

**ORIGINAL PAPER****Effect of Nutrition Training on Dietary Behavior of Turkish Seventh Grade Students and their Mothers****Gülendam Karadağ, PhD, RN**

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**Correspondence:** Gülendam Karadağ Department of Public Health Nursing, Faculty of Health Sciences, University of Gaziantep, Gaziantep, Turkey. Email: karadag@gantep.edu.tr**Abstract****Objective:** This study was designed to investigate the effect of nutrition training delivered to seventh grade students and their mothers on developing nutrition awareness**Design:** Using cross sectional and experimental design.**Participants:** A sample of 230 seventh graders was selected from 13,487 students in two primary schools chosen from 114 schools in Gaziantep, Turkey.**Interventions:** A questionnaire, a nutrition diary, Dietary Behavior Index was used. There is a relationship between two categorical variables, the chi-square test was used. A paired samples t-test was performed to compare before and after measurements, and Student's t test was used to compare the intervention and control groups.**Results:** Based on their post-training weekly nutrition diaries, the intervention group students developed more positive attitudes compared to the control group students in terms of increasing the frequency of consuming the basic food groups during the main meals, reducing the consumption of sugary and fatty foods, and decreasing their rate of meal omission. The difference between the groups was statistically significant ( $p < 0.001$ ). Regular consumption of breakfast and lunch post-training increased in a statistically significant way in the intervention group compared to the control group ( $p < 0.001$ )**Conclusion:**

Dietary behaviors of the students changed positively, consumption of basic food groups increased in all meals. Positively affected the dietary behavior of the children and their consumption of the basic food groups and the training provided to their mothers had a reinforcing effect in developing nutrition awareness and the nutrition guide enabled continuity of the training.

**Key words:** Primary School Student, Nutrition Training, Nutrition Awareness

## Introduction

Adequate and balanced nutrition, which is important for all age groups, is of particular significance for children (Raaijmakers et al., 2010; Mikolajczyk et al., 2009). Providing nutritional information to children when they are young, and introducing good nutritional habits are important for optimal, healthy nutritional preferences (Akar Şahingöz & Şanlıer, 2011). Dietary intake problems in childhood and adolescence can be carried forward to adulthood and can adversely affect public health. Therefore, it is important to prevent dietary intake problems during this period or to discover them early and treat them if they have already emerged (Nago et al., 2011).

Children of school age constitute a large portion of the Turkish population and play a key role in raising the health level of the society (Geçkil & Yıldız, 2006). In Turkey students usually do not follow healthy eating habits. A typical student diet is high in fat and low in fruits and vegetables (Akman et al., 2010; Ayrancı et al., 2010). The results of many studies among primary school students in our country revealed that the nutrition problems seen in school children are due to inadequate nutrition training, knowledge, environmental factors such as availability of sugared soda and juices as school, availability of quality food in family and failure to implement an effective nutrition program (Geçkil & Yıldız, 2006; Fahlman et al., 2008; Ayrancı, et al., 2010).

Correct dietary behaviors acquired in the period of childhood and adolescence form the basis for individuals to be healthier in the future (Acar Tek, et al., 2011). However, many adolescents do not adopt healthy eating habits due to complex and different factors. Friends, advertising, and promotion of commercial products such as soft drinks, sugary and salty foods, chips, and fast foods all affect negatively the eating habits of adolescents. On the other hand, as providers, models, and regulators, parents try to reduce the negative effects of these factors by imbuing healthy eating habits in their children (Blom-Hoffman et al., 2008). Women are the caregivers of the family, and they are a keystone of utmost importance in promoting and maintaining family health in all cultures (Akar Şahingöz & Şanlıer, 2011; Sonmezer et al. 2012). Mothers play an important role in the acquisition of healthy dietary habits, first for her children and then for her family (Karağaoğlu, 2008; Pekcan, 2008). Studies have demonstrated that nutrition awareness in mothers positively affected the dietary behavior and

health of their children (Gross et al., 2010; Blom-Hoffman et al., 2008). For this reason, it is vital that they are made aware of healthy eating habits (Blom-Hoffman et al., 2008). Schools are also significant because they reach a large number of individuals and contribute to the education of the society through their conveyance of knowledge to the family (Wabitsch, 2000; Wainwright et al., 2000). School nurses have a great responsibility to improve the health of the students at school, the members of their families, the teachers, and other school employees (Wainwright, et al., 2000; Carter, 2002).

