

## Original Research



# Effect of nutrition education received by teachers on primary school students' nutrition knowledge

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### Conflict of Interest

The authors declare no potential conflicts of interests.

## ABSTRACT

**BACKGROUND/OBJECTIVES:** The aim of this study was to assess the effect of nutrition education received by fourth- and fifth-grade teachers in state schools in Famagusta, Northern Cyprus, on their students.

**SUBJECTS/METHODS:** The aim of this study is to assess the effect of nutrition education received by fourth- and fifth-grade teachers (n = 27) in state schools in Famagusta on their students. Participants (n = 718) were selected through a regional pilot scheme. The teachers were instructed on nutrition by the researcher and provided with a researcher-prepared nutrition education book "I Am Learning about Healthy Nutrition". Before receiving their nutrition education, the teachers were pretested to assess their baseline nutrition knowledge. Following receipt of their nutrition education, a posttest, which included the same questions as those in the pretest, was administered to the teachers to assess the effectiveness of the training session. Similarly, students were asked pretest researcher-prepared questions to evaluate their baseline nutrition knowledge level. The teachers were then given a period of three to four weeks to instruct the students in nutrition education. Following this instructional period, a posttest that included the same questions as those in the pretest was administered to the students.

**RESULTS:** The results showed that there were significant differences between the pre- and posttest scores of both teachers and students; in both groups, the nutrition knowledge level increased ( $P < 0.05$ ).

**CONCLUSIONS:** These results show that the provision of nutrition education training to teachers positively affected the nutrition knowledge level of both teachers and students.

**Keywords:** Education; training programs; healthy nutrition; primary school; children

## INTRODUCTION

Nutrition refers to the use of nutrients for growth, development, survival, and the promotion of health. Therefore, adequate and balanced nutrition is one, maybe the most important, of the fundamental conditions needed for a healthy society. It is also important for individuals within a society to be healthy and strong in order for the society to develop both economically and socially, as well as to prosper and continue its existence [1,2].

### Author Contributions

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It is generally accepted that inadequate and unbalanced nutrition negatively affects the health of a society and hinders both social and economic development. This is particularly important for the children within that society. In many developing and developed countries around the world, the health of children is monitored on a regular basis from birth until the start of school in an effort to ensure children grow and develop in a healthy way. However, school-age children may not benefit from such healthcare services. On the other hand, school is one of the main institutions that can promote the psychological and biological development of individuals and affect their cultural changes at the highest level [3,4].

Typically, children spend a large part of the day in school. The school-age period between 6 and 11 years is one in which children develop both physically and mentally. During this period, children create their own identity and want to direct their own nutrition. It is very difficult for individuals who do not acquire the right habits during childhood to get rid of poor habits later in their life. Thus, implementing a proper course of nutrition education for school-age children is key in securing healthy habits during the early school-age period [5-7].

Nutrition education for school-age children not only positively affects their nutrition knowledge level and health, but also contributes to the development of behaviors that can promote health in families and societies because children can convey their new knowledge to their families. Therefore, the participation of families and teachers in training being provided to school-age children is important for reinforcing and maintaining children's knowledge [8-11].

Within the Turkish Republic of Northern Cyprus (TRNC) population, 7% are children of primary school age, and in Famagusta, TRNC, that figure is 6.8%, similar to that of the entire TRNC [12]. A review of the literature showed that there are no reports of studies investigating the effect on students and teachers of nutrition education material other than the standard books included in a school's curriculum. It is hoped that the results of this study will overcome some of the inadequacies in this field of study and contribute to positive overall shifts in society. The aim of this study was to assess the effect of nutrition education received by fourth- and fifth-grade teachers in state schools in Famagusta on their students.

## SUBJECTS AND METHODS

### Study design

This study was conducted on fourth- and fifth-grade teachers and students in 7 state schools in the city of Famagusta, TRNC. At the beginning of the academic year, approval to implement this study was received from the TRNC Ministry of National Education, as well as from school staff, teachers, and families.

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects were approved by the Ethics Committee at the Eastern Mediterranean University (date: April 18, 2016, decision No.: ETK00-2016-0029). Written informed consent was obtained from subjects and their families.

