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PRESCHOOL TEACHER CANDIDATES' LEVEL OF KNOWLEDGE ABOUT BASIC NUTRIENTS: SINOP UNIVERSITY SAMPLE

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Abstract:
This study was conducted to investigate the level of knowledge of pre-service preschool teacher candidates about basic nutrients. The sample of the study consisted of 70 preschool education teacher candidates studying at Sinop University, Faculty of Education in 2017-2018. A survey method consisting of 15 open-ended questions about essential nutrients was applied to prospective teachers and the results of the study were evaluated by descriptive analysis method. The responses given by the teacher candidates were coded, and content analysis was performed. Percentage and frequencies were calculated. When the questions posed to the teacher candidates were examined, the question with the most correct answers was 'amino acids are the building blocks of proteins' with 64.2%, and the question with the least correct answers was 'what is antioxidant' with 2.8%. It was concluded that teacher candidates have some general knowledge, but they have insufficient knowledge of the detailed questions about the role of nutrients and the use of some important terms.

Keywords: nutrition literacy, preschool teacher candidate, nutrients, nutrition knowledge level.

1. Introduction

The basic condition for building healthy societies is to raise healthy individuals. The power of productivity goes in parallel with the state of being physically, mentally and

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socially well and in balance. One of the most fundamental determinants of human health is the concept of nutrition (Acar, 2015).

According to the Turkish Language Institution (TDK/TLI), nutrition is the state of "*taking nutrients necessary for the body*". Adequate and balanced provision of energy and nutrients is important for individuals to be healthy. As a result of the continuation of the nutrition process with awareness it creates positive outcomes such as the acquisition of correct eating habits, reduction of disease risks, etc. (Kolasa *et al.*, 2001) saw the ability of individuals to obtain basic information about food and nutrition and to make decisions with this information as the first step of nutritional literacy (Aktaş & Özdoğan, 2016). The key concept in the acquisition of skills that constitutes the main focus of the concept of nutrition is education (Sarıoğlan & Deveci, 2021). The process of the child's eating habits, which starts with his/her parents, is shaped predominantly by the influence of peers and teachers when he/she reaches the school period. Not only the family but also the school environment affects the child's eating habits (Vliger *et al.*, 2020).

In the new preschool curriculum, under the title "Health for an Active and Fit Life", the importance of preschool children acquiring healthy living habits in the school environment and the necessity of acquiring integrated skills (fluid consumption, cleanliness, etc.) related to healthy nutrition are emphasized (Maarif Program, 2024). The preschool period, during which children acquire the most critical skills, plays a major role in the formation of healthy eating habits throughout life (Gündoğdu, 2009). Especially in this process, it is the teachers who are the models and learning centers for children. Preschool teachers have a lasting impact on children's basic life skills (Öztürk, Demir, & Şahin, 2015). Preschool teachers are responsible for the nutrition process not only as role models, but also as the ones who should have practical knowledge about how much and what kind of nutrients children need through their daily menu and feeding hours. In fact, recent studies have found that malnutrition significantly reduces learning skills (Currie & Slater, 2013; Ferber & Baten, 2022). THSK (2013); "*Nutrition services to be provided for children are extremely important in terms of both promoting adequate and balanced nutrition and gaining the right eating habits from an early age*." and emphasized the responsibility of teachers. As a result, teachers need supportive guidance to create healthy menus for children in early childhood and to develop positive learning outcomes related to nutrition. In the studies conducted in the literature, it has been stated that pre-service teachers' knowledge of healthy nutrition, even at a basic level, is not sufficient and needs to be supported (Ural & Yolagiden, 2022). From this point of view, the aim of this study is to reveal the level of knowledge of pre-service preschool teacher candidates about basic nutrients.

2. Material and Method

The survey method was used in the quantitative research model about basic nutrients consisting of 15 open-ended questions to pre-service teacher candidates. The questions prepared for this purpose were discussed with academicians who are experts in their

fields, and their opinions were taken. Students were interviewed and a form consisting of 15 open-ended questions was applied to the students. The data obtained were analyzed by descriptive analysis method. The answers given by the prospective teachers to the questions were given in a very detailed manner. All answers were analyzed, and frequency and percentage values were found for all of them. Preservice teachers were given codes and these codes were used in explanations.

