https://doi.org/10.46389/rjd-2021-1006
www.rjdnmd.org

Rom J Diabetes Nutr Metab Dis
2021; volume 28, issue 1, pages 38-46

Original Research

Nutritional label use among patients with type 1 diabetes mellitus

Aybike Cebeci[1], Sule Aktac[2], Safiye Keskin[3], Seda Senguzel[2], Fatma Esra Gunes[2]

[1] Department of Nutrition and Dietetics, Institution of Health Sciences, Marmara University, Istanbul, Turkey
[2] Department of Nutrition and Dietetics, Faculty of Health Sciences, Marmara University, Istanbul, Turkey
[3] Istanbul, Turkey

*Correspondence to: Aybike Cebeci, Marmara University, Basibuyuk, BasibuyukStreet, Number: 9, 34854, Maltepe, Istanbul, Turkey, E-mail: aybike_cebeci@hotmail.com, Phone: +90 538 817 23 33, Fax: +90 216 399 62 42.

Received: 18 July 2020 / Accepted: 12 February 2021

Abstract

Background and Aims: In this study, it was aimed to evaluate the nutritional label use of individuals with type 1 DM. **Material and Method:** This cross-sectional descriptive study was conducted in November 2017 - June 2018. Diabetic individuals were reached through hospitals and social networks. The study was conducted with 105 (64 female, 41 male) individuals with type 1 DM living in Istanbul. A questionnaire about sociodemographic characteristics, biochemical parameters, medical treatment, food label reading status, food label reading reasons were applied in the study. Data were analyzed using SPSS V 16.0 program. **Results:** 85.7% of the participants read the food label. No significant difference was found when age group and nutritional label reading status were examined ($p > 0.05$). Besides, information was given to 67.6% of the participants about reading the nutritional label. A significant association was found between nutritional label reading knowledge and carbohydrate counting application and stages ($P=0.0001$). However, there was no significant difference between biochemical parameters and reading label status ($p>0.05$). **Conclusions:** Nutritional label reading should be mentioned more in the medical nutrition therapy and diabetes education.

Keywords: Type 1 diabetes, nutritional label, carbohydrate counting, diabetes education.

Background and Aims

Diabetes mellitus (DM) is a chronic and metabolic disease in which the organism cannot use carbohydrates, fats, and proteins sufficiently due to insulin deficiency or insulin-effect defects, requiring constant medical care [1]. Type 1 diabetes is a type of diabetes caused by an autoimmune reaction in which the body's immune system attacks beta cells of insulin-producing pancreatic islets [2]. A total of 1 106 200 children under the age of 20 and adolescents worldwide are thought to have Type 1 diabetes. Type 1 diabetes accounts for more than 90% of childhood and adolescent diabetes in most western countries, while it accounts for 5-10% of people with diabetes in the entire population. According to the results of the first nationwide study to determine the incidence and prevalence of diabetes in Turkey, the number of Type 1 diabetes under the age of 18 have been found to be 17 175. According to these results, Type 1 diabetes cases in Turkey constitute approximately 3% of Type 1 diabetes cases of the World [3,4].

In the treatment of diabetes, one has to be able to manage his or her lifestyle, and insulin, medical nutrition therapy, and exercise are the mainstays of treatment. Nutritional management of people with diabetes can be achieved by choosing healthy food, providing portion control, reading and understanding nutritional

labels, counting carbohydrates, and eating at the right time [5,6].

One of the most challenging and ambitious goals that public health is trying to achieve worldwide is to promote healthy living and nutrition. Nutritional related health problems such as obesity, diabetes, and metabolic syndrome have a significant impact on societies. In order to enable individuals to make safer and more conscious choices about their health, the entire population should be encouraged to use the nutritional label effectively [7].

Carbohydrate counting, which is recommended to provide better glycemic control to patients with diabetes, is a meal planning method that allows the adjustment of the amount of carbohydrate to be consumed in the meals and also provides the adjustment of the insulin dose required by the individual according to the pre-meal blood glucose. Carbohydrate counting method requires the ability to read the nutritional labels [1,8].

