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Nutritional Knowledge and Behavior of Adults: Their Relations with Sociodemographic Factors

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Abstract: This cross-sectional study was carried out for the purpose of investigating the factors affecting nutritional knowledge and behaviors of adults and the relation between nutritional knowledge and these behaviors. The study population consisted of 1062 adults aged 18-65 who presented to health care centers (mean age was 37.6±11.7 years). Data was collected through a questionnaire. In both score types, participants with undergraduate and graduate degrees and the employed got the highest scores. The difference between the mean knowledge score according to age (p<0.05) and educational status (p<0.01) was significant. The difference in the mean knowledge score on educational status resulted from the gap between those who were illiterate and who received university education and higher education, for the age group of 18-29 year old. With respect to behavioral scores, the differences between gender, marital status, age, employment status and educational status were significant (p<0.01). The group that caused the difference in marital status was the single ones, in the age groups of 18-29 years and >50 year old and the difference in educational status resulted from the illiterate and from those with university degrees and higher education. It was also found that there was a significant positive relationship between the nutritional knowledge score and the behavior score (r = 0.248, p<0.01). The results of the study revealed that the more adults' ages and educational status increased, the more nutritional knowledge level they had; also gender, age, educational status, employment status and marital status affected adults' positive nutritional behaviors.

Key words: Nutrition, knowledge, behavior, adult

INTRODUCTION

A healthy diet refers to meeting the need for all nutritious elements in adequate amounts taking the age, gender and physical condition of an individual into account (Baysal, 2009). It is important to have a well-balanced diet in order to lead a healthy and quality life (Johansson et al., 2009). Dietary choices of individuals are affected by many factors that are related and/or unrelated to each other. Due to these complex relations, it becomes harder to put forth a working theory on dietary choices (Tepper et al., 1997). Socio-demographic factors such as age, educational status, marital status and level of knowledge of healthy nutrition affect individuals' nutritional knowledge and eating behaviors (Wardle et al., 2000; Wilson, 2001; Artazcoz et al., 2004). Nutritional knowledge is considered among the factors that has an impact on the nutritional behaviors of individuals and communities. The lack of nutritional knowledge leads individuals to develop bad dietary habits and various health problems. One of the leading

tools in the prevention of problems occurring as a result of not having enough and balanced nutrition is nutritional education. Studies reveal that nutritional education is effective in elevating the degree of nutritional knowledge and that as the level of education increases, so does nutritional education in line with it (Sabbag, 2003).

The relation between nutrition and various health problems has been known for a long time (Baysal, 2009).

The World Health Organization drew attention to the fact that sedentary life and unhealthy diet are directly related to various diseases such as cardiovascular diseases, cancer and diabetes (WHO, 2011).

Also, it is noted that the prevalence of chronic diseases in developed and developing countries can be reduced by changes in diet and lifestyle (Miller et al., 2010; Adriaanse et al., 2011). An ample number of studies were carried out on the awareness of public by developing healthy nutritional guides in many countries in order to prevent chronic diseases. Despite this fact, it

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is clear that the recommendations in nutritional guides have not been perceived well enough to be practiced. This problem shows the necessity of making nutritional education permanent and effective (Akbulut, 2002).

For this reason, it is crucially important to gain a habit of healthy diet in order to reduce the risk of contracting obesity and various other chronic diseases (Ozcelik and Ucar, 2008). The importance of an adequate and well-balanced diet should be considered not only on an individual level but on a social level as well. Diet is an influential factor in the social and economic development of societies and the elevation of their life standards. Therefore, it is important to accommodate healthy dietary practices in preventive public health approaches in order to prevent chronic diseases (Ulas and Genc, 2010).

It is of importance to take into consideration the differences in groups with different socio-demographic features and the factors affecting them in the determination of the status of health and nutrition in the society.

This study was carried out in order to examine the factors affecting the nutritional knowledge and behaviors of adults and the relation between nutritional knowledge and behaviors.

MATERIALS AND METHODS

Participants: This cross-sectional study was conducted with 1062 voluntary individuals between the ages of 18-65 (mean age was 37.6±11.7 years) who presented to 10 health centers that provide service within Ankara city center. The participants were selected randomly.

The research data were collected by using a questionnaire and face-to-face interview method. During data collection, a preliminary investigation was conducted and the health centers in the city center were identified with a consent taken from the Ministry of Health.

