

Relation between label reading, nutrition knowledge and dietary compliance* in nutrition counselling*

Beslenme danışmanlığında etiket okuma, beslenme bilgisi ve diyetle uyum arasındaki ilişki

Nur Orhan¹, Elif Ede Çintesun²

¹ Master of Science, Istanbul Sabahattin Zaim University, Graduate Education Institute, Department of Nutrition and Dietetics, Istanbul, Türkiye. diyetisyennurgunes@gmail.com 0009-0005-4515-5270

² Assistant Professor, Istanbul Sabahattin Zaim University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Istanbul, Türkiye. elifedecintesun@gmail.com, 0000-0001-6103-2784.

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ABSTRACT

Background and Aim: This study aims to determine the relationship between label reading, nutritional knowledge levels, and dietary compliance in individuals who receive nutritional counselling. **Materials and Methods:** This cross-sectional, descriptive study was conducted at the Nutrition and Diet Counseling Center in Manisa province with 27 men and 84 women. The demographic characteristic information, dietary habits, Food Label Reading Attitude Scale, and Nutrition Knowledge Scale were recorded and anthropometric measurements were taken. Statistical analyses were performed with SPSS-27. **Results and Conclusion:** It was found that 40.7% (n=11) of male counselees were obese, 33.3% (n=9) were preobese, 29.8% (n=25) of female counselees were obese, and 32.1% (n=27) were preobese. The mean values of, Food Label Reading Attitude Scale and Nutrition Knowledge Scale scores were 62.51 ± 25.32 and 93.93 ± 6.12 , respectively. Food Label Reading Attitude Scale and Nutrition Knowledge Scale scores were statistically higher in individuals who had better dietary compliance. Also, a strong positive correlation ($r=0.71$) was observed between label reading habits and nutritional knowledge level. Label reading habits were higher in women than in men, and label reading habits and nutritional knowledge levels have a positive effect on better dietary compliance. Nutrition knowledge level and label reading can play an important role in the process of adhering to a diet in nutrition counseling.

ÖZ

Giriş ve Amaç: Bu çalışmada beslenme danışmanlığı alan bireylerin etiket okuma, beslenme bilgi düzeyleri ve diyetle uyumları arasındaki ilişkinin belirlenmesi amaçlanmıştır. **Gereç ve Yöntem:** Kesitsel, tanımlayıcı tipteki bu araştırma Manisa ilinde Beslenme ve Diyet Danışmanlık Merkezinde 27 erkek ve 84 kadın ile yürütülmüştür. Bireylerin demografik özellikleri, beslenme alışkanlıkları, Besin Etiket Okuma Tutum Ölçeği, Beslenme Bilgi Ölçeği kaydedilmiş ve antropometrik ölçümleri alınmıştır. İstatistiksel analizler SPSS-27 ile yapılmıştır. **Bulgular ve Sonuç:** Erkek danışanların %40,7'sinin (n=11) obez, %33,3'ünün (n=9) preobez, kadın danışanların %29,8'inin (n=25) obez, %32,1'inin (n=27) preobez olduğu bulunmuştur. Besin Etiket Okuma Tutum Ölçeği ve Beslenme Bilgi Ölçeği skorlarının ortalama değerleri sırasıyla $62,51 \pm 25,32$ ve $93,93 \pm 6,12$ idi. Besin Etiket Okuma Tutum Ölçeği ve Beslenme Bilgi Ölçeği skorları diyetle uyumu daha iyi olan bireylerde istatistiksel olarak daha yüksektir. Etiket okuma alışkanlığı ile beslenme bilgi düzeyi arasında güçlü pozitif bir korelasyon bulunmuştur ($r=0,71$). Etiket okuma alışkanlığı kadınlarda erkeklere göre daha yüksektir ve etiket okuma alışkanlığı ile beslenme bilgi düzeyi diyetle uyumu olumlu yönde etkilemektedir. Beslenme bilgi düzeyi ve etiket okuma; beslenme danışmanlığında diyetle uyum sürecinde önemli rol oynayabilir.