2.1 Research Group

The population of the study consisted of students studying in the preschool program at Sinop University Faculty of Education in the 2017-2018 academic year. The sample consisted of 70 teacher candidates who were selected from this population and were studying in the 1st grade of the preschool teaching program.

3. Findings

Table 1. Meaning of Nutrition

1. Substances necessary for life	15	21.4
2. Intake of nutrients into our body	30	42.8
3. Intake of useful substances	8	11.4
4. Meeting daily energy needs	10	14.2
5. Intake and utilization of nutrients necessary for the body to sustain life	2	2.8
6. No answer	5	7.1

When the answers were given to the question of what nutrition is being examined, 30 respondents, i.e. 42.8%, gave the answer of taking nutrients into our body. In contrast, a small percentage of 2.8% gave a completely correct answer by saying that the nutrients necessary for the continuation of life are taken as much as necessary and used by the body (e.g., T15, T18).

Table 2: Grouping the Basic Nutrients

1. Carbohydrates	40	57.1
2. Protein	12	17.1
3. Carbohydrates and fats	8	11.4
4. Carbohydrate fat protein and vitamins	1	1.4
5. Carbohydrate fat protein minerals and vitamin	1	1.4
6. Milk, meat, eggs, fruits and vegetables	1	1.4
7. Vitamins and water	3	4.2
8. Fatty and sweet foods, flour products	1	1.4
9. No answer	3	4.2

When asked about basic nutrients, 57.1% said carbohydrates, 11.4% said carbohydrates and fats together, and only 1 person wrote carbohydrates, fats, protein, minerals and vitamins (T15).

Table 3: Importance of Carbohydrates for the Body

	f	%
1. The first source of energy, energizer	5	7.1
2. Important substance for growth and development	9	12.8
3. Substance that provides energy	9	12.8
4. Fat is stored	5	7.1
5. Building material of the body	7	10
6. Reparative and essential substance for growth	7	10
7. Foods such as bread and sweets	13	18.5
8. Sweet substance that causes obesity when taken in excess	10	1.4
9. No answer	5	7.1

When Table 3 is analyzed, the first applicant was 5 respondents who said that carbohydrates are a source of energy and energizers, and 9 respondents said that carbohydrates are a substance that provides energy. 18% of the respondents limited carbohydrates to bread and desserts. Likewise, 14.2% wrote that it was sweet and that too much of it would cause obesity.

Table 4: Importance of Proteins for the Body

	f	%
1. Energizer	13	18.5
2. Important substance for growth and development	10	14.2
3. Energy-giving muscle-building substance composed of amino acids	3	4.2
4. Found in meat, essential for health	2	2.8
5. Building material of the body	8	11.4
6. Repairing and energizing	8	11.4
7. Also found in meat, milk and eggs	15	21.4
8. No answer	11	15.7

Eight respondents correctly stated that protein is the building material of the body and eight respondents who stated that it is a restorative and energizer.

Table 5: Importance of Fats for the Body

	f	%
1. Energizer	15	21.4
2. Substance important for growth and development	12	17.1
3. Substances that cause weight gain	20	28.5
4. Constructive substance that makes blood	1	1.4
5. Harmful substance that causes obesity	10	14.2
6. Substance that damages the heart	3	4.2
7. No answer	9	12.8

When asked about fats, 28.5% associated it with weight gain and 14.2% with obesity. In general, there was a connection between fat and weight, and only 15 respondents answered that it is energizing.

Table 6: Importance of Minerals for Living Things

	f	%
1. Energizer	10	14.2
2. Important substance for growth and development	15	21.4
3. Essential for bone and dental health	11	15.7
4. Vitamin	10	14.2
5. Good for hair and skin	4	5.7
6. Ca-Mg- Phosphorus etc. substances are important for growth and development and to protect against some diseases	2	2.8
7. No answer	18	25.7

While 18 participants did not give any answer about minerals, only two teacher candidates answered, "*substances such as Ca-Mg- Phosphorus are important for growth and development and for protection against diseases*".

