "Reading Comprehension and Interpretation," has six questions with scores classified as insufficient (0–2), borderline (3–4), or sufficient (5–6). The third domain, "Food Groups," includes 10 questions with scoring similar to the first domain. The fourth domain, "Serving Sizes," contains three questions scored as insufficient (0–1), borderline (2), or sufficient (3). The fifth domain, "Reading Food Labels and Basic Mathematics," consists of six items with scoring classified as insufficient (0–2), borderline (3–4), or sufficient (5–6).

Statistical analyses were conducted using SPSS version 22.0. Cases with missing values on primary variables were excluded. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were used to summarize the data. The distribution of variables was assessed using histograms, coefficient of variation, skewness, kurtosis, and the Kolmogorov–Smirnov test. Comparisons between independent groups were made using the Mann–Whitney U test and the Kruskal-Wallis test, while relationships between numerical variables were examined using Spearman's correlation coefficient. Statistical significance was set at $p < 0.05$.

Results

A total of 309 nursing students participated in the study, including 53 males and 256 females. The average age of the participants was 20.2 ± 1.3 years, and the mean body mass index (BMI) was 22.4 ± 3.7 kg/m², with 69.9% of students falling within the healthy weight range. Among the participants, 27.2% had previously completed a university-level nutrition course. On average, students reported consuming 2.4 ± 0.5 main meals and 1.5 ± 1.0 snacks per day.

Table 1. General characteristics of nursing students

Variables	Value
Age (years)	20.2 ± 1.3
Number of main meals	2.4 ± 0.5
Number of snacks	1.5 ± 1.0
Gender	n (%)
Female	256 (82.8)
Male	53 (17.2)
Year of study	n (%)
1st grade	89 (28.8)
2nd grade	105 (34.0)
3rd grade	73 (23.6)
4th grade	42 (13.6)
Taken a nutrition course	n (%)
Yes	84 (27.2)
No	225 (72.8)
Body mass index (kg/m²)	22.4 ± 3.7
Underweight (< 18.5)	40 (12.9)
Healthy weight (18.5–24.99)	216 (69.9)
Overweight (25.00–29.99)	40 (12.9)
Obese (≥ 30.0)	13 (4.2)

The nutrition knowledge of the nursing students was assessed using the Nutrition Knowledge Level Scale for Adults, with an overall mean score of 56.6 ± 6.8 points. Among the participants, 6.1% were classified as having a poor level of nutrition knowledge, 34% had a moderate level, 50.5% demonstrated a good level, and 9.4% achieved a very good level of nutrition knowledge.

Table 2. Nutrition knowledge level of nursing students

Variables	Value
Nutrition Knowledge Score	56.6 ± 6.8
Classification of Nutrition Knowledge Level	n (%)
Poor (< 45 points)	19 (6.1)
Fair (45–55 points)	105 (34.0)
Good (56–65 points)	156 (50.5)
Excellent (> 65 points)	29 (9.4)

The overall nutrition literacy of the nursing students, measured using the Evaluation Instrument of Nutrition Literacy on Adults, had a mean total score of 28.6 ± 4.4 points, with 91.6% of students classified as having sufficient nutrition literacy. When the sub-sections of the scale were examined, the majority of students demonstrated adequate literacy in general nutrition information (73.1%), reading comprehension and interpretation (82.8%), and knowledge of food groups (92.6%). However, nutrition literacy was notably lower in the area of serving sizes, with only 13.6% of students showing sufficient competency. In contrast, 52.8% of students achieved sufficient literacy in reading food labels and basic mathematics.

Table 3. Evaluation of nutrition literacy status of nursing students

Variables	Mean ± SD or n (%)
Nutrition Literacy Total Score	28.6 ± 4.4
Classification of Nutrition Literacy Level	
Insufficient (0–11 points)	4 (1.3)
Borderline (12–23 points)	22 (7.1)
Sufficient (24–35 points)	283 (91.6)
General Nutrition Information Score	8.2 ± 1.6
Insufficient (0–3 points)	5 (1.6)
Borderline (4–7 points)	78 (25.2)
Sufficient (8–10 points)	226 (73.1)
Reading Comprehension and Interpretation Score	5.1 ± 1.0
Insufficient (0–2 points)	10 (3.2)
Borderline (3–4 points)	43 (13.9)
Sufficient (5–6 points)	256 (82.8)
Food Groups Score	9.1 ± 1.6
Insufficient (0–3 points)	10 (3.2)
Borderline (4–7 points)	13 (4.2)
Sufficient (8–10 points)	286 (92.6)
Serving Sizes Score	1.6 ± 0.7
Insufficient (0–1 point)	143 (46.3)
Borderline (2 points)	124 (40.1)
Sufficient (3 points)	42 (13.6)
Reading Food Labels and Basic Mathematics Score	4.5 ± 1.2
Insufficient (0–2 points)	16 (5.2)
Borderline (3–4 points)	130 (42.1)
Sufficient (5–6 points)	163 (52.8)