Nutritional labels are the materials by which the percentage of the nutrients (protein, fat, vitamins, minerals, etc.) of packaged foods and how much of the nutrients the consumer needs to receive daily [9]. According to Turkish Food Codex Regulation on Food Labeling and Informing Consumers, the label refers to any mark, brand, stamp, pictorial or other identifying element printed on the packaging or container of food, printed, stencil-printed, marked, embossed, cold-printed, glued, or affixed [10].

Nutritional label reading is known to facilitate carbohydrate counting and provide glycemic control. In addition, it has been shown that nutritional knowledge has a role in weight control and healthy nutrition and shortening duration of diabetes [11]. Therefore, health and number literacy are essential for understanding healthy nutrition, which plays an important role in the prevention and management of diabetes [6,12]. However, little is known about the prevalence of the use of nutritional labels in the type 1 diabetic population [13].

The aim of this study was to evaluate the nutritional label use, and the reasons affecting label reading status of patients with type 1 diabetes mellitus. The second aim was to determine the effect of label reading information on the attitude of the type 1 diabetes mellitus patients.

Material and Method

Study design and patients

This cross-sectional descriptive study was conducted in November 2017 - June 2018 with 105 individuals aged between 10-30 years with type 1 diabetes mellitus living in Istanbul. Diabetic individuals were reached through hospitals and social networks. Necessary permissions were obtained from hospitals. Permission of the Ethics Committee No. 09.2017.657 was obtained from the Marmara University Faculty of Medicine Clinical Research Ethics Committee. Before the study, participants were informed about the study and their consent was obtained. The families of children and adolescents were also informed and their consent was obtained.

Laboratory, anthropometric and clinical data collection

The study was conducted by face to face interview method. In the first part of the questionnaire, information on gender, age, occupation, education level, and income level was obtained. The questionnaire also included questions about diabetes duration, fasting plasma glucose (FPG), HbA1c values in the last three months and frequency of hypoglycemia.

Fasting plasma glucose and HbA1c values of children were evaluated using International Society for Pediatric and Adolescent Diabetes (ISPAD) data, according to Diabetes Control and Complications Trial (DCCT) standard and Turkey Endocrinology and Metabolism Association (TEMD) recommendations, whereas the evaluation of FPG and HbA1c values of adults was conducted according to the TEMD recommendations [1,14]:

- For 8-12 years; FPG 90-180 mg/dl, HbA1c <%8,0
- For 13-18 years; FPG 80-120 mg/dl, HbA1c %6,5-7
- For >18 years; FPG 80-130 mg/dl, HbA1c <%7 were considered good glycemic control.

Information on the anthropometric measurements of the participants was obtained from questions regarding the height, body weight, and body mass index (BMI) of the participants. Body mass indices of individuals with diabetes were calculated by BMI = Weight (kg) / Height (m^2) formula. The body mass index was evaluated by taking into consideration the classification published by WHO in 2007 for individuals 5-19 years and by the WHO classification arranged in 2004 for individuals 20 years and over. In addition, WHO AnthroPlus program was used to evaluate the z score for 5-19 years [15,16].

In the second part of the questionnaire, information about nutritional label was obtained. In this section of the questionnaire, nutritional label reading status and aims, the level of nutritional label reading, what the individual is paying attention to when reading the nutritional label and choosing the product, the status and purpose of using the packaged and dietary products, the purpose and frequency of using the product for diabetes, and impact of diabetes diagnosis on these choices of participants were determined.

Statistical analysis

The data obtained from the study were analyzed using SPSS version 16.0 program. The Kolmogorov-Smirnov test was used to determine whether the data fit the normal distribution, and chi-square test was used to determine the relationship between the data. Significance level was accepted as $P<0.05$. Quantitative variables were shown as mean ± standard deviation (X ± SD), lower and upper values. Number (n) and percentage (%) values were used for qualitative variables.

Results

The study included 64 female and 41 male type 1 diabetic patients aged between 10-30 years. The distribution of age group, education level, occupational classification and income status of the individuals are shown in Table 1.

54.2% of the participants were older than 18 years (female; 56.3%, male; 51.2%). It was determined that 33.3% of the participants were secondary school graduates. While 29.7% of the females who participated in the study were secondary school graduates, 29.7% were undergraduate graduates, and 39.0% of males were secondary school graduates. 65.7% of the participants (female; 68.8%, male; 61.0%) were students.

