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Determining the differences in nutrition knowledge, dietary behaviors, physical activity and self-efficacy behaviors based on obesity status among adolescents¹

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Abstract

Purpose: This study was conducted to specify the differences in nutrition knowledge, dietary behaviors, physical activity, and self-efficacy behaviors based on obesity status among adolescents.

Methods: In the study, descriptive-correlational design type was used. The sample of the study consisted of 530 adolescents and their parents selected among 5th grade students studying in five secondary schools by using the stratified random sampling method.

Results: 50.9% of the adolescents were male and 30% of them n=(159) were found to be overweight and obese according to BMI. ¹ There was no significant difference between the BMI normal, and overweight/obese adolescents ¹ according to gender, age, income status and the mother's educational level (p>0.05). The difference between BMI normal and overweight/obese children based on ² Father's Educational Level, Mother's BMI, and Father's BMI values was significant. As educational level of the father and BMI value of mother and father increased,

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the rate of overweight-obese adolescents also increased ($p < 0.05$). It was found that adolescents' mean "physical activity behaviors" was 17.457 ± 3.732 ; "nutrition knowledge mean score" was $11,330 \pm 3,258$; "dietary self-efficacy" mean score was 5.138 ± 5.386 ; "dietary behavior" mean score was 3.694 ± 5.324 . The adolescents' physical activity behaviors were high, self-efficacy behaviors were good, and nutrition knowledge levels and dietary behaviors were at moderate level. Nutrition knowledge, dietary behaviors, and dietary self-efficacy of overweight and obese adolescents were found to be high ($p < 0.05$). No significant difference was found among the groups based on physical activity behaviors ($p > 0.05$).

Conclusion: In this study, differences were determined between the nutrition knowledge, dietary behaviors, physical activity and self-efficacy behaviors of adolescents in terms of the obesity status. Obesity prevention programs should focus on increasing nutrition knowledge, dietary behaviors, physical activity, and self-efficacy behaviors among adolescents.

Keywords: Adolescents, obesity, nutrition, physical activity, self-efficacy

5

6 1.Introduction

7 Obesity in adolescence period is among major public health issues in 21st century.
8 According to WHO, 340 million adolescents aged between 5-18 years are overweight and
9 obese. The number of obese adolescents is increasing ten times more in recent years in the
10 world. If the current trend continues until 2022, it is thought that there will be higher number of
11 obese adolescents (World Health Organization [WHO], 2016). The prevalence of overweight
12 and obesity in the United States of America affects 17% and approximately 12.7 million
13 adolescents (Centers for Disease Control and Prevention [CDC], 2016). According to the data
14 of Turkey, 14.2% of the adolescents are overweight and 8.3% are obese (COSI-TR, 2013). The
15 possibility of overweight and obese children to have chronic health problems such as diabetes,
16 cardiovascular diseases, ischemic heart disease, and cancer at young ages and obese in

17 adulthood increases (CDC, 2016; Ha et al., 2016; WHO,2016). However, obese individuals may
18 experience social, emotional disorders and low self-esteem. This is because prevention of
19 obesity at an early age is important.

20 While the efforts to prevent obesity are important in every period of life, this importance
21 is increasing even more in the early adolescence period where growth and development
22 accelerate and learning and comprehension functions become important. In addition, there is a
23 high risk that erroneous eating habits in this period may be reflected to adulthood period
24 (TOÇBİ, 2011).

25 In studies investigating the effect of nutrition knowledge on health behaviors of
26 children, dietary behavior scores of children with high nutrition knowledge and attitude scores
27 were found to be high (Wagner and Bear, 2009; Forneris et al., 2010).

28 Participation in physical activities increases the control on the anxiety and depression
29 symptoms and helps to the self-expression, self-confidence and social development of children.
30 Therefore, performing physical activity of minimum 60 minutes between the ages of 5-17 years
31 is recommended for weight management (WHO, 2016).