Of the 27 teachers who participated in the study, 14 (51.8%) and 13 (48.2%) provided science lessons to fourth-grade and fifth-grade students, respectively. Of the teachers who provided the students with nutrition education, 16 (59.3%) were male and 11 (40.7%) were female. Initially, a short questionnaire, asking for general information about them, was administered

to the teachers. Afterward, a pretest consisting of questions related to nutrition was administered to the teachers to assess the current status of their nutrition knowledge. After the pretest, the teachers were instructed on the subjects included in the book “I Am Learning about Health Nutrition” with training done in the form of questions and answers. During the instructional period, the researcher gave a 2-hour training presentation using the Microsoft PowerPoint program. At the end of the training session, a posttest comprising the same questions as those in the pretest was administered to the teachers to assess the effectiveness of the nutrition education training program. Subsequently, the researcher asked the teachers to convey the content provided in the training material to their students during at least 1 lesson (40 min) per week for at least 3 weeks.

Nutrition education was given by the 27 trained teachers to 718 fourth- and fifth-grade students, particularly those taking science lessons, in order to enable this study to be both comprehensive and effective. During the study, the total population of fourth- and fifth-grade students in Famagusta was approximately 900 and 718 of them were subjects in this study. The criteria for inclusion in the study was for the child to be a fourth- or fifth-grade student in a state primary school in Famagusta. The study population included 350 boys (48.7%) and 368 girls (51.3%). Of the students who participated in the study, 51.9% were fourth-graders and 48.1% were fifth-graders. The majority of the students (98.7%) were in the 10-year-old to 11-year-old age range.

Prior to the start of nutrition education instruction by the trained teachers, a pretest about healthy nutrition was administered to the students under the supervision of the researcher. Afterward, the researcher administered a questionnaire to the students asking for general information such as the student's school, age, gender, and grade. After completion of the three- to four-week nutrition education instruction by the teachers, a posttest that included the same questions as those in the pretest was administered to the students, and the changes in their level of knowledge about healthy nutrition were examined.

### **Content of “I Am Learning about Healthy Nutrition” training book**

The guidebook entitled “I Am Learning about Healthy Nutrition”, prepared for educating teachers and students, is comprised of three parts. In the first part, problems caused by an inadequate and unbalanced diet, resulting in diseases or conditions, such as obesity, slimness, diarrhea, anemia, dental cavities, and vitamin and mineral deficiencies, are described under the chapter title “Effect of Nutrition on Health”. Moreover, the text indicates the need to pay attention to nutrition when eating out are also addressed.

In the second part, food groups are introduced, and the nutritional elements of each group and the roles of those nutrients are described. Information about dietary habits, eating speed, choosy eating, the order of meals, the importance of breakfast, healthy drinks, and the school canteen are included in this second chapter.

The third part of the book, entitled “I Am Learning about Healthy Nutrition”, presents nutrition health and personal hygiene guidelines, and indicates that teachers should revise what they will teach the students about nutrition. Moreover, at the end of the book, the teachers are told to include practice sessions with pictures when instructing the students, and their controls were requested.

### Data collection and analysis

#### *Pretest and posttest assessments of teachers and students*

A total of 40 test questions with four choices for each answer were included in the questionnaire for the teachers. The answers were tallied to provide a maximum score of 40 points; each correct answer was rated “1”, while each answer that was wrong or absent was rated “0”. The pretest and posttest questions were identical.

A total of 30 multiple-choice questions relating to nutrition were included in the questionnaire for the students, 22 of which included 4 potential answers, and 8 of which included 2 potential answers (true/false). The answers were tallied to provide a maximum score of 30 points. Each correct answer was rated “1”, while each answer that was wrong or absent was rated “0”. The pretest and posttest questions were identical.

### Statistical data analysis

The statistical data analysis was performed in collaboration with a biostatistics expert. Descriptive statistics were used in this study to provide information about the general characteristics of participants. The median value, minimum and maximum values, and the interquartile percentages of the continuous variables were determined. Median values were used in this study because the variables were not normally distributed. In the descriptive data statistical analysis, mean and standard deviation values were used when the data explained by numerical measurements were distributed normally. For the assessment of qualitative data, information about the data distribution was given by presenting number (%) values [13].