In Turkey, there are limited studies on solutions to nutrition training problems and the practice and evaluation of nutrition training services. There is also a lack of research on dietary education programs involving the participation of mothers, who have a crucial role in making the other members of the family aware of healthy nutrition behaviors (Geçgil & Yıldız, 2006; Güleç et al., 2008; Allsaffar, 2012). This study is intended to address this research gap. Its objective is to investigate and evaluate the effect of nutrition training given to seventh grade students and their mothers on their developmental nutritional awareness through a randomized and experimental method.

## Methods

A cross-sectional, design was used. The parents students in this research signed an informed consent to participate for their children, after receiving the necessary explanations about the purpose and method of the study and the results that were planned to be achieved. The Directorate of National Education in Gaziantep and the Medical Ethics Committee of the Faculty of Medicine in Gaziantep University provided written approval for the study. Verbal permissions were obtained from the school principals to perform the study as well as permission to use the DBI by e-mail.

## Population and Sample

The population of the study consisted of seventh grade students in state schools operating under the Directorate of National Education in the provincial center of Gaziantep. Cultural characteristics and economic status, as well as the recommendations of the Gaziantep Regional Directorate of the Turkish Statistics Institution (TSI) and the grouping of the Provincial Directorate of National Education, were taken into consideration in selecting the schools. Gaziantep is divided into two districts, Şahinbey and Şehitkamil, each with three regions classified

according to family income as wealthy, mid-level, and poor. The students were chosen from schools in mid-level neighborhoods because the students in the wealthy parts of the city have more spending money and consume more snacks at the school canteen and because the families in the poor sections move their place of residence very often, which results in their children not being able to attend school regularly. The names of all schools (Şahinbey town: 17 schools, Şehitkamil town: 23 schools) located in mid-level regions were written on small pieces of paper and placed in two different bags marked Şahinbey and Şehitkamil, respectively. One school name was then selected from each bag. The two names were put inside another bag, from which one was chosen as the intervention group and the other as the control group. The reason for selecting an intervention and a control group school from two different districts was to prevent interaction between the students during the training.

All seventh grade students in both schools who had no psychiatric problems and lived with their families were included in the sample, which consisted of 230 students, 115 from each school. The rate at which the intervention group students attended the study was 88.4% and that of the control group students was 91.5%.

### Instruments

A questionnaire for students, a nutrition diary, and a dietary behavior index were used to collect the data for the study. In addition, a nutrition guide developed for seventh grade students was used. The questionnaire was developed on four steps: defining the problem, writing the items, asking experts opinions about the questionnaire, and pilot study.

### Student Questionnaire

The questionnaire for students was prepared by the investigators based on the literature on the subject to obtain data on the students' sociodemographic characteristics (5 items, such as age, sex, education level of parents etc.) and dietary behaviors (6 questionnaire items, such as number of daily meals, regularity of meals, consumption of milk/yogurt etc.) (Demirezen & Coşansu, 2005; Geçgil & Yıldız, 2006).

### Nutrition Diary

The Food and Nutrition Board in U.S. stated in 1958 that grouping foods in four categories would be appropriate for adequate and balanced nutrition. In 1985, the Board adopted using "Food Pyramid"

which depicts foods in a pyramid with the tip representing foods to be consumed less and the bottom level representing foods to be consumed more, considering it would facilitate raising awareness of the communities for nutrition (Nutrition Guide for Turkey, 2004). Hacettepe University developed a national nutrition guide, in collaboration with the Ministry of Health, General Directorate of Basic Health Services. Giving consideration to our country's food production and nutritional status, it was decided that use of four food groups in the Guide would be more appropriate in the planning of basic food intake on a daily basis and **four-leaf clover** was chosen to illustrate the groups<sup>24</sup> (1<sup>st</sup> group: meat and meat products, 2<sup>nd</sup> group: dairy products, 3<sup>rd</sup> group: vegetables and fruits, 4<sup>th</sup> group: cereals). In the present study, food groups were categorized in four classes as per the aforementioned guide. Additionally, students were asked to record their consumption of potato chips, biscuits, sugar, soft drinks, other carbonated/sweet drinks and missed meals. The nutrition diary is a table prepared by the investigators based on the literature to obtain data on the food and beverages consumed by the students during three main meals, including snacks, for one week (Baysal, 2004; Geçgil & Yıldız, 2006; Pekcan, 2008; Nutrition Guide for Turkey, 2004). The students recorded in their nutrition diaries the names of the food and quantities (e.g., a glass of tea/milk, one apple, a piece of bread, a bowl of soup) that they consumed during the main meals in the morning, at noon, and in the evening, including snacks, for one week. For example, if the student ate eggs (meat products), cheese (dairy products), tomatoes, cucumber (fruit/vegetables), and bread (cereals) for breakfast the investigators marked the 1st, 2nd, 3rd, and 4th food groups. If the student consumed pizza (meat, vegetables, and cereals), salad (fruit and vegetables), soft drink, candies, and chocolate (fizzy drinks) for lunch, the investigators marked the 1st, 3rd, and 4th food groups. The investigators grouped and recorded the food and quantities written by the students in their nutrition diaries in the following way:

- 1<sup>st</sup> Group: Meat and Meat Products (meat, fish, chicken, eggs, dry legume)
- 2<sup>nd</sup> Group: Dairy Products (milk, yogurt, cheese, skim-milk cheese, buttermilk)
- 3<sup>rd</sup> Group: Vegetables and Fruits (vegetable dishes, salads, raw vegetables and fruits)
- 4<sup>th</sup> Group: Cereals (bread, rice, bulgur, macaroni, bakery products)

### **Dietary Behavior Index (DBI)**

The Dietary Behavior Index (DBI) is a Likert-type scale developed by Demirezen consisting of 6 items for dietary behaviors (Demirezen, & Coşansu, 2008). The response format in DBI includes 5 points: 0 = "never," 1 = "rarely," 2 = "sometimes," 3 = "often," and 4 = "always." However, the scoring is reversed in the last item (i.e., 0 = always to 4 = never). The risk level of dietary behaviors is evaluated by risk intervals established according to the total score obtained in the DBI. The highest score that can be obtained in the DBI is 24, and the lowest is 0. The DBI score is evaluated as no risk (0 point), low risk (1-6 points), moderate risk (7-12 points), high risk (13-18 points), and very high risk (19-24 points). As the total score obtained in the DBI increases, the risk level of dietary behaviors also increases. As the total score obtained in the DBI decreases, the risk level of dietary behaviors also decreases. In Demirezen's study DBI total item scores and cronach alpha analyses were made and the total item correlation coefficients ( $r$ ) of DBI items ranged between 0.37 and 55 and the Cronbach alpha value was found to be 0.68. In our study, we used the internal consistency analysis (Cronbach alpha) to determine the reliability of DBI and the Cronbach alpha value was calculated to be 0,64.

### **Nutrition Guide for Primary School Students**

The nutrition guide is a brochure prepared by the investigators after the nutrition training. It provides information based on the literature and in line with the contents of the training, including the importance of healthy diet in the primary school and early adolescence period, the nutrition requirements of children of this age, facts about nutrients and food groups, and sample menus. It consists of 10 pages printed in color, with eye-catching pictures related to the subjects it contains (Karaağaoğlu, 2008; Pekcan, 2008; Nutrition Guide for Turkey, 2004; Baysal, 2004; Garipağaoğlu et al., 2008). The guide was shared only with the intervention group students and their families.

### **Procedure**

The data were collected during the school year September 2009- June 2010. The investigator waited inside the classroom while the students filled out the questionnaire. After they had completed the questionnaires, the students were given a nutrition diary in which to record the food and drinks they consumed for a week; they were instructed on how to do the recording by writing examples on the

board. After collecting the pre-training data, nutrition training (nutrition elements, food groups, nutrition of children at school, the importance of main meals, regular and balanced diet) was given to the intervention and control groups for six weeks at two hours weekly on different days of the week. In addition the mothers of the students in the intervention group were received nutrition training for three weeks at two hours weekly on different days of the week and nutrition guide was given to the families in the interventions group. Table 1 shows the process applied to both groups. The questionnaire, nutrition diary and DBI were re-administered to the students as a posttest four months after the training. Figure 1 Flow Diagram presents the procedures applied to the intervention and control groups.