32 Self-efficacy demonstrates self-confidence of an individual about behavioral change.
33 Dietary self-efficacy is the efficacy level perceived by the individual as choosing healthier foods
34 and is a factor that must be examined in the planning of nutritional interventions (Di Noia,
35 Schinke, Prochaska, and Contento 2006; Horwath, Nigg, Wong, and Dishman, 2010). In
36 preventing the obesity in adolescents, determination of dietary behaviors and the associated
37 factors at an early period is important since it leads to interventions to be made in order to
38 prevent or control the obesity.

39 In this study, it was aimed to determine the differences in nutrition knowledge, dietary
40 behaviors, physical activity, and self-efficacy behaviors in terms of obesity status among
41 adolescents.

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44 **2.Method and Material**

45 **2.1.Design**

46 Descriptive-correlational design type was used in the study.

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48 **2.2.Participants and Procedure**

49

50 The population of the study consisted of 5th grade students (N=2993) studying at secondary
51 schools affiliated with Uşak Provincial Directorate of National Education. The sample of the
52 study was selected from the fifth-grade students (n = 2993), who had no chronic disease and
53 agreed to participate in the study, via the stratified random sampling method. The sample size
54 was calculated by carrying out the power analysis (α : 0.05, $1-\beta$ = 0.80). According to the
55 stratum weight, the sample is composed of 380, 115 and 35 students from a public secondary
56 school, a religious secondary school and a private secondary school, respectively. The purpose
57 was to reach a mosaic group for obesity prevention programs covering different family
58 structure- education and culture. A random number table was used to select students from the
59 strata. The study was carried out between January and December 2014. The measurement tools
60 were filled by the students independently and they were allowed to ask questions. Their heights
61 and weights were measured. The adolescents were divided into overweight - obesity and normal
62 weight groups based on their body mass index percentages. A Family Information
63 Questionnaire was sent to the parents in a closed envelope to be filled.

64

65 **2.3.Instruments**

66

67 2.3.1. Family Information Questionnaire

68 This questionnaire was prepared by the researchers upon the literature review. It included the
69 adolescents' age, gender and BMI values and parents' educational levels, income status, and
70 BMI values. For age and gender, the children were categorized as underweight (<5 p.), normal
71 (5-85 p.), overweight(85-95 p.), and obesity or obese (>95 p.) based on BMI (kg/m²) reference
72 values published by Bundak et al., (2006) for Turkish children. **Self-reported weight and height**
73 values **were used to calculate BMI** values of the parents. Educational levels of the parents were
74 specified as **(1) low (≤5 years), (2) moderate (6–11 years), and (3) high (≥12 years)**, and their
75 income status was specified as (1) high, (2) middle, and (3) low.

76 **2.3.2. Nutrition Knowledge Scale:** This scale was developed to find out the nutritional
77 knowledge level of adolescents (Melnyk & Small, 2003). It is a three-point Likert-type scale
78 with twenty items. The total score of the scale ranges from 1 to 60. The Turkish validity and
79 reliability study of the scale was conducted by Ardiç and Erdogan (2017) and **Cronbach's alpha**
80 **coefficient is 0.84**. The **Cronbach's alpha coefficient** was found to be 0.70 in this study.

81 **2.3.3. Diet Behavior Scale:** This scale was developed to explore the ordinary food consumption
82 of adolescents (Edmundson et al., 1996). It includes 14 items with pictures in a **forced-choice**
83 **format** indicating **higher fat or sodium food** versus lower fat or sodium food. Total score ranges
84 from -14 to +14. The total score obtained from the scale is shown as percentage. It indicates a
85 range from 0% unhealthy to 100% healthy food consumption. The Turkish validity and
86 reliability study of the scale was conducted by Haney and Erdoğan (2013). Its test-retest
87 reliability is 0.74 and **Cronbach's alpha coefficient** is 0.68. **Cronbach's alpha coefficient** was
88 found to be 0.63 in the present study.

89 **2.3.4. Children's Dietary Self-Efficacy Scale:** This scale measures self-efficacy of adolescents,
90 which helps them choose foods less fat and salt instead of fatty and salty foods (Edmundson et
91 al., 1996). It is a three-point Likert scale with 15 items. The total score of the scale ranges from

92 -15 to +15. A higher score indicates higher self-efficacy. The Turkish validity and reliability
93 study of the scale was conducted by Haney and Erdoğan (2013). Its reliability coefficient was
94 0.79 and the test-retest reliability was 0.68; it was found to be 0.77 in the present study.