The Shapiro-Wilks test was used to determine if the data for the continuous variables were normally distributed. If the data were not distributed normally, the Mann-Whitney U test was used for inter-group comparisons (comparing 2 independent groups). Wilcoxon Matched-Pairs Signed Rank Test was used for intragroup or intertemporal comparisons [13].

The test results were considered statistically significant when the *P*-value was calculated to be less than 0.05. Data analyses were conducted using commercially available statistics software (IBM SPSS Statistics 19; IBM Corp., Armonk, NY, USA) [13].

## RESULTS

### Pretest and posttest assessments of teachers

**Table 1** shows the median values of the pretest and posttest scores of the teachers, which were 33 and 35, respectively, out of a total possible score of 40. The difference between the teachers' pretest and posttest median score distributions was statistically significant for teachers ( $P < 0.05$ ) (**Table 1**).

### Pretest and posttest assessments of students

The pretest scores of the 718 students varied between 5 and 28 with a median value of 20. The posttest scores of the students varied between 8 and 29 (median value of 22). The difference between the pre- and posttest scores of the students was significant ( $P < 0.05$ ) (**Table 2**).

### Changes between pretest and posttest assessments

Compared to the pretest scores, there were increases in the posttest scores of both groups (teachers and students). However, there was no statistically significant difference between

**Table 1.** Comparison of median values of teachers' pretest and posttest scores

Test name	Median	Range	Z	P-value
Pretest (n = 27)	33	23–38	-3.461	0.001
Posttest (n = 27)	35	23–39	-	-

Wilcoxon Matched-Pairs Signed Rank Test.

**Table 2.** Comparison of median values of students' pretest and posttest scores

Test name	Median	Lower-higher	Z	P-value
Pretest (n = 718)	20	5–28	-10.756	< 0.001
Posttest (n = 718)	22	8–29	-	-

Wilcoxon Matched-Pairs Signed Rank Test.

**Table 3.** Effect of nutrition education provided by teachers on students' improvements in test scores

Participants	Posttest-pretest differences (higher-lower values)	Posttest-pretest difference (median value)	Interquartile percentage (Q3-Q1)	Z	P-value
Teacher (n = 27)	-2, 6	2.0	4	-0.891	0.373
Student (n = 718)	-15, 17	1.0	5	-	-

Mann-Whitney U test.

the change in pretest and posttest median values of teachers and the change in those of the students ( $P > 0.05$ ) (**Table 3**). This result shows that the nutrition education provided to the teachers improved their nutrition knowledge level and had a similar effect on increasing the nutrition knowledge level of the students.

## DISCUSSION

Attitudes, habits, and preferences regarding food and nutrition begin before and continue during and after the pre-school period [14]. An adequate and balanced diet is of great importance for the prevention and treatment of diseases, and it is known that unhealthy eating habits acquired during childhood and adolescence are associated with poor health in adulthood. A fundamental reason for the occurrence of a significant portion of health-related problems is inadequate nutrition knowledge. Because children spend most of the day at school, teachers have a particularly key role in children acquiring correct nutrition habits. Therefore, nutrition education provided to teachers, as well as students, can be effective in enhancing the nutrition knowledge and habits of children [14-16].

A previous study examined the nutrition knowledge level and nutritional habits of 381 elementary school teachers (128 males and 253 females) [17]. Of those teachers, 71.3%, 24.9%, and 3.6% had adequate, good, and inadequate levels of nutritional knowledge, respectively. Another study, conducted by Gürel *et al.* [18], assessed the nutrition knowledge level of teachers and determined that 80.9% of the teachers had an inadequate level of nutrition knowledge; the authors concluded that the teachers needed to receive nutrition-related education. Taşkaya *et al.* [19] reported that nutrition education should be given to teachers, and Rossiter *et al.* [20] reported that 72.0% of the students studying in the department of education at a university had moderate or low levels of nutrition knowledge.

In the present study, we detected a significant difference between pretest and posttest scores of teachers with the teachers' posttest median value and level of nutrition knowledge increasing after they were instructed using the study's education materials ( $P = 0.001$ ) (**Table 1**). We argue, therefore, that the level of nutrition knowledge of teachers can increase if relevant training is provided.