Key Words:
Dietary Compliance, Label Reading, Nutrition Counselling, Nutrition Knowledge

Anahtar Kelimeler:
Beslenme Bilgisi, Beslenme Danışmanlığı, Diyetle Uyum, Etiket Okuma

Corresponding Author/Sorumlu Yazar:

Assistant Professor, Istanbul Sabahattin Zaim University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Istanbul, Türkiye. elifedecintesun@gmail.com, 0000-0001-6103-2784.

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INTRODUCTION

Healthy and adequate nutrition is necessary to support physical and mental health, increase energy levels, reduce the risk of chronic diseases and form the basis of long-term healthy life (Shlisky et al., 2017). Creating a balanced diet with the correct selection of foods plays an important role in providing the nutrients needed by the body and thus protecting health (Pettigrew et al., 2024). Food labels are an important factor for individuals to make the right food choices. Consumers can make healthy dietary choices with increased knowledge and awareness of healthy living and nutrition (Plasek et al., 2020). Food labelling provides consumers with accurate and sufficient information about a product's content, ingredients, nutritional values, instructions for use and potential health effects. This helps consumers to make healthy dietary choices, while also providing information on food safety and product quality (Koen et al., 2016). Labelling also helps prevent counterfeiting and misleading product packaging and advertising, helps consumers make better choices and maintains high standards of product quality and safety (Cecchini & Warin, 2016). With the development of technology in the food industry, the production of packaged foods has increased. While the increase in the use of packaged foods provides convenience to individuals in terms of accessibility, it increases the consumption of food additives that will adversely affect public health (Legesse et al., 2016). In order to make the right food choice, consumers should have the habit of reading labels and have sufficient nutritional knowledge (Cannoosamy et al., 2014). Nutritional knowledge will enable individuals to make the right choices about choosing healthy foods, preparing and consuming these foods in line with healthy nutrition recommendations (Tarabashkina et al., 2016). Also, nutritional knowledge guides individuals in developing healthy lifestyle habits, as well as enables individuals to learn and apply appropriate dietary strategies for chronic diseases (Martin et al., 2014). Individuals can maintain a diet that is right for them if they are aware of the right food preferences and the health effects of eating the wrong or unhealthy foods (Spronk et al., 2014). Individuals with a high level of nutritional knowledge are more likely to read food labels (Cannoosamy et al., 2014).

Especially in nutrition counselling, nutrition knowledge and label reading can be the main factors that improve adherence to the diet. In individuals who have received nutrition counseling, merely identifying their level of nutrition knowledge and label reading behavior is not sufficient; examining the relationship between them in a comprehensive and comparative manner provides concrete data and a new perspective to the existing

literature in this field. This study aims to investigate the relationship between food label reading levels, nutritional knowledge, and dietary compliance of individuals receiving nutrition counselling.

MATERIALS AND METHODS

Ethical Aspects of the Research

The study was evaluated and approved by the Ethics Committee of the University Rectorate (Date: 07.07.2023, decision no: 2023/06). Informed consent form was obtained from all participants who voluntarily agreed to participate in the study. The study was conducted under the Principles of the Declaration of Helsinki.

The Research Type

This study was conducted as a cross-sectional and descriptive study.

Research Population and Sample

The population of the study consisted of individuals who applied to a nutrition counselling centre in Manisa, Türkiye. The inclusion criteria were consent to participate in the study and being over 18 years of age. Exclusion criteria were being younger than 18 years of age and being illiterate. Sample size required for the study was determined using G*Power as 111 with 0.3 effect size, 0.95 power, and confidence level $\alpha=0.05$. This study involved 111 participants, 27 males, and 84 females, who willingly took part.

Data Collection Tools

In the study, a questionnaire form was used as a data collection tool. Demographic information, food label reading habits, nutrition knowledge level, and dietary compliance status were obtained through the questionnaire.

Food Label Reading Attitude Scale

The food Label Reading Attitude Scale (FLRAE) developed by Seçkin Sığircı was used to measure the participants' attitude towards reading food labels (Seçkin Sığircı & Sarp, 2024). Five-point rating method was used for the scale and it is a Likert-type scale. Cronbach's alpha internal consistency coefficient was 0.929. A five-point Likert-type scale was used for the scale. The scale contains 20 items. The scoring system used for the responses to the scale is "strongly disagree=1", "disagree=2", "unsure=3", "agree=4" and "strongly agree=5". High scores indicate that individuals have a more positive attitude toward reading and understanding nutrition labels.