95 **2.3.5.Exercise Behavior Scale:** This scale measures the exercise behaviors of adolescents. It is
96 one of seven subscales of the Adolescent Lifestyle Profile (ALP) Scale (Hendricks , Murdaugh
97 & Pender, 2006). It is a four-point Likert-type scale with six items. The total score of the scale
98 ranges from 6 to 24. The Turkish validity and reliability study of the scale was conducted by
99 Ardiç and Esin (2015). Its test-retest reliability was 0.84 and its Cronbach's alpha coefficient is
100 0.80. Its Cronbach's alpha coefficient was found to be 0.76 in this study.

101 **2.4.Ethical Considerations**

102 Approval of the Ethics Committee of Uşak University (No: 54749836-050-01-03/11) was
103 received before the study. Permission was received from the families to use the “Family
104 Information Questionnaire” which they would fill out. While verbal consents of the children
105 were received, written consents of their families were received. They were informed that their
106 identities would be kept confidential and their answers would be anonymous.

107 **2.5.Statistical Analysis of Data**

108 While evaluating the data obtained in the study, SPSS 22.0 Statistical packaged software
109 was used for statistical analysis. For the data assessment, descriptive statistical methods (mean,
110 median, number, percentage) were used. Pearson’s Chi-Square test was applied for comparison
111 of categorical data. The t-test was performed in between-group comparison of parameters. The
112 confidence interval of 95% and the significance level of $p < 0.05$ were used to assess the results.

113 **3.Results**

114 According to the results, average age of 530 adolescents participating in the study was
115 10.85 ± 0.53 and the age range varied between 10 and 12. 50.9% of the adolescents were male
116 and according to BMI, 70% (n=371) were found to be normal and 30% (n=159) were found to

117 be overweight and obese. In terms of gender, age, income status and mother's educational
118 level, no significant difference was found between the children whose BMI values were normal
119 and overweight/obese ($p>0.05$). In terms of Father's Educational Status, Mother's BMI and
120 Father's BMI, a significant difference was found between the children whose BMI values were
121 normal and overweight/obese. As the Father's educational level, Mother's BMI and Father's
122 BMI increased, the rate of overweight/obese adolescents increased ($p<0.05$). (Table 1).

123 **Table 1.** Socio-demographic characteristics (n=530)
124

		Normal (n=371)	Overweight / Obese (n=159)	P
		n (%)	n (%)	
Gender	Female	181 (48.8%)	79 (49.7%)	$X^2=0.036$
	Male	190 (51.2%)	80 (50.3%)	$p=0.462$
Age	10	80 (21.6%)	40 (25.2%)	
	11	257 (69.3%)	112 (70.4%)	$X^2=3.919$
	12	34 (9.2%)	7 (4.4%)	$p=0.141$
Income Status	Low	90 (24.3%)	32 (20.1%)	$X^2=3.209$
	Moderate	251 (67.7%)	107 (67.3%)	$p=0.201$
	High	30 (8.1%)	20 (12.6%)	
2 Mother's Educational Level	Primary School	220 (59.3%)	83 (52.2%)	$X^2=3.521$
	High School	77 (20.8%)	33 (20.8%)	$p=0.172$
	University	74 (19.9%)	43 (27.0%)	
Father's Educational Level	Primary School	158 (42.6%)	50 (31.4%)	$X^2=9.750$
	High School	116 (31.3%)	47 (29.6%)	$p=0.008^*$
	University	97 (26.1%)	62 (39.0%)	
Mother's BMI	Normal	186(50.4%)	56 (35.7%)	$X^2=18.418$
	Overweight / Obese	183 (49.6%)	101 (64.3%)	$p=0.000^*$
Father's BMI	Normal	139 (37.5%)	27 (17.1%)	$X^2=26.540$
	Overweight / Obese	232 (62.6%)	131 (82.9%)	$p=0.000^*$

125 * $p<0.05$
126

127

128

129 It was found that the adolescents' mean score of "exercise behaviors" was $17.457 \pm$
130 3.732 ; "nutrition knowledge" mean score was 11.330 ± 3.258 ; "dietary self-efficacy" mean
131 score was 5.138 ± 5.386 ; and "dietary behavior" mean score was 3.694 ± 5.324 . The
132 adolescents' exercise behaviors were high, their self-efficacy behaviors were good, their
133 nutrition knowledge levels and dietary behaviors were at moderate level (Table 2).