When nutrition knowledge and nutrition literacy were analyzed according to various demographic and academic parameters, no significant differences were observed. Scores for both nutrition knowledge and total nutrition literacy did not vary significantly based on gender, year of study, completion of a nutrition course, or BMI classification ($p > 0.05$), indicating that these factors did not have a measurable impact on students' nutritional knowledge or literacy levels.

Table 4. Evaluation of nutrition knowledge level and nutrition literacy status according to some parameters

Variables	Nutrition Knowledge Level	p-value	Nutrition Literacy	p-value
Gender				
Female	56.4 ± 6.8	0.148[a]	28.8 ± 4.2	0.073[a]
Male	57.7 ± 6.9		27.6 ± 5.2	
Year of Study				
1st grade	57.2 ± 6.5	0.162	28.9 ± 3.9	0.247
2nd grade	56.2 ± 7.5		27.7 ± 5.3	
3rd grade	55.7 ± 6.4		29.3 ± 3.6	

4th grade	58.0 ± 6.1		29.2 ± 3.3	
Taken a Nutrition Course				
Yes	57.7 ± 7.1	0.143[a]	29.0 ± 3.8	0.399[a]
No	56.2 ± 6.7		28.5 ± 4.6	
Body Mass Index (kg/m²)				
Underweight	55.9 ± 7.1	0.640	29.2 ± 2.5	0.124
Healthy weight	56.9 ± 6.9		28.3 ± 4.7	
Overweight	55.9 ± 6.2		29.6 ± 4.6	
Obese	56.6 ± 6.5		29.7 ± 2.0	

[a] Mann-Whitney U test; all other comparisons used Kruskal-Wallis test. *p < 0.05 indicates statistical significance.

Analysis of the relationship between nutrition knowledge and nutrition literacy revealed a statistically significant positive correlation. Higher nutrition knowledge scores were associated with higher total nutrition literacy scores, as well as higher scores across all sub-sections of the nutrition literacy scale, indicating that students with better nutritional knowledge also tended to have greater competency in applying and understanding nutrition-related information.

Table 5. Evaluation of the relationship between nutrition knowledge level and nutrition literacy status

Variables	Nutrition Knowledge Score
Nutrition Literacy Total Score	r = 0.451 p < 0.001*
General Nutrition Information Score	r = 0.413 p < 0.001*
Reading Comprehension and Interpretation Score	r = 0.341 p < 0.001*
Food Groups Score	r = 0.136 p = 0.017*
Serving Sizes Score	r = 0.184 p = 0.001*
Reading Food Labels and Basic Mathematics Score	r = 0.284 p < 0.001*

Data expressed as non-parametric correlation of Spearman-Rho
*Significant at $p < 0.05$

In addition, the association between BMI and both nutrition literacy and nutrition knowledge was examined, and no statistically significant differences were observed for either nutrition literacy total score ($p > 0.05$) or nutrition knowledge score ($p > 0.05$) (data not shown in the table).

Discussion

This study is significant for its assessment of nutrition literacy and nutrition knowledge among nursing students, as well as for exploring the relationship between these two variables. A key finding was the significant positive correlation between nutrition knowledge and nutrition literacy, indicating that increases in nursing students' nutrition knowledge correspond with higher levels of nutrition literacy.

The recent surge in diet-related non-communicable diseases (NCDs) has been associated with obesogenic environments, which encourage excessive consumption of unhealthy foods while restricting opportunities for physical activity [2, 4, 5]. This situation highlights the critical need for public education on nutrition and the implementation of strategies to enhance nutrition literacy [4, 14]. Nurses, who play a pivotal role in public health promotion and health decision-making, should receive training that strengthens both nutrition knowledge and literacy, starting at the undergraduate level [27]. Well-informed nursing students are therefore better prepared to provide guidance and consultation to the public as future healthcare professionals.