The average height and body weight for the ages of 10-18 were 163.4 ± 10.1 cm, 58.4 ± 11.3 kg, respectively, while the average height and body weight for the age of 18 over were 168.8 ± 8.7 cm, 64.7 ± 11.9 kg, respectively.

When z score values of children between the ages of 10–18 years were examined, 79.1% (female; 75.0%, male; 85.0%) were found to be within normal limits. There was no significant difference between z scores of individuals in this age group according to gender ($P > 0.05$). In addition, when BMI values of the individuals over 18 years of age were examined, 70.1% (female; 75.0%, male; 61.9%) were within normal limits. There was no significant difference in BMI values of individuals in this age group according to gender ($P>0.05$).

When the HbA1c values were examined, it was found that 81.6% (for age 10–18 years; 87.2%, for age >18 years; 76.8%) had higher HbA1c values than the target values. On the other hand, 58.8% (64.5% of individuals aged 10–18) and 54.1% of individuals over 18 years of age (68 people) had higher FPG levels than the target levels. HbA1c values and FPG levels was not significantly different according to age groups values ($P>0.05$). In addition, no difference was found between BMI values of those with HbA1c values below and above the target ($P>0.05$).

Table 2 shows the nutritional label use status of patients. It was seen that 85.7% of participants (female; 87.5%, male; 82.9%) read the nutritional label. When causes of reading or not reading of nutritional labels was analyzed, it was found that 29.2% of participants read the labels to apply carbohydrate counting, while 28.5% of participants don't read the food labels because they thought it was not necessary.

88.6% of participants (female; 90.6%, male; 85.4%) had previously received nutritional counseling and nutritional label reading information was given to 67.6% of participants in

 https://doi.org/10.46389/rjd-2021-1006

Table 1: Demographic and diabetes characteristics.

Demographic and diabetes characteristics	10–18 age (n = 48)				>18 age (n = 57)				Total (n = 105)			
	Female (n = 28)		Male (n = 20)		Female (n = 36)		Male (n = 21)		Female (n = 64)		Male (n = 41)	
	n	%	n	%	n	%	n	%	n	%	n	%
Level of education												
Literate	2	7.1	2	10.0	–	–	–	–	2	3.1	2	4.9
Primary school	7	25.0	2	10.0	–	–	–	–	7	10.9	2	4.9
Secondary school	19	67.9	15	75.0	–	–	1	4.8	19	29.7	16	39.0
High school	–	–	1	5.0	17	47.2	7	33.3	17	26.6	8	19.4
License	–	–	–	–	19	52.8	9	42.9	19	29.7	9	22.0
Postgraduate	–	–	–	–	–		4	19.0	–	–	4	9.8
Occupational Classification												
Student	27	96.4	19	95.0	17	47.2	6	28.6	44	68.8	25	61.0
Employee	1	3.6	–	–	18	50.0	12	57.1	19	29.6	12	29.2
Not laboring	–	–	1	5.0	1	2.8	3	14.3	1	1.6	4	9.8
Diabetes duration (years)												
<6	12	42.9	6	30.0	14	38.9	6	28.6	26	40.6	12	29.3
6–10	13	46.4	9	45.0	8	22.2	4	19.0	21	32.8	13	31.7
11–20	3	10.7	5	25.0	13	36.1	11	52.4	16	25.0	16	39.0
>20	–	–	–	–	1	2.8	–	–	1	1.6	–	–
Presence of Metabolic Disease												
Yes	5	17.9	4	20.0	9	25.0	3	14.3	14	21.9	7	17.1
No	23	82.1	16	80.0	27	75.0	18	85.7	50	78.1	34	82.9
Presence of Complications												
Yes	2	7.1	1	5.0	3	8.3	2	9.5	5	7.8	3	7.3
No	26	92.9	19	95.0	33	91.7	19	90.5	59	92.2	38	92.7
Received Medical Treatment												
Multi–dose insulin therapy	22	78.6	15	75.0	28	77.8	17	81.0	50	78.1	32	78.0
Insulin pump	6	21.4	5	25.0	8	22.2	4	19.0	14	21.9	9	22.0

counseling (female; 68.8%, male; 65.9%). It was determined that 73.2% of the nutritional label reading information was obtained from dietitians and 25.4% from nurses. In addition, 65.8% (female; 68.8%, male; 61.3%) of the total participants stated that the given information was sufficient.