Nutritional knowledge and behavior tests: The questionnaire form was developed by the researchers depending on the work of Hawkes and Nowak (1998). Some statements and food names were modified for accommodation in Turkish by the researchers. Questions and statements were translated into Turkish by a translator. The first part of the questionnaire form, which consisted of three parts altogether, involved questions about general knowledge about adults. The second part was made up of a nutritional knowledge test of 16 questions to measure adults' nutritional knowledge and the third part held a scale that consisted of 27 statements aiming to determine their nutritional behavior (Appendix 1, 2).

At the data assessment stage, the correct answers of adults to the nutritional knowledge test were graded as "1" whereas their wrong answers and "I do not know"

Appendix 1: Questions to determine adults' nutritional knowledge

1:   What kind of foods should be consumed less in order to lose weight?

Banana
Cake
Apple
French Fries
Grape
Butter
Margarine
Coke-Soda
Low Fat Cheese

2:   What kind of foods should be consumed less in order to lower cholesterol?

Cake and Biscuits
Low Fat Milk
Ice cream
Butter
Sugar
Whole-Grain Bread
Apple
Egg
Meat
Tomato

3: What are the foods with high fat content?

Breakfast Cereals
Orange
Rice
Bread
Dried Fruits
Margarine
Olive Oil
Meat
Tomato

4: What are the foods that contain fiber?

Meat
Pea
Apple juice
Bread
Fish
Plum
Milk
Haricot Beans

5: What are the foods that have high protein content?

Mandarin
Spinach
Egg
Meat
Fish
Red Lentils

6: Which of the following contains cholesterol?

7: What percent of energy should come from fat?

8: Which of the following has the highest iron content?

9: Which of the following is protective against many cancer types?

10:   Which of the following is protective against neural tube defect?

11: Which of the following is richer than lycopene?

12: Which of the following increases blood sugar more slowly?

13: Which of the following desert type is healthier?

14: What is the most proper way of losing weight?

15:   Which of the following is the definition of a well-balanced diet?

16:   How many grams should be the maximum amount of daily salt consumption?

Appendix 2: Statements to determine nutritional behavior of adults

1: I try to lose weight by skipping meals. (-)
2: I use solid fat in my meals. (-)
3: I eat foods with shells as they are.
4: I eat fruit between meals.
5: I eat fish at least once a week.
6: I make sure that I eat fruit in my main meals. (-)
7: I eat boiled eggs rather than fried in oil.
8: I do physical activity everyday for a healthy life.
9: I put salt in my meals without tasting them. (-)
10: I use the diets given by newspapers and magazines. (-)
11: I drink fruit juice rather than eating fruit. (-)
12: I eat fried food 3 or 4 times a week. (-)
13: I pay attention to eating vegetables and fruits in season.
14: I pay attention to eating vegetables in my meals.
15: I prefer milky desserts rather than pastry desserts.
16: I keep my dessert ready for each meal. (-)
17: I eat pastry such as cake and pound cake between meals. (-)
18: I do not eat foods fried in oil.
19: I eat three main meals a day.
20: I include all groups of nutrition in my meals.
21: I follow the recommendations of only doctors and dietitians.
22: I drink packaged milk instead of open milk.
23: I eat legume when I don't eat meat.
24: I eat chicken with its skin. (-)
25: I eat a handful of hazelnut/walnut in my daily diet.
26: I eat whole wheat bread instead of white bread. (-)
27: My daily diet consists mostly of meat and meat products. (-)

answers were graded as "0". The highest score that adults could get on the test if they answered all the questions correctly was "53."

The scale that was used to determine adults' nutritional behavior consisted of 27 items. The gradation of scale items was based on a five-point gradation system (1: never, 2: rarely, 3: sometimes, 4: usually, 5: always). Negative statements were graded reversely. The highest score to be received at the end of the scale was "135" (min. 27).

For the reliability of the questionnaire, "Cronbach's Alpha", the internal consistency coefficient, was calculated and the alpha value was found to be 0.77 (second part) and 0.71 (third part).

Statistical analysis: The data collected through the research were evaluated by the package program SPSS (The Statistical Packet for The Social Sciences). Gender, age, employment status, marital status and educational status were taken as explanatory variables. The Kolmogorov-Smirnov one-sample test was applied for the statistical analysis of the data in order to test whether the mean points gathered from nutritional knowledge and behaviors were dispersed normally. The test result determined that the mean points gathered from nutritional knowledge (p<0.01) and behavior (p<0.01) were not distributed normally. Therefore, the "Mann-Whitney U Test" and the "Kruskal-Wallis Test", both of which are nonparametric tests, were used for data analysis. In order to determine the relation between nutritional knowledge and behaviors, the Spearman correlation analysis was used.

