

# Adherence to the Mediterranean diet and risk of functional constipation in children in Turkey: case–control study

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## Abstract

**Background:** Functional constipation is often seen in children, affecting quality of life and imposing a considerable burden on health care services. The Mediterranean diet is associated with a lower risk of functional gastrointestinal disorders.

**Aims:** This study aimed to evaluate the relationship between functional constipation and adherence to the Mediterranean diet in Turkish children aged 6–18 years.

**Methods:** In this case–control study, 221 children with functional constipation (cases) were selected from a paediatric gastroenterology clinic between May 2018 and September 2019, and 230 children without constipation (controls) were randomly selected from those attending a well-child check-up. Cases and controls were matched on sex, age and socioeconomic characteristics. Compliance with the Mediterranean diet was assessed using the KIDMED index score. Multivariable logistic regression analysis was used to analyse the data.

**Results:** KIDMED index scores in cases and controls were 4.0 (SD = 2.5) and 6.3 (SD = 2.4), respectively ( $P < 0.001$ ). Odds ratios for functional constipation were 0.23 (95% confidence interval (CI): 0.13–0.38) for KIDMED index score 4–7 and 0.05 (95% CI: 0.03–0.11) for score  $\geq 8$  compared with the lowest category (score  $\leq 3$ ;  $P < 0.001$ ). A negative correlation was observed between age and adherence to the Mediterranean diet.

**Conclusion:** Good adherence to the Mediterranean diet was associated with a lower risk of functional constipation, and adherence to the Mediterranean diet decreased with age. Education on nutrition and health is warranted to help maintain and improve the health of young people in Turkey.

Keywords: constipation, child, adolescent, Mediterranean diet, Turkey

Citation: Akbulut U; Isik I; Atalay A; Topal I. Adherence to the Mediterranean diet and risk of functional constipation in children in Turkey: case–control study. *East Mediterr Health J.* 2021;27(6):587–594. <https://doi.org/10.26719/2021.27.6.587>

Received: 10/04/20; accepted: 07/10/20

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## Introduction

Functional constipation is often seen in children and has an estimated global prevalence of 9.5% (1). The condition affects the quality of life of children and parents and is a significant burden on health care services (2). Functional constipation is characterized by a slowing of bowel movements with no structural or biochemical disorder, painful defecation and sometimes faecal incontinence (3). Functional constipation in children is diagnosed clinically and using the Rome criteria (4). The pathophysiology of constipation in children involves many factors. The most common cause is avoidance of defecation following difficult and painful defecation. Factors also leading to functional constipation include genetic disposition, low socioeconomic status, impaired mobility and insufficient daily fibre intake (5). Studies have reported a greater disposition to constipation in children with low vegetable, fruit and cereal consumption and low fibre intake (6,7).

The Mediterranean diet is one of the most frequently described and evaluated dietary models in the scientific literature (8). This diet is very important for healthy life and has been shown to have preventative effects on

some diseases such as cardiovascular diseases, metabolic diseases, and various cancers (9,10). In addition to its high fibre and antioxidant levels and low saturated fatty acids and oligosaccharides, the Mediterranean diet may also be useful in improving functional gastrointestinal symptoms. A recent study reported a low prevalence of functional constipation in children with good adherence to the Mediterranean diet (11).

Antalya is in the Mediterranean region of Turkey in the north-east of Mediterranean. The dietary habits in the Antalya region include a high consumption of cereals, olive oil, fruits and vegetables, and water and milk products. Olives, olive oil and cereals are important in the Mediterranean dietary culture and are known to have been grown and used in the region since ancient times. The purpose of this study was to investigate the relationship between functional constipation and adherence to the Mediterranean diet in the Antalya region of Turkey. We hypothesized that constipation will be seen less frequently in children consuming a Mediterranean diet because of its high fibre content and antioxidative effect.

## Methods

### Study design and setting

We conducted a case-control study at the Pediatric Gastroenterology Department of the Antalya Education and Research Hospital, Turkey. The hospital is a tertiary health centre in the Mediterranean region of Turkey, and serves an urban area where mostly middle-income families live. The study was conducted between May 2018 and September 2019.