When sociodemographic characteristics were examined according to nutritional label reading status; it was found that 62.2% of the food label readers and 53.3% of those who did not read were females; 57.8% of the food label readers were over 18 years of age. When education levels are examined, it is determined that 28.9% of food label readers and 60.0% of those who do not read were secondary school graduates, and incomes and expenses of 60.0% of label readers and 73.3% of those who do not read were equal.

It was found that 90.0% of food label readers and 80.0% of those who did not read food label had previously received nutritional counseling. It was observed that 71.1% of food label readers

Table 2: Nutritional label use.

Label Reading	10–18 age (n = 48)				>18 age (n = 57)				Total (n = 105)			
	Female (n = 28)		Male (n = 20)		Female (n = 36)		Male (n = 21)		Female (n = 64)		Male (n = 41)	
	n	%	n	%	n	%	n	%	n	%	n	%
Reading	23	82.1	15	75.0	33	91.7	19	90.5	56	87.5	34	82.9
Not reading	5	17.9	5	25.0	3	8.3	2	9.5	8	12.5	7	17.1
Cause of Nutritional Label Reading	**Female (n = 55)**		**Male (n = 38)**		**Female (n = 97)**		**Male (n = 39)**		**Female (n = 152)**		**Male (n = 77)**	
Curiosity	9	16.4	3	7.9	13	13.4	4	10.3	22	14.5	7	9.1
Increasing product confidence	3	5.5	4	10.5	6	6.2	1	2.6	9	5.9	5	6.5
Buying healthy product	12	21.8	5	13.2	18	18.6	5	12.8	30	19.7	10	13.0
New product	2	3.6	3	7.9	5	5.1	2	5.1	7	4.7	5	6.5
Weight loss product	3	5.5	1	2.6	1	1.0	1	2.6	4	2.6	2	2.5
First consumption	6	10.9	3	7.9	14	14.4	5	12.8	20	13.2	8	10.4
Applying for carbohydrate count	14	25.4	14	36.8	23	23.7	16	41.0	37	24.3	30	39.0
Comparing the products	6	10.9	5	13.2	17	17.6	5	12.8	23	15.1	10	13.0
Cause of not Reading Nutritional Label	**Female (n = 7)**		**Male (n = 6)**		**Female (n = 3)**		**Male (n = 5)**		**Female (n = 10)**		**Male (n = 11)**	
Thinking not necessary	2	28.6	3	50.0	–	–	1	20.0	2	20.0	4	36.3
Being time consuming	1	14.3	–	–	1	33.3	–	–	2	20.0	–	–
Being unclear of ingredients	2	28.6	1	16.6	–	–	1	20.0	2	20.0	2	18.2
Unreadable of letters and numbers	1	14.3	–	–	1	33.3	1	20.0	2	20.0	1	9.1
Because there is no indication of harmful aspects of products	–	–	1	16.6	–	–	1	20.0	–	–	2	18.2
Lack of credible	1	14.3	–	–	–	–	1	20.0	1	10.0	1	9.1
Because reading of parents	–	–	1	16.6	1	33.3	–	–	1	10.0	1	9.1

were given food label reading information while reading information was not given to 53.3% of those who did not read food labels.

Biochemical parameters according to nutritional label reading status are given in Table 3. Accordingly, it was seen that 79.8% of the label readers and 92.9% of those who did not read the label were above the target values of HbA1c. In addition, 56.1% of the label readers and 72.7% of the non-label readers were observed to have higher values than the target fasting plasma glucose levels. However, there were no statistical differences in HbA1c values and FPG levels according to nutritional label reading status of patients ($P > 0.05$).

According to label reading information received, carbohydrate counting, carbohydrate counting stages, and label reading status of participants were shown in Table 4. It was seen that 62.0% of those who were given label reading information knew and applied the carbohydrate count. In addition, it was determined that 75.0% of those who were given label reading information had a carbohydrate count at the 3rd stage, while 63.6% of those who were not given label reading information applied the carbohydrate

https://doi.org/10.46389/rjd-2021-1006

Table 3: Comparison of biochemical parameters according to nutritional label reading status.