Nutrition Knowledge Scale

Nutritional Knowledge Scale (NKS) developed by Öngün Yılmaz was used (Öngün Yılmaz et al., 2021). The highest score that can be obtained from the scale is 126. Cut-off points of the scale were 79 (<79=low knowledge level), 90 (90-100=medium knowledge level) and 101 (>101=high knowledge level). Cronbach's alpha internal consistency coefficient was 0.851.

Dietary Compliance

Dietary compliance was determined with a questionnaire form prepared by the researchers, including skipping meals, consumption of forbidden foods, cooking methods, water consumption, portion control, and adherence to mealtimes.

Anthropometric Measurements

Weight, height, waist circumference, hip circumference, waist-to-hip ratio, body fat, muscle and body water percentage were evaluated. The participants' height was measured with a stadiometer, and waist and hip circumferences were measured by the researcher using a tape measure. Body weight, body fat, lean mass, and body water ratios were determined with a bioelectrical impedance analysis device TANITA BC-601 (BIA). Body Mass Index (BMI) was calculated with the Body weight (kg)/ height (m²) formula. According to BMI values, BMI <18.5 kg/m² was classified as underweight, BMI between 18.5-24.99 kg/m² as normal weight, BMI 25-29.99 kg/m² as preobese, and BMI 30 kg/m² as obese (Casadei & Kiel, 2024).

Data Collection

The data collection process took place between July 2023 and November 2023 from the counselees who applied to a nutrition counselling centre and voluntarily accepted to participate in the research.

Table 1. Demographic characteristics.

Features	Male (n=27)	Female (n=84)	Total (n=111)
Age (years), Mean ($\bar{X}\pm SS$)	42.22±14.72	37.57±12.63	38.70±13.25
Education Level	Primary School	0 (0.0)	9 (8.1)
	Secondary School	17 (63.0)	35 (41.7)
	Bachelor's Degree	8 (29.6)	31 (36.9)
	Postgraduate	2 (7.4)	9 (10.7)
Income Status	Equal Income	2 (7.4)	16 (16.2)
	Surplus Income	25 (92.6)	68 (81.0)
Occupation	Housewife	0 (0.0)	26 (23.4)
	Officer	5 (18.5)	19 (22.6)
	Private Sector	11 (40.7)	22 (26.2)
	Worker	7 (25.9)	6 (7.1)
	Retired	2 (7.4)	6 (7.1)
	Other	2 (7.4)	5 (6.0)

Data Evaluation

Descriptive statistics for categorical variables (demographic characteristics) are presented as frequency and percentage. The Shapiro-Wilk test was used to ensure that the numerical variables were consistent with the normal distribution. "Independent Sample T Test" was used to compare two normally distributed and uncorrelated groups. "Mann-Whitney U Test" and Kruskal-Wallis H Test" were applied for the comparison of unrelated groups that were not normally distributed. The results of the comparison of the scales that were not normally distributed were found with "Spearman's Rank Difference Correlation Coefficient". In correlation grading, "<0.2 is a very weak correlation", "0.2-0.4 is a weak correlation", "0.4-0.6 is a moderate correlation", "0.6-0.8 is a high correlation", and "0.8> is a very high correlation" (Choi et al., 2010). In the study, statistical significance levels were considered as "p<0.05, p<0.01, p<0.001". Statistical analysis of the data was performed with the "SPSS v27 (IBM Inc., Chicago, IL, USA)" program.

RESULTS

A total of 101 counselees, including 27 males and 84 females, participated in the study. The mean age was 42.22 ±14.72 years for males and 37.57 ± 12.63 years for females, with a general average age of 38.70 years. 8.1% of participants have primary education, 46.8% secondary education, 35.1% bachelor's degree, and 9.9% postgraduate education. The income of 83.8% of the participants was higher than their expenses. The rate of those whose income is equal to their expenses was recorded as 16.2%. In this study, the rate of private sector employees was 29.7%, housewives 23.4%, civil servants 21.6%, workers 11.7%, pensioners 7.2% and other occupational groups 6.3%. Descriptive statistics of demographic information of the individuals in the study according to their gender are given in Table 1.