RESULTS

General information about adults: Of the adults who participated in the study, 79.3% were female and 20.7% were male. Their mean age was 37.6±11.7 and 29.5% of the adults were in the age group of 18-29, 26.9% were in the age group of 30-39, 25.4% were in the age group of 40-49 and 18.2% were at the age of 50 and older.

It was found that 72.4% of the participants were married. It was also determined that 75.9% of the participants had a job. When the educational status of the adults was examined, it was found that 35.3% of them graduated from high school, 25.2% had bachelors or master's degrees, 22.9% of them graduated from an elementary school and 12.3% of them graduated from a secondary school. Further, 2.2% of the participants were not literate and 2.1% of them only knew how to read and write. It was also determined that while the adult's mean nutritional knowledge score was 38.9±6.2 their behavior score was 98.5±11.1.

Nutritional knowledge scores of adults in terms of various variables: According to Table 1, it was found that age (p<0.05) and educational status (p<0.01) created a significant difference among the variables that were related to the mean nutritional knowledge score of the participants. With respect to ages, it was found that nutritional knowledge scores of the adults were found to be close to each other. However, differences among the groups were significant (p<0.05). With regards to the rank mean of the participants according to age groups, the adults who created a significant difference were those who were aged between 18 and 29.

Group rank means reveal that the participants with university education and higher education had the highest mean knowledge score and the mean knowledge score increased with the educational status. The individuals who created a significant difference were those who were illiterate and who received university education and higher education (Table 1).

Nutritional behavior scores of adults in terms of various variables: It was found that the nutritional behavior of the participants significantly changed according to their gender (U = 77882.0, p = 0.000), employment status (U = 91433.0, p = 0.006), marital status (X^2 = 10.414, p = 0.005), age (X^2 = 75.746, p = 0.000) and educational status (X^2 = 32.566, p = 0.000, Table 2).

The adults that created a significant difference in mean behavior score were those who were single in marital status, those who were 18-29 years and ≥50 years old and those who were illiterate and who had university education and higher education (Table 2).

Table 1: Nutritional knowledge scores of adults according to various variables

Variables	n	Mean	SD	Rank mean	Rank sum		U-value	p	
				Mann-Whitney U test results of mean nutritional knowledge scores					
Gender									
Male	220	39.6	5.7	522.58	440013.0		85110.0	0.063	
Female	842	38.7	6.3	565.64	124440.0				
Employment status									
Employed	256	39.1	6.3	541.79	138697.0		100535.0	0.537	
Unemployed	806	38.8	6.2	528.23	425756.0				
				Kruskal-Wallis test results of mean nutritional knowledge scores					
Variables	n	Mean	SD	Rank Mean	Sd	X²	p		Sig. differences
Marital status									
Single	226	39.2	6.3	547.50	2	1.05	0.591		-
Married	769	38.7	6.3	525.56					
Widowed or Divorced	67	39.1	5.7	545.73					
Age									
18-29 years	313	38.1	6.5	493.3	3	10.572	0.014		1-2, 1-3
30-39 years	286	39.4	5.9	559.5					
40-49 years	270	39.5	5.9	560.6					
≥50 years	193	38.4	6.4	511.0					
Educational status									
Can not read/write	23	32.3	7.8	268.02	5	137.24	0.000		1-5,1-6
Only read/write	22	35.9	6.9	391.75					2-6
Elementary school	243	36.6	6.2	409.62					3-5, 3-6
Secondary school	131	37.4	6.5	465.99					4-6
High school	375	39.2	5.9	545.63					5-6
University and Higher	268	41.9	4.6	688.35					

Table 2: Nutritional behavior scores of adults according to various variables

Variables	n	Mean	SD	Rank mean	Rank sum		U-value	p	
				Mann-Whitney U test results of adults' nutritional behavior scores					
Gender									
Male	220	96.4	10.1	549.00	462261.00		77882.0	0.000	
Female	842	99.0	11.3	464.51	102192.00				
Employment status									
Employed	256	100.4	11.6	577.34	147799.00		91433.0	0.006	
Unemployed	806	97.9	10.9	516.94	416654.00				
				Kruskal-Wallis test results of adults' nutritional behavior scores					
Variables	n	Mean	SD	Rank Mean	Sd	X²	p		Sig. differences
Marital status									
Single	226	96.4	10.6	475.13	2	10.414	0.005		1-2, 1-3
Married	769	98.9	11.1	544.10					
Widowed or Divorced	67	100.2	11.9	576.98					
Age									
18-29 years	313	94.9	10.5	435.2	3	75.746	0.000		1-2,1-3,1-4
30-39 years	286	97.6	9.2	510.8					2-3,2-4
40-49 years	270	99.6	11.1	564.6					3-4
≥50 years	193	103.9	12.1	671.8					
Educational status									
Can not read/write	23	89.7	10.2	304.85					
Only read/write	22	94.9	10.6	441.48	5	32.566	0.000		1-3, 1-5, 1-6
Elementary school	243	97.5	11.5	507.76					3-6
Secondary school	131	96.6	11.1	483.47					4-6
High school	375	98.8	10.5	533.84					
University and Higher	268	100.9	11.0	600.07					