Biochemical Parameters	Reading Label		Not Reading Label		Total		χ2 Value	P Value
	n	%	n	%	n	%		
Diabetes Duration (years) (n=105)							0.96	0.81
<6	34	37.8	4	26.7	38	36.2		
6-10	28	31.1	6	40.0	34	32.4		
11-20	27	30.0	5	33.3	32	30.5		
>20	1	1.1	—	—	1	0.9		
HbA1c % (n=103)							1.37	0.45
Target	18	20.2	1	7.1	19	18.4		
Above Target	71	79.8	13	92.9	84	81.6		
FPG (n=68)							0.51	1.33
Under Target	3	5.3	—	—	3	4.4		
Target	22	38.6	3	27.3	25	36.8		
Above Target	32	56.1	8	72.7	40	58.8		

HbA1c: Glycated hemoglobin
FPG: Fasting plasma glucose

count in the first stage. When the carbohydrate count was examined according to label reading status, it was determined that 55.6% of label readers and 33.3% of those who did not read labels knew and applied carbohydrate counting. Also; 66.0% of those who read the label and 40.0% of those who don't read the label applied the carbohydrate count in the 3rd stage.

Discussion

In this study, which aimed to evaluate the nutritional label reading status of individuals with type 1 diabetes, sociodemographic characteristics, diabetic characteristics, anthropometric properties and biochemical parameters, dietary and diabetic product usage conditions and factors affecting product selection were examined.

When nutritional label reading status was examined according to gender, Alpuguz et al. determined that 55.8% of female students and 45.0% of male students read nutritional labels. In another study conducted by Sezek et al., it was seen that 24.1% of female students and 22.2% of male students read nutritional labels. In addition, in both studies, it was found that female students read nutritional label significantly more than male students [17,18]. In the study conducted by Ozgul and Aksulu (2006), it was found that there was no difference between nutritional label reading and gender during the 1995 period, whereas in 2005, females showed more attention to label information than males [19]. In this study, nutritional label reading rate was 89.1% for females and 85.3% for males unlike other studies. No significant difference was found between sex and nutritional label reading status. There was no similarity between the previous studies on gender and nutritional label reading status and this study.

In some studies, relationship between education levels and nutritional label reading habits was investigated. Accordingly, it was found that as the level of education increases, the level of nutritional label reading increases parallely [12,19].

It has been shown that nutritional label reading status differed significantly according to age in many studies [12,19,20]. Additionally, in the study conducted by Coskun and Kayisoglu (2016), it was determined that according to participants

Table 4: Evaluation of CHO count and CHO count stages according to nutritional label reading information and label reading status.

Carbohydrate Count	Informed about label reading (n=71)		Not informed about label reading (n=34)		Total (n = 105)		χ2 Value	P Value
	n	%	n	%	n	%		
Unknows	4	5.6	14	41.2	18	17.1	21.057	**0.0001**
Knows but not applies	23	32.4	9	26.5	32	30.5		
Knowing and applying	44	62.0	11	32.3	55	52.4		
Carbohydrate Count Stage	**Informed about label reading (n=44)**		**Not informed about label reading (n=11)**		**Total (n = 55)**			
	n	%	n	%	n	%		
1. Stage	3	6.8	7	63.6	10	18.2	20.089	**0.0001**
2. Stage	8	18.2	2	18.2	10	18.2		
3. Stage	33	75.0	2	18.2	35	63.6		
Carbohydrate Count	**Reading Label (n = 90)**		**Not Reading Label (n = 15)**		**Total (n = 105)**		**χ2 Value**	**P Value**
	n	%	n	%	n	%		
Unknowing	13	14.4	5	33.3	18	17.1	3.935	0.14
Knowing but not applying	27	30.0	5	33.3	32	30.5		
Knowing and applying	50	55.6	5	33.3	55	52.4		
Carbohydrate Count Stage	**Reading Label (n = 50)**		**Not Reading Label (n = 5)**		**Total (n = 55)**			
	n	%	n	%	n	%		
1. Stage	8	16.0	2	40.0	10	18.2	1.933	0.38
2. Stage	9	18.0	1	20.0	10	18.2		
3. Stage	33	66.0	2	40.0	35	63.6		

P < 0.001

the reasons for reading the nutritional label were 74.4% health, 14.5% learning the content, 6.9% solving the weight problem, and 3.2% of participants had other reasons [20]. However, in this sutdy, it was seen that nutritional label reading status didn't differ according to age groups. In addition, it was found that 29.2% of participants read the labels to apply carbohydrate counting.