The mean body weight of the men was 84.69 kg and the mean body weight of the women was 72.39 kg. The mean height of men was 173.22 cm and that of women was 161.68 cm. In terms of waist circumference, the mean waist circumference of men and women was 98.89 cm and 92.02 cm. Body fat percentage was higher in women (35.84% vs. 30.56%). Body fat-free mass and body fluid were higher in men (69.44% vs. 63.73% and 52.39% vs. 47.85%, respectively). The statistical data of the anthropometric measurements of the participants in the study according to their gender are given in Table 2.

The mean scores of FLRAE were 54.67±24.22 and 65.04±25.28, respectively, for male and female participants. The mean score for the total participants was found to be 62.51±25.32. The mean score of NKS was found to be 88.67±14.67 for males and 95.62±16.28 for female participants. Also, this difference was statistically significant according to gender (p<0.05). These findings indicate that female participants had higher mean values in both FLRAE and NKS scores than male participants. The means and medians of FLRAE and NKS scores of male and female participants are presented in Table 3.

Table 4 shows the correlation coefficients between (FLRAE) scale and NKS total scores according to age, anthropometric measurement values and gender. NKS total scores were generally negatively associated with age, BMI, waist circumference, and waist/hip ratio, particularly in women, while positive correlations were observed with fat-free mass, body fluid percentage, and FLRAE total scores.

Table 5 represents the comparison of NKS and FLRAE total scores according to dietary compliance status of individuals. The findings in the table show that there are significant relationships between eating habits and nutritional awareness and knowledge levels. Individuals who consumed forbidden foods less frequently or not at all had significantly higher FLRAE and NKS scores, meaning that nutritional awareness and knowledge levels increased as forbidden food consumption decreased. Similarly, individuals who regularly adhere to meal times also had higher scores, indicating that nutritional awareness and knowledge levels increase with greater adherence to meal times.

Table 2. Anthropometric measurements of participants

Features	Male		Female		Total		p-value
	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)	
Body weight, (kg)	84.69±13.67	83.4(56.6-113.6)	72.39±14.40	69 (43.5-122)	75.38±15.12	72.2(43.5-122)	0.001
Height, (cm)	173.22±9.01	176 (148-185)	161.68±6.82	162 (145-178)	164.49±8.89	163 (145-185)	0.001***
BMI, (kg/m ²)	28.30±4.54	29.1 (18.9-36.5)	27.78±5.78	26.3 (17.4-47.5)	27.91±5.49	27 (17.4-47.5)	0.260
Waist Circumference, (cm)	98.89±15.60	97 (75-130)	92.02±18.63	89 (57-156)	93.69±18.12	91 (57-156)	0.026*
Hip Circumference, (cm)	106.37±10.74	102 (90-128)	112.62±12.67	112 (82-142)	111.10±12.47	111 (82-142)	0.023*
Waist / Hip Ratio	0.93±0.12	0.9 (0.7-1.2)	0.81±0.12	0.8 (0.7-1.3)	0.84±0.13	0.8 (0.7-1.3)	0.001***
Body Fat, (%)	30.56±10.09	32.1 (11.8-51)	35.84±7.70	36.8 (11.2-52.8)	34.55±8.60	35.6 (11.2-52.8)	0.011*
Lean Mass, (%)	69.44±10.09	176 (148-185)	161.68±6.82	162 (145-178)	164.49±8.89	163 (145-185)	0.001***
Body Fluid, (%)	52.39±7.25	29.1 (18.9-36.5)	27.78±5.78	26.3 (17.4-47.5)	27.91±5.49	27 (17.4-47.5)	0.260

*p<0.05; **p<0.01; ***p<0.001

Table 3. Comparison of FLRAE and NKS Total Scores According to Gender of Individuals.