In previous studies conducted in Turkey, the majority of teachers stated that they did not find the level of nutrition education provided to students at school to be adequate [17,21]. This may be because there is no course dedicated to nutrition in elementary schools in Turkey; we suggest that the same situation may be present in the schools in TRNC. A study conducted by Şanlıer and Güler [22] examined changes in the knowledge and habits of students after the researchers provided them with nutrition education via different methods and reported that nutrition information provided via a supplementary book yielded more effective results than such information provided verbally.

In a study conducted by Park *et al.* [23], the student subjects were divided into three groups: one was trained directly by an educator; one was trained by family members, and the third was not trained. Examination of the differences among the groups revealed a significant positive benefit when instruction on nutrition knowledge and eating habits were provided by an educator. In a study of elementary school students performed by Sabbağ and Sürücüoğlu [24], the researchers provided the students with nutrition education and examined the subsequent effect of that education on the students. The researchers reported that the provision of nutrition education affected positively the nutritional attitudes and behaviors of students. Another study showed that nutrition education provided via information transfer from child to child can also significantly increase the nutrition knowledge levels of students [25].

In a study conducted by Yiğit *et al.* [26], 216 students (half in the fourth grade and half in the fifth grade) received nutrition education and changes in their level of nutrition knowledge after the training were examined. The authors reported a significant increase in the nutrition knowledge levels of all students. Moreover, a study conducted by Shah *et al.* [27] involving students instructed on nutrition by parents and teachers reported that children aged between 8 and 11 years who received nutrition education showed more improvement in nutrition knowledge than those aged between 12 and 18 years. However, the study did show that children, as well as their families and teachers, had major health-, nutrition knowledge- and behavior-related deficiencies; consequently, the researchers pointed out that an education program involving an appropriate team of parents and teachers who can have an impact on young children would be effective.

Teachers can affect their students' eating habits in different ways by applying their nutrition knowledge, being a role model, and avoiding unhealthy foods [20]. A study conducted by Rossiter *et al.* [20] reported that teachers have an important effect on their students' nutrition knowledge and nutritional attitudes, and suggested that students should be informed about nutrition during both early childhood and adolescence. Another study suggested that providing nutrition training programs in institutions such as schools can have positive effects on students and their families who are trained [28].

A study conducted by Prelip *et al.* [29] included a nutrition education program and examined children's consumption of fruits and vegetables, knowledge of food groups, attitudes and beliefs toward fruit and vegetable consumption, and the effect of families and teachers on these attitudes and beliefs. The results showed improvements in the children's nutrition knowledge as well as in their attitudes and beliefs toward vegetables. In addition, they reported that teachers had an effect on children's attitudes and beliefs.

The results of the present study indicated that after the students received three to four weeks of nutrition education, their nutrition knowledge levels increased significantly ( $P < 0.05$ ) (Table 2). However, continuity of attendance may be obligatory in order for such an

education program to be effective. Thus, problems related to nutrition can be minimized. To further investigate such issues, this study will continue as a project of the Turkish Cypriot Dieticians Association.

Our analysis revealed no significant difference between the improvements in the test results of the teachers and the students. The absence of a statistical difference between the test results of the 2 groups indicates that both groups increased their nutrition knowledge levels to a similar degree (**Table 3**). In other words, the teachers increased their knowledge and effectively conveyed that increment in their knowledge to their students; thus, the level of knowledge of a teacher can affect the level of knowledge of the teacher's students.

School-based educational programs can have a considerable effect on children's healthy living behaviors. Teachers are the educational representatives who can achieve this in schools. Moreover, teachers are among the first role models for school-age children in the school setting; often, the first place they regularly inhabit outside of their family environment. Therefore, the effects of teachers' behaviors and their knowledge on students are considerable.

The aim of this study was to assess the effect on students of nutrition education received by fourth- and fifth-grade teachers in state schools in Famagusta, TRNC. In the study, teachers were instructed in nutrition and asked to convey what they learned during their training to their students. The results showed that the teachers effectively conveyed their increased knowledge to the students.

The long-term aim of this study, which was conducted with the support of the Ministry of Education, is to transfer nutrition-related information imparted to teachers to all future generations. To that end, during every school year, the same pre- and posttests should be administered to students during the same academic term to ensure that teachers continue to communicate what they have learned and the Ministry of Education should be encouraged to implement such a program.

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