### **Data Analyses**

To determine if there is a relationship between two categorical variables, the chi-square test was used. A paired samples t-test was performed to compare before and after measurements, and Student's t test was used to compare the intervention and control groups. The SPSS 11.5 statistical package was used for the calculations. The mean  $\pm$ std. for continuous variables and the frequencies and percentages for categorical variables were given as descriptive statistics. For all analyses,  $p < 0.05$  was considered to be statistically significant.

### **Results**

#### **Students' Dietary Habits Pre- and Post-Training**

A statistically significant difference was found between the pre-training and post-training quantities of meals consumed by the intervention and control group students ( $p < 0.05$ ), and this difference resulted from the fact that the students increased the number of daily meals they consumed after the training. Although there was an increase in the post-training rate of having meals on a regular basis in both groups, the increase was greater in the intervention group. Regular consumption of breakfast and lunch post-training increased in a statistically significant way in the intervention group compared to the control group ( $p < 0.001$ ) (Table 2).

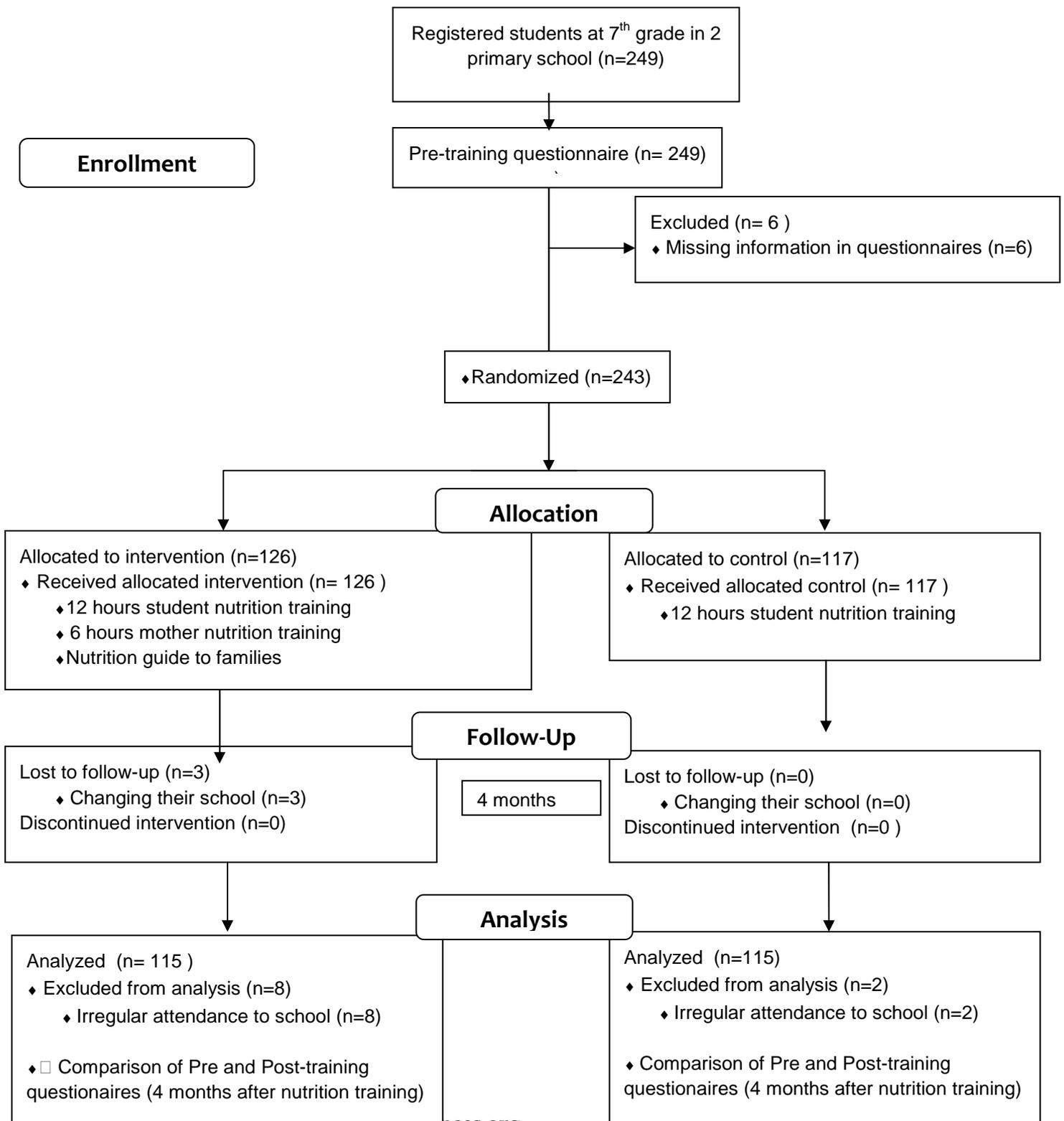
#### **Students' Pre- and Post-Training Dietary Behavior Index**