With regard to the mean scores of the participants according to their ages, the study showed that the highest mean nutritional behavior score belonged to those who were ≥50 years old and the mean nutritional behavior score increased with age. According to the participants' educational status, the study showed that the highest mean nutritional behavior score belonged to those with university education and higher education and the mean nutritional behavior score increased with the status of education (Table 2).

Correlation between adults' nutritional knowledge and behavior scores: It was determined that there was a positive and significant relationship between the

nutritional knowledge scores and behavior scores of the participants (r = 0.248, p = 0.000).

DISCUSSION

It is impossible for a society that consists of individuals having inadequate and unbalanced diets to live on healthily, have enough power to perform its basic functions, develop its own economy and increase its social prosperity. For these reasons, adequate and well-balanced diet is a crucial condition to be secured not only for the development of each individual but for the development of the society as a whole (Ozmen *et al.*, 2007). Therefore, it needs to have sufficient nutritional knowledge and convert this knowledge into healthy eating behaviors.

In several studies, it was found that women and individuals with higher educational level were more relevant to the topic of healthy eating and more open to change than men and individuals with lower educational level (Turrell, 1997; Girois *et al.*, 2001; Sharma *et al.*, 2008; Grunert *et al.*, 2010). In this study the mean nutritional knowledge scores of male adults (Mean = 39.6±6.6) were found to be slightly higher from those of female participants (Mean = 38.7±6.3, p>0.05). This difference might be caused by the fact that the educational status of the male participants was higher than those of the females (81.3% for males and 55.1% for females for high school and higher). However, when the mean behavior scores of the adults were examined, it was found that the females had a higher mean score than the males (Mean = 99.0±11.3, Mean = 96.4±10.1, respectively; p<0.01). This situation can be explained by the fact that women are claimed to be responsible for the nutrition of family members and more concerned with nutrition than men. It was found in some studies that purchasing, preparation and cooking of foods were regarded to be the tasks of women. In addition, women pay more attention to healthy nutritional behaviors compared to men (Ozcelik and Ucar, 2008; Sharma *et al.*, 2008; Grunert *et al.*, 2010). In a study carried out in Mexico, it was found that women were more aware of the recommended daily allowance amounts of food than men and that women were more affect the household (Sharma *et al.*, 2008). Turrell (1997) found in a study carried out about the nutritional behaviors and knowledge levels of adults that both the behavioral and knowledge mean scores of women were significantly higher than men (p = 0.000).

Marital status is a factor having an impact upon the lifestyle of an individual throughout the world (Wilson, 2001). When it comes to the Turkish family structure, it is known to us that individuals achieve a more regular lifestyle through marriage, it changes lifestyle in a positive way and that it is reflected on the behaviors and habits about health and nutrition.

With respect to marital status, it was found that nutritional knowledge scores of the adults were found to be close to each other (p>0.05). As for nutritional behavior scores, single participants were found to have the lowest score and the differences among the groups were significant (p<0.01). The results of some studies support our findings as well (Parmenter *et al.*, 2000; Peltzer, 2004; Mirmiran *et al.*, 2010). For example, in their study, Mirmiran *et al.* (2010) found that married individuals had higher scores in practices than did singles (p<0.01); Parmenter *et al.* (2000) found that married or living as married individuals achieved slightly higher nutritional knowledge scores than those who were either single, or separated, divorced or widowed (p<0.01).

In some studies, it was found that nutritional knowledge and behaviors increase in a positive way with age and that young adults needed to be informed about nutrition (Dichoutis and Lazaridis, 2005; Vriendt *et al.*, 2009). In the current study, it was also found that while the knowledge scores of adults were close, the nutritional knowledge of the middle age group (30-49 years) was higher than the others (p<0.05) and their behavioral scores increased in line with age (p<0.01).