134 **Table 2.** Descriptive results of the scales

	N	Mean	Sd	Min.	Max.
Exercise Behaviors	530	17.457	3.732	6	24
Nutrition Knowledge Score	530	11.330	3.258	3	20
Dietary self-efficacy	530	5.138	5.386	-15	15
Dietary Behavior	530	3.694	5.324	-12	14

135

136

137 The difference between the group mean scores as a result of t-test conducted to
138 determine whether or not the exercise behavior mean scores of the adolescents showed a
139 significant difference according to the variable of group was not found to be statistically
140 significant ($t=-1.485$; $p=0.138 > 0.05$).

141 The correlation between the *nutrition knowledge mean score* of the adolescents and the
142 variable of group was examined and found to be significant ($t=-4.548$; $p=0.000 < 0.05$). Nutrition
143 knowledge score of adolescents with overweight/obese BMI (12.296 ± 3.389) was found to be
144 higher than the nutrition knowledge score of adolescents with normal BMI (10.916 ± 3.114).

145 The correlation between the *dietary self-efficacy mean scores* of the adolescents and the
146 variable of group was examined and a significant correlation was found ($t=-3.451$;
147 $p=0.001 < 0.05$). Dietary self-efficacy scores of the adolescents with overweight/obese BMI

148 (6.359±5.083) were found to be higher than the dietary self-efficacy scores of the adolescents
149 with normal BMI (4.615±5.434).

150 The correlation between the *dietary behaviors mean scores* of the adolescents and the
151 variable of group was examined and a significant correlation was found ($t=-2.661$;
152 $p=0.008<0.05$). Dietary behavior scores of the adolescents with overweight/obese BMI
153 (4.629±5.466) were found to be higher than the dietary behavior scores of adolescents with
154 normal BMI (3.294±5.218) (Table 3).

155 **Table 3.** Distribution of the Adolescents in Terms of Scales

	Normal (n=371)	Overweight / Obese (n=159)	t	p
	Mean±Sd	Mean±Sd		
Exercise Behaviors	17.299±3.747	17.824±3.681	-1.485	0.138
Nutrition Knowledge Score	10.916±3.114	12.296±3.389	-4.548	0.000*
Dietary self-efficacy	4.615±5.434	6.359±5.083	-3.451	0.001*
Dietary Behavior	3.294±5.218	4.629±5.466	-2.661	0.008*

156 * $p<0.05$; t-test

157

158

159 4.Discussion

160 This study was conducted to specify the differences in adolescents' nutrition knowledge,
161 dietary behaviors, physical activity, and self-efficacy behaviors based on obesity status. In the
162 study, 30% of the adolescents (n=159) were found to be overweight and obese. ⁷ 42 million of
163 children under the age of 5 years all around the world are overweight and obese. The prevalence
164 of childhood obesity doubled between 1980 and 2014 (WHO, 2016). ¹ In the United States of
165 America, ¹ obesity rate in children and adolescents aged between 2 and 19 years is approximately ⁸
166 17%, and 12.7 million children and adolescents in the last 10 years have been affected from
167 obesity (CDC, 2016). According to KNHANES's study, 16.3% of the adolescents are

168 overweight and obese (KNHANES, 2013). All these studies confirm that obesity is not still at
169 the desired level for the health of adolescents.

170 Being overweight and obese for adolescents differs according to the father's educational
171 status and parents' BMI values. As ² Father's educational level, Mother's BMI and Father's BMI
172 increase, ² the rate of overweight/obese adolescents increases. The studies have shown that
173 dietary habits of children are influenced by their parents' dietary habits (Scaglioni, Salvioni, &
174 Galimberti, 2008) and the most important factor in the increase of BMI in children is the
175 parents' BMI (Haney and Erdoğan, 2013).