The majority of the intervention and control group students were in the moderate-risk group according to their pre-training DBI and the difference between them was not significant ( $p > 0.05$ ). There was a Post-

training decrease in the moderate risk interval and an increase in the low risk interval of the intervention group students, and there were no students in the high and very high risk groups. The post-training DBI of the control group students revealed that there

was no decrease in their moderate risk interval, and the post-training difference between the intervention and control groups was significant ( $p < 0.001$ ) (Table 3).

Figure 1. Flow Diagram of Participant Recruitment and Retention



**Table 1.** Procedures Applied to the Intervention and Control Groups

<b>Pre-Training</b>	<b>During Training</b>		<b>Post-Training</b>
<b>Intervention and Control</b>	<b>Intervention</b>	<b>Control</b>	<b>Intervention and Control</b>
Questionnaire	Nutrition Training (6 weeks/2 hours)	Nutrition Training (6 weeks/2 hours)	Questionnaire
Nutrition Diary	Nutrition Training to Mothers (3 weeks/2 hours)		Nutrition Diary
DBI Administration	Nutrition Guide to Families		DBI Administration

**Table 2.** Distribution of Some Characteristics of the Intervention and Control Group Students According to Their Meals Before and After Training

MEAL CHARACTERISTICS	Intervention Group			Control Group			Post-Training Intervention and Control Groups $\chi^2$ P	
	Pre-Training n (%)	Post-Training n (%)	$\chi^2$ P	Pre-Training n (%)	Post-Training n (%)	$\chi^2$ P		
<b>Number of daily meals</b>								
2 meals	14 (12.2)	4 (3.5)	27.709	27 (23.5)	11 (9.6)	23.846	5.689	
3 meals	83 (72.2)	89 (77.4)	<0.001	73 (63.5)	87 (75.7)	0.001	0.128	
4 meals and more	18 (15.7)	22 (19.1)		15 (13.0)	17 (14.7)			
<b>Regularity in having meals</b>								
<u>Breakfast</u>	Regular	70 (60.9)	112 (97.4)	7.217	52 (45.2)	71 (61.7)	5.165	44.952
	Irregular	45 (39.1)	3 (2.6)	<0.001	63 (54.8)	44 (38.3)	0.02	<0.001
<u>Lunch</u>	Regular	67 (58.3)	114 (99.1)	3.894	73 (63.5)	93 (80.9)	2.132	21.304
	Irregular	48 (41.7)	1 (0.9)	<0.001	42 (36.5)	22 (19.1)	0.002	<0.001
<u>Dinner</u>	Regular	104 (90.4)	114 (99.1)	1.735	100 (87.0)	112 (97.4)	1.118	1.018
	Irregular	11 (9.6)	1 (0.9)	0.003	15 (13.0)	3 (2.6)	0.002	0.313
<b>Consumption of milk/yogurt</b>								
At least one glass/cup daily	48 (41.7)	64 (55.7)		42 (36.5)	43 (37.4)			
At least 2 glasses/cups daily	14 (12.2)	37 (32.2)	75.286	9 (7.8)	23 (20.0)	38.686	33.416	
2 glasses/cups once in 2-3 days	23 (20.0)	13 (11.3)	<0.001	27 (23.5)	23 (20.0)	0.049	<0.001	
1 glass/cup once or twice a week	28 (24.3)	1 (0.9)		19 (16.5)	15 (13.0)			
I do not drink milk or eat yogurt	2 (1.7)	-		18 (15.7)	11 (9.6)			

**Table 3.** Distribution of Pre-Training and Post-Training Dietary Behavior Indexes (DBI) of Intervention and Control Groups by Risk Intervals