This case might have been caused by various reasons. As an example, young adults, in particular, avoid eating for fear that they would be disliked and exhibit some behaviors of unhealthy nutrition for the sake of losing weight a tendency which appears to be a result of the media and social environment. Yet, individuals become more aware of the importance of health through experience and this is reflected upon their behaviors.

On the other hand, some researchers found no connection between nutritional knowledge and age (Dallongeville *et al.*, 2001; Carrillo *et al.*, 2012).

An important characteristic of education is that it leads to changes in behaviors by creating an awareness of health in individuals. Some researches revealed that the nutritional problems result from illiteracy and lack of knowledge, as the level of education increases, so does the knowledge of nutrition in parallel with it. Nutritional faults are in a reverse relation with the educational level of individual. As the educational level increases, wrong and faulty practices decrease, some useful practices and habits regarding health and nutrition increase (Nocon *et al.*, 2007).

In accordance with the previous studies (Parmenter *et al.*, 2000; Vriendt *et al.*, 2009; Masuku and Lan, 2014) this study found that the educational status of the participants was a factor that affects nutritional knowledge score (p<0.01). In their study conducted with 803 females, Vriendt *et al.* (2009) found that the mean nutritional knowledge scores of adults with higher educational status were significantly higher (p<0.01). In this study, it was determined that the difference was caused by adults with university education and higher as well.

As educational level increases, individuals' rate of involving in working life increases as well. In this case, an improvement is observed in the nutritional status of individuals. Ugur (2001) found in a study carried out with over 1000 married women, 500 employed and 500 non-working, in the age group of 21-50 at different socio-economic levels in the city of Ankara that as the level of education increases, the amount of reading articles in newspapers and magazines on nutrition and the rate of reading articles in the newspapers and magazines are higher in working women (31.2%) compared to non-working women (25.6%).

In the current study, nutritional knowledge scores of the adults were found to be close to each other in terms of employment status (p>0.05). However the mean nutritional behavior scores of working adults were found to be higher than those of non-working participants (p<0.01). Similarly, in the study conducted with 324 women living in Swaziland, it was found that the employment status was significantly associated with nutritional practices (Masuki and Lan, 2014). Ciltik (2009) found in a study carried out in Turkey that the nutritional knowledge of working people was good whereas that of non-working ones was in the medium level (p<0.05).

Nutritional knowledge becomes important when it influences healthy choices and practices. However, knowledge is not sufficient enough on its own to put it into practice due to other factors such as socio-economic and cultural ones and food availability. The aim of promoting nutritional knowledge is to influence society's health through behavior change by fostering positive food habits and practices among individuals. Even though studies have indicated that level of education can influence dietary practices, higher knowledge levels do not always lead to practices especially when individuals do not know how to apply acquired knowledge (Kinyua, 2013).

The literature on the relation between nutritional knowledge and behavior is inconsistent. Some researchers found that nutritional knowledge was positively and significantly related to nutritional behavior (Hendrie *et al.*, 2008; Barzegari *et al.*, 2011; Masuku and Lan, 2014; Geaney *et al.*, 2015), whereas other researchers found little correlation between them and advocated that nutritional knowledge alone was not sufficient to influence healthy dietary behaviors (Drewnowski and Specter, 2004; Darmon and Drewnowski, 2008; Kinyua, 2013). In this study, it was found that there was a significant positive relation between the nutritional knowledge score and the behavior score (r = 0.248, p<0.01). It means that positive nutritional behaviors increase in line with an increase in nutritional knowledge. Based on this relation, it can also be argued that participants transform their nutritional knowledge into behavior.

Conclusion: The results of the study revealed that the more adults' ages and educational status increased, the more nutritional knowledge level they had; it was also found that other variables did not affect the nutritional knowledge level. With respect to nutritional behaviors, it was determined that gender, age, educational status, employment status and marital status affected the adults' positive nutritional behaviors.

Being aware of the changes in nutritional habits and determining their relations with economic, socio-demographic factors shed light on understanding the reasons and results of nutritional habits at a significant level. There is no doubt that it will help people making necessary changes for a more healthy nutrition and improving it.

Educational strategies on nutrition help raise the levels of knowledge aiming at preventing unhealthy food related lifestyles as well as promoting society's health. Nutritional knowledge indirectly contributes to nutritional status when good dietary practices are transformed into practice and sustained in life. Knowledge targets to influence dietary practices by promoting actions that lead to healthy food intake and in discouraging negative practices likely to negatively influence nutritional status. For this purpose, both as a part of society and as individuals who will affect social health as a whole by educating future generations, adults should be given a sustainable education in order to help them gain awareness about healthy nutrition.

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