Table 7: Importance of Vitamins for Living Things

	f	%
1. A substance that protects us from diseases and enables us to grow and develop	22	31.4
2. Vitamins such as 'A, B, C, D' protect us from diseases	15	21.4
3. They strengthen immunity	12	17.1
4. Substances that provide energy	15	21.4
5. A protein type substance	1	1.4
6. No answer	5	7.1

It was determined that 22 respondents were more knowledgeable about vitamins than minerals with the answer "*growth, development and protection from diseases*", 15 respondents were more knowledgeable about vitamins than minerals with the answer "*vitamins such as A, B, C, D protect from diseases*" and 12 respondents were more knowledgeable about vitamins than minerals with the answer "*they strengthen immunity*".

Table 8: Building Block Knowledge of Proteins

	f	%
1. Amino acid	45	64.2
2. Sugar	3	4.2
3. Ester	1	1.4
4. Glucose	10	14.2
5. Ions	2	2.8
6. Fat	2	2.8
7. No answer	7	10

This question had the highest number of correct answers; 64.2% or 45 respondents answered amino acids.

Table 9: First Referenced Energy Source Knowledge in the Body

	f	%
1. Carbohydrate	43	61.4
2. Fat	10	14.2
3. Protein	10	14.2
4. Vitamins	1	1.4
5. Starch	2	2.8
6. Iron	1	1.4
7. No answer	3	4.2

The second question with the highest number of correct answers was question 9. As a result, 43 respondents stated that carbohydrates were the first source of energy.

Table 10: Knowledge of What happens If the Body Burns Too Much Protein

	f	%
1. Weight loss	15	21.4
2. Hair loss and osteoporosis occur	1	1.4
3. The body destroys its own structure, eats itself and is dangerous	5	7.1
4. Diseases occur	8	11.4
5. Causes obesity	1	1.4
6. Death occurs	16	22.8
7. No answer	24	34.2

When Table 10 is analyzed, it is seen that the rate of non-answers is quite high (24 respondents), and only five respondents gave the correct answer.

Table 11: Examples of Carbohydrate Foods

	f	%
1. Bread - cake - dessert - pasta	20	28.5
2. Potato bread	20	28.5
3. Milk - sugar	3	4.2
4. Milk-eggs-bread	5	7.1
5. Fiber foods cereals grains bread desserts pasta potatoes rice	1	1.4
6. Sweets	15	21.4
7. No answer	6	8.5

The most interesting answer to this question was the high number of answers, such as "*dessert-bread*", while only one participant answered correctly and in detail, such as fiber foods, cereals, bread, dessert, pasta, potato, and rice (T18).

Table 12: Diseases Occurring in Iodine Deficiency

	f	%
1. Goiter 33 47.1	33	47.1
2. Heart disease 5 7.1	5	7.1
3. Vascular diseases 3 4.2	3	4.2
4. Nail and hair loss 2 2.8	2	2.8
5. Color blindness 4 5.7	4	5.7
6. Cancer 3 4.2	3	4.2
7. Thyroid diseases 10 14.2	10	14.2
8. No answer	10	14.2

When Table 12 is examined, correct answers were given as "*Goiter*" (f:33); "*Thyroid diseases*" (f:10).

Table 13: Meaning of Cholesterol

	f	%
1. Fat	18	25.7
2. Harmful substance that makes you gain weight	25	35.7
3. Blood product	1	1.4
4. Bile	1	1.4
5. No answer	25	35.7

When Table 13 is examined, the question "*What is cholesterol?"* was not answered with a high rate of 35.7% (f:25), and 25 participants defined it as "*a harmful substance that causes weight gain*".