DBI Risk Intervals	Pre-Training		$\chi^2$ P	Post-Training		$\chi^2$ P
	Intervention Group	Control Group		Intervention Group	Control Group	
	n (%)	n (%)		n (%)	n (%)	
Low risk	26 (22.6)	17 (14.8)		66 (57.4)	25 (21.7)	
Moderate risk	67 (58.3)	63 (54.8)	7.252	49 (42.6)	68 (59.1)	43.558
High risk	19 (16.5)	34 (29.69)	0.064	-	21 (18.3)	<0.001
Very high risk	3 (2.6)	1 (0.9)		-	1 (0.9)	

**Table 4.** Weekly/daily Distribution of the Food Groups Consumed By The Intervention and Control Group Students As Per Their Nutrition Diary

Weekly Consumption (Days/week)		Intervention Group		t	P	Control Group		t	P	Post-Training		t	P
		Pre- Training $\bar{X}\pm SD$	Post- Training $\bar{X}\pm SD$			Pre- Training $\bar{X}\pm SD$	Post- Training $\bar{X}\pm SD$			Intervention Group $\bar{X}\pm SD$	Control Group $\bar{X}\pm SD$		
Meat and meat products	Bfast	2.62±1.95	3.86±1.69	5.867	<0.001	2.22±1.88	2.27±1.71	0.272	0.786	3.86±1.69	2.27±1.71	7.038	<0.001
	Lunch	2.75±1.57	4.33±1.32	9.055	<0.001	2.20±1.52	2.68±1.50	2.575	0.011	4.33±1.32	2.68±1.50	8.791	<0.001
	Dinner	4.05±1.65	5.42±1.01	0.223	<0.001	3.91±1.26	4.20±1.39	1.728	0.087	5.42±1.01	4.20±1.39	7.547	<0.001
Milk and dairy products	Bfast	2.61±1.87	6.41±1.05	5.298	<0.001	2.42±1.76	5.48±1.34	3.584	<0.001	6.41±1.05	5.48±1.34	5.841	<0.001
	Lunch	4.11±1.90	6.17±0.87	10.654	<0.001	3.49±1.84	4.00±1.80	2.238	0.027	6.17±0.87	4.00±1.80	11.565	<0.001
	Dinner	4.56±1.75	6.29±0.80	10.347	<0.001	3.93±1.99	4.26±1.93	1.548	0.724	6.29±0.80	4.26±1.93	10.418	<0.001
Bread and cereals products	Bfast	6.36±1.08	6.77±0.45	3.656	<0.001	5.73±1.45	5.96±0.98	1.492	0.138	6.77±0.45	5.96±0.98	7.999	<0.001
	Lunch	6.33±1.01	6.77±0.53	4.286	<0.001	5.74±1.52	5.79±1.18	0.267	0.790	6.77±0.53	5.79±1.18	8.096	<0.001
	Dinner	6.58±0.77	6.93±0.28	4.899	<0.001	6.60±0.82	6.60±0.65	0.086	0.931	6.93±0.28	6.60±0.65	4.924	<0.001
Fruit/vegetable	Bfast	3.84±1.87	5.67±1.23	8.709	<0.001	2.75±1.81	3.13±1.86	1.729	0.086	5.67±1.23	3.13±1.86	12.196	<0.001
	Lunch	4.32±1.73	6.04±0.97	9.261	<0.001	4.14±1.86	4.60±1.75	2.313	0.124	6.04±0.97	4.60±1.75	7.658	<0.001
	Dinner	5.28±1.38	6.60±0.67	9.628	<0.001	5.40±1.31	5.81±1.18	2.973	0.004	6.60±0.67	5.81±1.18	6.215	<0.001
Sugary and fatty food (chips. coke. candy etc.)	Bfast	3.57±2.25	0.56±0.67	14.243	<0.001	4.31±1.88	3.21±1.89	4.783	<0.001	0.56±0.67	3.21±1.89	14.131	<0.001
	Lunch	4.00±1.86	0.56±0.83	19.094	<0.001	3.91±1.89	2.88±2.05	5.005	<0.001	0.56±0.83	2.88±2.05	11.236	<0.001
	Dinner	2.89±1.67	0.44±0.67	15.445	<0.001	2.53±1.77	1.70±1.53	4.866	<0.001	0.44±0.67	1.70±1.53	8.066	<0.001
Meal omission (non- consumption)	Bfast	0.52±0.94	0.21±0.45	3.125	0.002	1.26±1.47	0.93±0.91	2.185	0.031	0.21±0.45	0.93±0.91	7.484	<0.001
	Lunch	0.50±0.87	0.19±0.41	3.293	0.001	1.21±1.48	1.27±1.27	0.363	0.717	0.19±0.41	1.27±1.27	8.695	<0.001
	Dinner	0.43±0.78	0.08±0.31	4.691	<0.001	0.37±0.82	0.40±0.67	0.344	0.731	0.08±0.31	0.40±0.67	4.644	<0.001