Features	Male		Female		Total		p-value
	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)	Mean±SD	Median (min-max)	
FLRAE	54.67±24.22	50 (20-100)	65.04±25.28	58.5 (20-100)	62.51±25.32	54 (20-100)	0.101
NKS	88.67±14.67	82 (72-118)	95.62±16.28	99.5 (61-120)	93.93±16.12	92 (61-120)	0.030*

*p<0.05; **p<0.01; ***p<0.001

Table 4. Age, Anthropometric Measurement Values and Correlation Coefficients Between (FLRAE) Scale and NKS Total Scores of Individuals According to Gender

Features	Male		Female		Total	
	NKS Total		NKS Total		NKS Total	
	s	p	s	p	s	p
Age (years)	-0.357	0.068	-0.313	0.004**	-0.356	0.001***
BMI (kg/m ²)	-0.330	0.093	-0.252	0.021*	-0.285	0.002**
Waist circumference (cm)	-0.334	0.089	-0.249	0.022*	-0.291	0.002**
Hip Circumference (cm)	-0.135	0.503	-0.114	0.302	-0.090	0.350
Waist/Hip Ratio	-0.281	0.156	-0.222	0.042*	-0.269	0.004**
Body Fat (%)	-0.169	0.398	-0.164	0.136	-0.085	0.373
Lean Mass (%)	0.169	0.398	0.224	0.040*	0.124	0.195
Body Fluid (%)	0.187	0.349	0.231	0.034*	0.132	0.168
FLRAE Total	0.444	0.020*	0.758	<0.001***	0.711	0.001***

*p<0.05; **p<0.01; ***p<0.001

Table 5. Comparison of the Total Scores of the NKS and FLRAE According to the Dietary Compliance Status of the Individuals.

Features	Consumption of Forbidden Foods	Mean ± SD	Median (min-max)	H	p
FLRAE	1-3 times a week	53.26±21.12	47,5 ^a (20-99)	52.245	0.001***
	3-5 times a week	42.72±10.94	43 ^a (20-61)		
	Never	86.54±16.46	91 ^b (29-100)		
NKS	1-3 times a week	88.39±13.04	84 ^b (66-116)	59.785	0.001***
	3-5 times a week	80.91±10.68	80 ^a (61-108)		
	Never	109.22±8.05	110 ^c (72-120)		
Adherence to Mealtimes in Diet Plan		Mean ± SD	Medyan (min-max)	H	p
FLRAE	1-3 times a week	45.11±10.86	44 ^a (20-90)	57.999	0.001***
	3-5 times a week	46.65±15.45	48 ^a (20-62)		
	Every day	83.69±18.35	84 ^b (29-100)		
	More than once a day	88.81±16.29	96 ^b (31-100)		
NKS	1-3 times a week	78.78±10.06	80 ^a (61-98)	73.725	0.001***
	3-5 times a week	84.86±11.05	82 ^a (65-112)		
	Every day	108.62±4.27	108 ^b (100-114)		
	More than once a day	110.90±5.45	112 ^b (100-120)		

*p<0.05; **p<0.01; ***p<0.001; a, b, c: The difference between the medians that do not share a common letter is significant (p<0.05)

DISCUSSION

Label reading, nutritional knowledge and dietary compliance are factors that support each other and are necessary for healthy nutrition (Gökçen & Küşümler, 2021). The significance of the present study lies in its contribution to unravelling the relationship between label reading habit, nutritional knowledge level, and adherence to diet in individuals receiving nutrition counselling. A total of 111 individuals, 24.3% (n=27) male and 75.7% (n=84) female, participated in the study. It is thought that the reason for the high rate of women receiving nutritional counselling compared to men is due to the difference in numbers between the genders. Several studies indicated that women tend to be more engaged with nutrition information and dietary advice compared to men (Svendsen et al., 2021; Vrkić et al., 2022). Nutritional knowledge and label reading

habit are critical components of effective nutritional counselling (İçer & Karadağ, 2023). In the present study, it was found that females had higher FLRAE scores than males, however this difference was not statistically significant. In another study conducted in Singapore, food label reading attitudes of the participants who were in the supermarket and shopping were examined. Odaman et al. reported that there was no relationship between gender and food label reading attitude (Odaman et al., 2020). Güneş et al. also examined the relationship between gender and food label reading habits and reported that there was no relationship between gender and food label reading (Güneş et al., 2014). In a study among university students, it was stated that gender and FLRAE score status were statistically significant, and women had higher scores (Seçkin Sığırıcı & Sarp, 2024). The different results between studies may attributed to