176 In this study, it was found that while nutrition knowledge levels and dietary behaviors of
177 the adolescents were at moderate level, their dietary self-efficacy behaviors were at good level.
178 Contrary to expectations, nutrition knowledge, dietary self-efficacy perception and dietary
179 behaviors in overweight and obese adolescents were found to be high compared to the other
180 adolescents in this study. However, the studies have indicated that these three items are the
181 main determinants for developing obesity prevention behaviors and even the presence of only
182 one of these would not be sufficient to prevent obesity (Prochaska, Spring, and Nigg, 2008; Di
183 Noia ¹³ et al., 2006; Driskell, Dymont, Mauriello, Castle, and Sherman, 2008). In addition, it is
184 thought that effective and continuous nutrition training is necessary for adolescents to convert the
185 information taught into behaviors. The studies have reveal that there is no difference between
186 the normal weight and overweight/obese groups in terms of adolescents' nutrition knowledge
187 and dietary behaviors (Ha et al., 2013; Şanlıer, Konaklıoğlu & Güçer, 2009). Self-efficacy
188 behaviors are lower in the overweight and obese group (Ha et al., 2013). This is inconsistent
189 with the results of this study. In addition, the fact that the adolescents' nutrition knowledge and
190 dietary behavior levels are low in general needs the arousal of increasing the nutrition
191 knowledge and behavior scores in order to prevent obesity in this study.

192 Exercise behaviors of the adolescents were high in this study. No significant difference was
193 found between normal weight and overweight / obese group based on exercise behavior in this
194 study. In the study by Ha et al., the exercise behaviors were found to be lower in overweight
195 and obese adolescents (Ha et al., 2013). For this reason, it is aimed to increase physical activity
196 in obesity prevention programs. In addition, adolescents should be removed from increasing
197 sedentary activities like watching TV, playing computer games, and using cellphones.

198

199 **Limitations**

200 The sample group was selected from a city in the western region of Turkey. Therefore, it cannot
201 be generalized to all adolescents living in Turkey. The accuracy of self-report data is limited to
202 the statements of adolescents.

203

204 **5. Conclusions**

205 In the study, 30% (n = 159) of the adolescents were found to be overweight and obese.
206 When the status of adolescents to be overweight and obese was examined in terms of
207 sociodemographic characteristics, they did not differ in terms of gender, age, income status and
208 mother's educational level. However, they differed according to father's educational level and
209 mother's and father's BMI. As Father's education level, Mother's BMI and Father's BMI
210 increased, the rate of overweight/obese adolescents increased as well.

211 It was found in this study that while the nutrition knowledge levels and dietary
212 behaviors of the adolescents were at moderate level, dietary self-efficacy behaviors were at
213 good level. In this study, nutrition knowledge, dietary self-efficacy perception, and dietary
214 behaviors were found to be higher in overweight and obese adolescents compared to other
215 adolescents. However, the exercise behaviors of adolescents were higher in this study. There

216 was no significant difference between normal weight and overweight/obese groups based on
217 exercise behaviors in this study.

218 Nutrition knowledge, dietary behaviors, dietary self-efficacy and exercise behaviors are
219 the most important determinants in obesity prevention programs in adolescents. Nutrition
220 knowledge is one of the factors that affect nutritional status and habits of individuals, families
221 and communities. Therefore, the place and importance of nutrition education is great in
222 protecting and promoting health. The fact that the nutrition knowledge, dietary behavior and
223 self-efficacy of overweight and obese adolescents were high in this study showed that the
224 nutrition knowledge and behaviors of young people were inadequate and thus these inadequate
225 information could not be converted into habits and behaviors. The education should be repeated
226 at regular intervals in order for the knowledge to be converted into behaviors. Obesity
227 prevention programs should focus on increasing nutrition knowledge, dietary behaviors, dietary
228 self-efficacy and exercise behaviors in adolescents.

229 **Acknowledgment**

230 The author are grateful for the support of all the students who participated in the study.

231 **Conflicts of Interest**

232 The author declare no conflict of interest.

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