## Discussion

Good eating habits are an essential part of a healthy lifestyle (Rakıcıoğlu & Akal, 2011). The nutrition training provided to the students in our study was associated with an increase in the frequency of their consumption of food groups and led to their eating regularly, being nourished more knowledgeably, and changing their dietary behaviors positively.

Adolescents often do not have sufficient knowledge and experience to make appropriate decisions, and tend to develop unhealthy eating habits (Acar Tek et al., 2011). These habits include skipping breakfast, replacing lunch meals with snack foods, and increasing soft drink intake, all of which can lead to inadequate nutrient intake (Turan et al., 2009; Rakıcıoğlu & Akal, 2011). In our study, the percentage of the intervention group students who had three meals daily increased significantly after training was provided to their mothers and nutrition brochures were given to their families ( $p < 0.05$ ). The percentage of the control group students who had three meals daily also increased after the training but not as much as that in the intervention group ( $p < 0.05$ ). Thus, information should be provided on the need for children to consume three main meals daily, the balanced distribution of nutrients in the meals to be taken during the day, and the importance of breakfast (Fahlman et al., 2008; Turan et al., 2009; Rakıcıoğlu & Akal, 2011). In our study, it was observed that before the training, both the intervention and control group students had irregular, inadequate, and incorrect dietary behaviors, such as the number of daily meals, meal omissions, milk/yogurt consumption, however, apparent positive changes took place after the training. Such positive changes were more distinct in the intervention group students.

Eating regular meals and the composition of meals and snacks are important factors for healthy nutrition (Blom-Hoffman et al., 2008; Acar Tek et al., 2011). Studies stress that students should regularly have breakfast and that this meal should consist of the nutrients in the basic food groups including (meat products, dairy products, vegetables and fruits, and cereals (Raaijmakers et al., 2010; Kral et al., 2012). In our study, approximately half of the students had irregular breakfast eating habits before the training, and breakfast was the most frequently

omitted meal. After the training, however, the students had breakfast more regularly; this change was more apparent in the intervention group and was due to the training and nutrition guide given to the mothers. This is because children of primary school age are not yet fully independent of their families in terms of dietary behaviors; thus, when mothers gain nutrition awareness, their children also eat in a healthier manner.

Although growth is important for all the organs, calcium has a special role in the growth of the skeleton (Ha et al., 2009). We observed in our study that whereas the students in both groups consumed at least a glass/cup of milk and dairy products daily before the training, this rate increased after the training, and the difference was statistically significant. The finding that the amount of milk and dairy products consumed by both the intervention and control group students increased markedly after the training is a gratifying result. A significant difference was found between the post-training frequency of consuming milk and dairy products between the intervention and control group students, and this difference is believed to result from the training given to mothers ( $p < 0.001$ ).

The growth and development of school-age children are the most affected by nutritional deficiencies (Rakıcıoğlu & Akal, 2011; Garipağaoğlu et al., 2008). Previous studies have shown that children do not have regular eating habits, and that skipping meals is common (Akar Şahingöz & Şanlıer, 2011; Ayrancı et al., 2010). These findings are supported by the present study. In our study, the students had high rates of consumption of soft drink, chips, biscuits, and processed fruit juices in their meals before the training. After the training, however, their consumption rate of such foodstuff decreased in a statistically significant way, and this decrease was more obvious in the intervention group. Therefore, to develop healthy eating habits in students and to ensure that this positive change turns into a behavior, it is important that both the students and their families be trained; mothers in particular should have an information source (guide or brochure) to which they can refer from time to time towards conveying correct dietary behaviors to their children.