different groups of samples. Also, according to gender, it was observed that the nutritional knowledge level of female participants was statistically significantly higher. In a study conducted with Austrian participants, it was found that the mean score of female participants in the field of nutritional knowledge was higher than males (Gruber et al., 2022). In a study in which NKS was developed for adults, it was reported that the nutritional knowledge of male participants was higher than that of female participants (Batmaz & Güneş, 2018). The higher nutritional knowledge level in women may be related to interest in nutrition, the role of women in the family and society in regard to food shopping and the food preparation process (Feraco et al., 2024).

The relationship between anthropometric measurements and demographic data, FLRAE and the NKS were interpreted according to gender in Table 4. In general, the FLRAE score showed strong and significant positive correlations with NKS in all groups (male, female and total). Some variables, such as hip circumference, body fat, muscle mass and body fluid percentage, showed weak or non-significant associations with the NKS in general. In women, some significant associations were observed between body fluid and muscle mass and NKS. These findings revealed the strong associations between FLRAE Total and NKS, but suggested that the influence of other anthropometric measurements varies by gender and that the contribution of some variables to these associations may be limited. İçer et al. also reported that individuals with higher nutrition knowledge read food labels more frequently and had a better understanding of food content (İçer & Karadağ, 2023). Briefly, individuals with higher levels of nutrition knowledge are able to make healthier dietary choices by using labelling information more effectively. This emphasises the importance of nutrition education, because increasing individuals' food literacy can help them develop healthy eating habits (Gökçen & Küşümler, 2021)..

Other remarkable findings of the present study belonged to the effects of the consumption of prohibited foods and compliance with mealtimes in the diet plan on FLRAE and NKS scores. As presented in Table 5, it was observed that FLRAE and NKS scores of individuals who did not consume prohibited foods were significantly higher than those who consumed prohibited foods 1-3 times or 3-5 times ($p<0.001$). In particular, the median values of FLRAE and NKS scores of those who never consumed prohibited foods were significantly higher than the other groups. This suggests that avoiding prohibited foods may positively affect dietary compliance and nutritional behaviours. Similarly, it was observed that FLRAE and NKS scores increased significantly with increasing compliance with mealtimes ($p<0.001$). In particular,

the scores of individuals who adhered to mealtimes every day and more than once a day were higher than those who adhered 1-3 times or 3-5 times a week. These findings emphasise that adherence to regular mealtimes and avoidance of prohibited foods are associated with better eating habits and dietary adherence.

Although this study provides important data to reveal the importance of the relationship between label reading, nutritional knowledge level and dietary adherence in individuals receiving nutritional counselling, the study has some limitations. The limitations of the study include the relatively small number of participants, the imbalance between genders and the inability to control the effects of demographic differences fully. These limitations may make it difficult to generalise the results and suggest the need for future research with larger and more balanced sample groups. Another limitation of this study is that participants who had received dietary counseling were not excluded. Future research could address this by examining these individuals separately, which would provide a clearer understanding of how dietary counseling influences nutrition knowledge and label-reading behaviors.

In conclusion, this study examined the relationships between label reading habits, nutritional knowledge and dietary adherence in individuals receiving nutrition counselling. It was observed that not consuming prohibited foods and following regular mealtimes positively affected FLRAE and NKS scores. Also, the level of nutritional knowledge and dietary compliance of women were generally higher than men, but this difference was not statistically significant. In addition, individuals with higher nutritional knowledge read labels more frequently and use this information more effectively. In order to use food labels as an effective nutrition tool, food labels should be well understood. In this regard, consumers should be made aware of understanding food labels and using the information. Health professionals can use food labels as a nutrition education tool to better understand food labels and raise awareness of individuals by increasing the frequency of use. Raising awareness of individuals about nutrition can direct individuals to make healthy choices and enable them to access the right foods. These trainings can help consumers develop more conscious and healthy eating habits.

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