In a study in which consumers' attitudes and behaviors were examined, 68.0% of the participants stated that they read the nutritional label when they purchased the new product and 67.0% of them read the nutritional label when buying the product for the first time or when buying a product they did not buy frequently. In addition, the reasons for the participants to read the nutritional label always and often were comparing two different products (62.0%), having a food-related health problems (61.0%), maintaining / fitting their forms (60.0%), and losing weight (58.0%) [21]. In this study, the reasons why the participants to read the nutritional label were applying carbohydrate count (72.8%), comparing products (45.9%), curiosity (32.6%), purchasing the product for the first time (31.5%), increasing product confidence (16.3%), and purchasing a slimming product (7.6%). When the reasons for reading the nutritional label were examined, similar results were reached with previous studies. It was found that participants generally read the nutritional label for health related issues.

In the study where consumers' attitudes and behaviors towards nutritional labels were

https://doi.org/10.46389/rjd-2021-1006

investigated, it was noteworthy that 32.1% of the participants think it was not required to read nutritional labels [12]. As a result of this research, it was found that the reason for not reading the nutritional label was not considered necessary at the rate of 46.2% and that the content was not understandable at the rate of 30.8%. The reason for not reading the nutritional label was similar to the previous studies. It was found that most of the participants did not read the nutritional label because they did not think it was necessary. In this study, the label reading rate of individuals with Type 1 diabetes was 85.7%. This differs according to having additional metabolic disease. In addition to type 1 diabetes, 90.4% of the individuals with hypothyroidism and other metabolic diseases such as celiac are reading labels, while the rate of label reading is 86.9% for individuals without additional metabolic diseases.

There was no significant difference between label reading status and the presence of additional metabolic disease and did not show any similarity with previous studies. This may be due to insufficient number of participants with metabolic disease in addition to type 1 diabetes.

In a case-control study conducted by Fitzgerald et al. (2008) of 100 type 2 diabetic and 101 healthy individuals, it was reported that the artificial sweetened sweet and drink consumption of diabetic individuals was more frequent than the control group [22]. In this study, the use of diabetic products was 43.8% (46.7% of nutritional label readers) and no significant relationship was found between age, sex, and duration of diabetes. It was found that 53.3% of the participants used diabetic products to balance blood sugar and 73.3% preferred diabetic beverages the most. Diabetic product usage of diabetic individuals shows similarity in the studies due to its high availability in the market, frequently recommended to people with diabetes, and advertisements [22].

In a study conducted by Kollannoor-Samuel et al. between 2006 and 2010, 12 months of intervention by community health workers on 203 people (100 people type 2 diabetes, 103 people healthy) to determine the effect on nutritional label use and to investigate the effect of nutritional label use and dietary quality on glycemic control, the use of nutritional labels was higher than the control group [23].

Conclusions

In this study, nutritional label reading status of individuals with Type 1 diabetes and factors affecting nutritional label reading status were examined and their attitudes and behaviors towards nutritional labeling are revealed. Nutritional labeling has an effect on the metabolic control of individuals with Type 1 diabetes, thus preventing complications and reducing the risk of additional metabolic diseases. In this context, reading the labels of foods consumed by people with Type 1 diabetes will contribute to the regulation of blood sugar and prevent problems related to diabetes in the long term. In order to increase this awareness, the importance of nutritional label reading should be mentioned in medical nutrition treatment and diabetes education. Making nutritional labels more readable and understandable will reduce the difficulties in reading labels and will be effective in raising awareness about this.

Conflict of Interest

The authors declare no conflict of interest.