Dietary behaviour is known to play a key role as a risk factor for chronic diseases and alterations

in eating habits can have strong effects, both positive and negative, on health throughout life (Alsaffar, 2012). Demirezen and Coşansu and Turan et al. found that most students were in the moderate risk

### Students' Pre- and Post-Training Nutrition Diary

The post-training weekly/daily average consumption of the four basic food groups during three main meals significantly increased in the intervention group students, and the difference between the pre-training and post-training values was significant ( $p < 0.001$ ). The students also decreased their average consumption of chips, soft drink, candy, biscuits, etc. during meals and their rate of meal omission ( $p < 0.001$ ) (Table 4).

Based on their post-training weekly nutrition diaries, the intervention group students developed more positive attitudes compared to the control group students in terms of increasing the frequency of consuming the basic food groups during the main meals (in the morning, at noon, and in the evening), reducing the consumption of sugary and fatty foods, and decreasing their rate of meal omission. The difference between the groups was statistically significant ( $p < 0.001$ ) (Table 4).

interval based on the DBI (Demirezen & Coşansu 2006; Turan et al., 2009). The pre-training diets of the intervention and control group students were concentrated in the moderate risk interval according to the DBI, but after the training, the number of intervention and control group students who were in the high risk interval declined, and the intervention group students' low risk intervals increased. These results show that nutrition training leads to a positive change in dietary habits. We believe that the decrease in the risk intervals of the intervention group students based on the DBI was more apparent because of the nutrition guide and mothers' training. In Gaziantep, especially, where the habit of consuming meat dishes, pizza, and meat rolls is excessive, dietary patterns make it generally impossible to have adequate and balanced nutrition. For this reason, raising awareness about correct eating principles and instituting this awareness in the family will help children develop correct dietary behaviors.

For healthy life prolonged consumption of whole grains, fruits, and vegetables, which are rich in fibre, and whole grains, milk, and meat and beans is very important (Akman et al., 2010; Garipağaoğlu et al., 2008). Bread and cereal products are traditional foods of the Turkish people (Baysal, 2004; Pekcan, 2008; Karağaoğlu, 2008). In our study, an apparent improvement was observed after the training in terms of consuming the food groups recommended for breakfast, lunch, and dinner; there was an improvement in the control group in some meals and some basic food groups, and omission of meals decreased considerably in both groups. The positive increase in the consumption of the food groups during main meals among the control group students, as shown in their nutrition diaries, demonstrates the effectiveness of nutrition training. We believe that the reason why there were more positive changes in the intervention group was due to the mothers' training and its continuity through the nutrition guide.

Various epidemiologic studies have shown that insufficient vegetable and fruit consumption leads to a number of chronic diseases and increases the risk of heart diseases, obesity, and some cancer types (Gross Pollock & Braun, 2010; Morgan et al., 2010; Ransley et al., 2010; Gunnarsdottir & Thorsdottir, 2010). In our study, we found that after the training, both the intervention and control group students increased their consumption of vegetables and fruits in every main meal. This result is very important in supporting the healthy development of students. In this case, it can be considered that the nutrition training given to the mothers, as well as the nutrition guide, was effective in developing positive behavior in the students.

Our study found that the nutrition training positively affected the dietary behavior of the children and their consumption of the basic food groups, the training provided to their mothers had a reinforcing effect in developing nutrition awareness, and the nutrition guide enabled continuity of the training.

Schools, families, and communities should be made aware of the importance of helping students acquire the habit of regularly having the three main meals, which is crucial for their growth and development; in particular, the habit of eating breakfast regularly is very important. It

should be kept in mind that family members are models for students of primary school age; likewise, teachers have considerable influence on their students. Therefore, the school management should plan nutrition trainings periodically to provide information to the students and their guardians and supply them with brochures or manuals on nutrition.

### Implications for Research and Practice

This study has two important implications. The first is the importance of involving the family in the care of the children; as shown in our results, providing training to their families as well is crucial to reinforcing correct dietary behavior in children as mothers have an influence on the nutrition of students of primary school age. The second is the necessity for school nurses to provide continuous nutrition education and to follow developments related to health education. The role of school nurses has expanded to include health promotion. In Turkey, the school nursing practice is present only in private schools. Our study results show that the school nursing practice must be present in state schools as well and that political or legal arrangements must be done to provide nursing service in all schools. Future research should focus on the effectiveness of the methods used to determine the dietary behaviors and food consumption status of students in primary schools, the necessary measures that should be taken according to the results obtained, and the inclusion of nutrition training in the curriculum to develop correct eating habits in primary school students.

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