Table 14: Meaning of Antioxidant

	f	%
1. A bad substance	10	14.2
2. Substances that protect the heart	10	14.2
3. A disease	1	1.4
4. Substances and hormones that make a living thing grow	1	1.4
5. Substances that provide many benefits to the body and are taken from certain foods and increased with a healthy diet	1	1.4
6. No answer	47	67.1

Table 14 is the question that most of the participants (f:47) did not answer. The candidate teacher gave the closest answer to the correct answer coded T20, who wrote, "*Substances that are very beneficial to the body and are taken from some foods and increase with a healthy diet*".

Table 15: Assets/substances Important for Bone and Dental Health

	f	**%**
1. Vitamins 20 20.5	20	20.5
2. Nutrients 5 7.1	5	7.1
3. Sun-Ca-Phosphorus-Mg 12 17.1	12	17.1
4. Doing sports, brushing teeth 1 1.4	1	1.4
5. Sun 25 35.7	25	35.7
6. No answer	7	10

When Table 15 is analyzed, among the answers given to the question, 12 respondents gave the correct answer as "*Sun-Ca-Phosphorus-Mg*" with 17.1%.

5. Discussion and Conclusion

This study explored the level of knowledge of preschool teacher candidates about basic nutrients. When the answers given to the question "*what is nutrition?"* were examined, 42.8% of the participants gave the answer "*taking nutrients into our body*", while 2.8% of respondents gave the correct answer by saying "t*aking the nutrients necessary for the continuation of life as much as necessary and using them by the body*". In parallel with this result, Durukan *et al.* (2017) conducted a study with pre-service teachers; in the related study, "*awareness of teacher candidates towards the concept of nutrition*" was examined during the education and training process given to teacher candidates, and it was found that their knowledge level of adequate and balanced nutrition was at a medium level.

In the study, when asked, "*what are the basic nutrients?"* more than half of the (f:40) respondents answered carbohydrates. Only one person gave the correct answer as "*carbohydrate fat, protein mineral and vitamin*". In addition, the participants were asked the question, "*Write the importance of carbohydrates for the body*", and it was seen that 18% of participants limited carbohydrates to bread and dessert. The researchers asked the teacher candidates to give examples of carbohydrate foods. When the answers given were examined, only one teacher candidate gave correct and detailed answers such as fiber foods, cereals, bread, dessert, pasta, potatoes, and rice. Similar to this result, Daşdemir (2021) investigated the "Readiness Levels of Prospective Primary School Teachers for the Concepts in Primary School Science Subjects" and concluded that prospective teachers had difficulty in defining the concept of carbohydrates. However, in the study, teacher candidates were also asked the question, "*What is the first energy source used in the body?*" and the second most correct answer was obtained. 43 of the teacher candidates said that "*carbohydrate is the first source of energy*". In line with these results, it can be concluded that teacher candidates' level of knowledge about the concept of carbohydrates remains at the memorization level.

In the study, the researchers asked the participants the question, "*Write the importance of proteins for the body*." The correct answer was eight 8 teacher candidates who explained protein as "*the body's building material" and eight teacher candidates who explained it as "restorative and energizing*". Related to this result, Daşdemir (2021) stated in his study

that 34.5% of teacher candidates had difficulty in defining the concept of protein. The teacher candidates were asked the question, "*Write the importance of fats for the body*" and when the answers were analyzed, it was found that 28.5% of the teacher candidates answered "*weight gainer*", 14.2% answered "*obesity-related concept*", and in general, "*fat and weight*" were related. Daşdemir (2021) reached a similar result in his study and found that the level of knowledge of teacher candidates about the concept of fat (78.5%) was high. In the study, prospective teachers were asked the question, "*What is the importance of minerals for living things?*" and 18 participants did not give any answer about minerals, while only two participants answered, "*substances such as Ca-Mg- Phosphorus and substances important for growth, development and protection from diseases*". In addition, teacher candidates were asked the question, "*What is the importance of vitamins for living things?*" and it was seen that 22 teacher candidates answered "*growth, development and protection from diseases*"; 15 teacher candidates answered "*Vitamins such as A, B, C, D protect from diseases*". It was determined that 12 of the teacher candidates were more knowledgeable about vitamins than minerals by answering "*strengthens immunity*". When the literature was examined, it was found that 40.8% of university students used vitamin-mineral-supplements (male 47.0%, female 53.0%) in the study conducted by Keser *et al.* (2014) on university students, and it was found that university students' awareness of the concept of vitamins was at a good level.