In this study, 50.5% of nursing students demonstrated good nutrition knowledge, whereas 40.5% exhibited medium or poor levels. Chepulis and Mearns [17] similarly reported poor nutrition knowledge among nursing students. A systematic review noted that while nurses' nutrition knowledge can improve with experience, it remains limited in areas such as medical nutrition therapy [14]. Likewise, Cho *et al.* [22] found that nurses had limited nutrition knowledge despite high e-health literacy. Collectively, these findings indicate that both nurses and nursing students often possess only moderate or insufficient nutrition knowledge. In Turkey, nutrition courses are typically included in nursing curricula, but they mainly focus on disease-related nutrition and are limited to two or three hours per week. Our findings suggest that course content should be expanded to include general nutrition knowledge relevant to the health of the overall population, not just those who are unwell. This underscores the importance of comprehensive nutrition education in nursing programs.

The present study also revealed that 91.6% of students had adequate nutrition literacy overall; however, only 13.6% demonstrated sufficient literacy in estimating portion sizes, and 52.8% in reading food labels and performing basic calculations. Mehri *et al.* [28] reported similarly low nutrition literacy among nursing students. Additionally, research on nurses' e-health literacy emphasizes that while they may have high digital health literacy, their nutrition literacy is often limited [22]. Nurses, as a central group of health professionals [29], are ideally positioned to address patients' basic nutritional needs across diverse settings and cultural contexts. In hospitals, this may involve managing dietary problems, dehydration, or malnutrition [30], which, if unaddressed,

can lead to prolonged hospital stays and increased mortality risk [31]. Ensuring patient health outcomes is therefore a key responsibility for nurses [27].

However, studies by Chao *et al.* [32] indicate that student nurses' knowledge in this domain is often limited. Low nutrition literacy represents a significant barrier to delivering high-quality nutritional care. Consequently, targeted educational programs beyond undergraduate training are essential to enhance nursing students' confidence and competence in providing nutrition care [32, 33]. Strengthening nutrition literacy during both undergraduate and postgraduate education is crucial for improving public health outcomes and patient quality of life.

It has been emphasized that nutrition knowledge and nutrition literacy are closely correlated [27]. In line with this, the present study found a positive correlation between nursing students' nutrition knowledge scores and their total nutrition literacy scores, as well as the scores of the sub-sections. Consistent with these results, Kim *et al.* [34] reported that nursing students' dietary attitudes were positively associated with their nutrition knowledge. Liao *et al.* [35] found that nutrition literacy accounted for 17.2% of the total variance in college students' healthy-eating behaviors. Similarly, Uysal *et al.* [36], in a study involving 905 students from nursing, law, and Islamic sciences departments, determined that health literacy was significantly correlated with nutrition knowledge. Collectively, these findings suggest that enhancing nursing students' nutrition knowledge is likely to improve their nutrition literacy.

Current undergraduate nursing programs do not sufficiently equip students to meet the demands of providing nutritional care for patients or maintaining their own long-term health. Preparing students with the necessary training to support both personal and professional nutritional competence is critical for addressing contemporary nutrition-related concerns [36]. Therefore, nursing students' ability to acquire, process, and apply nutrition information effectively should be strengthened during undergraduate education, and nutrition courses should be formally integrated into the nursing curriculum.

Conclusion

This study examined the nutrition knowledge and nutrition literacy levels of nursing students, highlighting the pivotal role of nurses as nutrition educators and advisors who can guide patients in disease prevention and management through dietary practices. The results demonstrate a clear relationship between nutrition knowledge and nutrition literacy, emphasizing the need for more comprehensive clinical and general nutrition education within nursing programs. These findings underscore the importance of including nutrition-related courses in the nursing curriculum to enhance students' nutrition knowledge and literacy, ultimately supporting the prevention of non-communicable diseases (NCDs) and improving public health outcomes. The implications of this study are significant for the development and revision of nursing education curricula.

Limitations

This study has several limitations. First, the sample size was relatively small, and the response rate was approximately 45%, which may limit the generalizability of the findings. Second, the study focused on evaluating the relationship between nursing students' nutrition knowledge and nutrition literacy and did not examine additional factors that might influence these outcomes. Future research should explore the determinants of nutrition knowledge and literacy among nursing students to provide a more comprehensive understanding of how to enhance these competencies.

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