References

1. TEMD Diabetes Mellitus Study and Education Group. Guidelines for the Diagnosis, Treatment and Follow-up of Diabetes Mellitus and Complications, April 2017.
2. Diabetes Atlas. International Diabetes Federation. 7th Eds. 47–74, 2015.
3. Mayer-Davis EJ, Kahkoska AR, Jefferies C, Dabelea D, Balde N, Gong CX, Aschner P, Craig ME. ISPAD Clinical Practice Consensus Guidelines 2018: Definition, epidemiology, and classification of diabetes in children and adolescents. *Pediatr Diabetes* 19(27): 7–19, 2018.
4. Yesilkaya E, Cinaz P, Andiran N et al. Research: Epidemiology First report on the nationwide incidence and prevalence of Type 1 diabetes among children in Turkey. *Diabet Med* 34: 405–410, 2017.
5. Abaci A, Bober E, Buyukgebiz A. Tip 1 DiyabetveİnsülinPompası (Type 1 diabetes and insulin pump). *TurkiyeKlinikleri J Pediatr* 17(2):115–129, 2008.

6. Yildirim F, Keser A. Health Literacy. Ankara University Faculty of Health Sciences Publication Number: 3. Ankara. 46–50, 2015.
7. Viola GCV, Bianchi F, Croce E, Ceretti E. Are Food Labels Effective as a Means of Health Prevention?. *J Public Health Res* 5(3): 768, 2016.
8. GokmenOzel H. Type 1 Diabetes Mellitus and Nutrition. *Turkish Pharmacists Association Publication / Vocational Continuing Education Magazine (mised)* 23–24: 20–26, 2010.
9. Ozgen L. Food Label Preferences of Consumers.*Journal of The Industrial Arts Education Faculty of Gazi University* 21:117–127, 2007.
10. Official Gazette. Thursday, January 26, 2017, No: 29960. Accessed January 25, 2018.
11. Nuncio-Naud C, Parenteau M, Lafrance G, Rottembourg D. Nutrition Knowledge in Children with Type 1 Diabetes and Their Parents. J Diabetes Treat: JDBT-162. DOI: 10.29011/2574-7568. 000062.
12. Gunes FE, Aktac S, Korkmaz IB. Consumer Attitudes and Behaviors of Food Labels.*Academic Food* 12(3): 30–37, 2014.
13. An R. Diabetes Diagnosis and Nutrition Facts Label Use among US Adults, 2005-2010. *Public Health Nutr* 19(12): 2149–2156, 2015.
14. Wolfsdorf JI, Allgrove J, Craig ME et al. ISPAD Clinical Practice Consensus Guidelines 2014.Diabetic ketoacidosis and hyperglycemic hyperosmolar state.*Pediatr Diabetes* 15(20):154–79, 2014.
15. http://www.who.int/growthref/who2007_bmi_for_age/en/. Accessed January 25, 2018.
16. Pekcan G. Evaluation of Nutritional Status. In: Nutritional Therapy in Diseases. Alphan E (ed) 2nd Ed. Ankara, Turkey, Hatipoglu Publishers, pp 85–134, 2014.
17. Alpuguz G, Erkoc F, Mutluer B, Selvi M. Investigation of Knowledge and Behavior of Young People (14-24 years) on Food Hygiene and Consumption of Packaged Foods. *Turk Hij Den BiyolDerg* 66(3):107-115, 2009.
18. Sezek F, Kaya E, Dogan S. Knowledge, Attitudes and Options about Additival and General Nutrition Interests of University Students.*Cankaya University Journal of Arts and Sciences* 10:117–134, 2008.
19. Ozgul E, Aksulu I. Changes in Consumer Sensitivity in Packaged Food Products. *Ege Academic Review* 1(6): 1–11, 2006.
20. Coskun F, Kayisoglu S. Investigation of the effect of consumer age on food label reading habits. *Journal of Human Sciences* 13(3): 4876–4890, 2016.
21. Aygen FG. Attitudes and Behavior of Consumers Related to the Inspection of Food Labels. *Journal of Business Research-Turk* 4(3):28–54, 2012.
22. Fitzgerald N, Damio G, Segura-Pérez S, Pérez-Escamilla R. Nutrition Knowledge, Food Label Use And Food Intake Patterns Among Latinas with and without Tip 2 Diabetes. *J Am Diet Ass* 108(6):960–967, 2008.
23. Kollannoor-Samuel G, Shebl FM, Segura-Pérez S, Chhabra J, Vega-López S, Pérez-Escamilla R. Effects of Food Label Use on Diet Quality and Glycemic Control Among Latinos With Type 2 Diabetes in a Community Health Worker-Supported Intervention. *Am J Public Health* 106(6):1059–1066, 2016.

https://doi.org/10.46389/rjd-2021-1006