In the scope of the research, prospective teachers were asked the question, "*What is the building block of proteins?*" and 64.2% provided the correct answer, "*amino acids*." Similarly, the prospective teachers have asked, "*What happens if the body excessively metabolizes proteins?*" The findings revealed a high number of participants (f:24) who did not respond, with only five participants providing the correct answer. These two findings suggest that prospective teachers adopt a memorization-based learning approach, failing to internalize and assimilate knowledge at a conceptual level and inadequately linking the contents of concepts to their meanings.

Additionally, prospective teachers were asked, "*What diseases are caused by iodine deficiency?*" The responses showed that 33 participants answered "*goiter*," while 10 participants mentioned "*thyroid diseases*," both of which were considered correct. In alignment with this, a study by Gündoğdu (2009) on the nutritional knowledge of preschool teachers posed the question, "*What disease is caused by iodine deficiency?*" and reported a correct response rate of 87.15%.

Furthermore, in response to the question, "*What is cholesterol?*" 35.7% of prospective teachers did not provide an answer, while 25 participants incorrectly defined cholesterol as a "*harmful, fat-producing substance*." In contrast, Birsen's (2004) study on adults' knowledge about fats and cholesterol indicated that 50% of adults had sufficient knowledge about fats, 55% about cholesterol, and 54% about the relationship between fats, cholesterol, and health.

When asked, "*What is an antioxidant?*" the question elicited the highest non-response rate, with 47 prospective teachers failing to provide an answer. The literature reveals no similar studies conducted specifically with prospective teachers. However,

Sezer's (2021) research on healthcare professionals (physicians) found that, while physicians demonstrated positive attitudes towards nutritional awareness, they lacked sufficient knowledge about antioxidant foods.

Lastly, in response to the question, "*Which elements or substances are essential for bone and dental health?*" only 17.1% of the participants correctly answered "*Sunlight-Ca-Phosphorus-Mg*." In this regard, a study by Bilgiç, Hamamcılar, and Bilgiç (2011) on the nutritional knowledge and practices of athletes found that 16.3% of athletes were unaware of the richest dietary sources of calcium, while 33.3% had misconceptions about the minerals essential for bone and dental health.

The literature underscores that nutritional habits dominant in early childhood directly impact growth and development. Healthy eating habits that support growth in early childhood also serve as protective factors against chronic diseases in adulthood. The recently updated "2024 Preschool Curriculum" and the newly introduced "Türkiye Yüzyılı Maarif Modeli [Turkish Century Education Model-TCEM] Preschool Curriculum" emphasize the importance of instilling healthy eating habits in children. Preschool institutions, as the first structured learning environments that children encounter after the family, play a pivotal role in this regard. Children observe, model, and learn from their teachers. Özcan *et al.* (2019) conducted a study on the effects of direct and indirect nutrition education on children's nutritional status, revealing that children who received indirect nutrition education through their teachers had higher levels of nutritional knowledge than those who received direct education from dietitians.

Before 2018, the undergraduate program for preschool teacher candidates included "Maternal and Child Nutrition" as a mandatory course. However, the revised 2018 curriculum removed this requirement, offering nutrition courses as electives in some universities. According to Lund (2011), teachers' feelings of inadequacy in nutrition education stem from concerns about selecting the correct resources, time constraints, and the lack of inclusion of nutrition topics in the curriculum. In light of these findings, as highlighted in the literature (e.g., Zembat *et al.*, 2018), supporting teachers' perceptions and habits regarding healthy nutrition is crucial, as teachers are the primary influencers in children's learning environments.

The most effective way to support teachers is to equip them during their training as teacher candidates, maintain their knowledge base, and help them construct knowledge that resonates with their personal and professional lives. It is imperative to develop dynamic awareness programs enriched with diverse content, including interactive face-to-face, virtual, and hybrid formats, focusing on healthy nutrition education and nutritional literacy for preschool teacher candidates.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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