### Cases and controls

We recruited two groups of children aged 6–18 years. Cases (Group 1) were patients diagnosed with functional constipation ( $n = 221$ ) by our paediatric gastroenterology unit. Controls (group 2) were 230 healthy children (matched on sex, age and socioeconomic characteristics) who had no previous history of chronic health problems and organic gastrointestinal disorders; control children were randomly selected from those attending our clinic for a well-child check-up.

Functional constipation was diagnosed by questioning both parents and the patient using the Rome IV criteria (4) – constipation for at least 1 month and including at least two of the following: two or fewer defecations a week; faecal incontinence more than once a week; retentive posturing; painful or hard bowel movements; large faecal mass in rectum; and large stool diameter. Exclusion criteria were: previous diagnosis of organic causes of defecation disorders; suspected gastrointestinal obstruction; abdominal or rectal surgery that might affect constipation; or any other conditions that cause the chronic constipation. Children in both the case and control groups were also excluded if they had severe neurological or mental disorders.

The control group underwent routine clinical examinations to check their health status, after excluding the presence of a functional chronic constipation during the clinical interview. Participants were further classified into two age subgroups: children attending elementary school (age 6–12 years,  $n = 288$ ) and high-school students (age 13–18 years,  $n = 163$ ).

We recorded data on some confounding variables, namely maternal and paternal education and socioeconomic status of family. Maternal and paternal educational level was reported by the parents and categorized into three groups: primary school and below, secondary school and university. Socioeconomic status of family was evaluated using the family affluence scale, which has been used in the Turkish setting before (12,13). Socioeconomic status was categorized into three levels based on the score on the family affluence scale: level 1 low prosperity (score: 0–3), level 2 moderate prosperity (score: 4–5) and level 3 high prosperity (score: 6–7).

### Anthropometric measurements

For all cases and controls, anthropometric measurements were collected by the same trained operator. Height was measured to the nearest centimetre using a Harpenden

stadiometer (Holtain Instruments Ltd, UK). Weight was measured in underwear to the nearest 0.1 kg using a calibrated balance scale. Body mass index (BMI) was calculated using the equation: weight (kg)/height squared ( $\text{m}^2$ ). BMI values were categorized according to the World Health Organization criteria as follows:  $< 18.5 \text{ kg/m}^2$  = underweight,  $18.5\text{--}24.9 \text{ kg/m}^2$  = normal weight,  $25\text{--}29.9 \text{ kg/m}^2$  = overweight and  $\geq 30 \text{ kg/m}^2$  = obese (14).

### Adherence to the Mediterranean diet

Adherence to the Mediterranean diet was assessed using the KIDMED index (15). This index includes 16 questions that summarize the characteristics of the Mediterranean diet. Twelve questions in the KIDMED index have a positive connotation with the Mediterranean diet (e.g. consumes olive oil at home) and four have a negative connotation (e.g. consumes sweets and candy several times a day). We used the previously validated Turkish language version of the questionnaire (16). A score of +1 was given for affirmative responses to positive questions (0 for negative responses), and a score of –1 was given for affirmative responses to negative questions (0 for negative responses). The total possible score ranges between 0 and 12. A KIDMED index score of  $\geq 8$  indicates optimal adherence to the Mediterranean diet (good), scores of 4–7 indicate that adherence to the Mediterranean diet needs to be improved (moderate), and scores of  $\leq 3$  indicate low adherence to the Mediterranean diet and poor nutritional quality (low).

### Statistical analysis

We used SPSS 13.0 (SPSS Inc., Chicago, IL, USA) software for data analyses. In our descriptive analysis, categorical variables were expressed as number and percentage, and continuous variables were expressed as mean and standard deviation (SD). Normally distributed variables were compared between the cases and controls using the independent samples *t*-test. Non-normally distributed variables were compared using the Mann–Whitney *U* test. We used the chi-squared test to compare categorical variables.

The potential confounding variables were included in a final univariate and multivariable logistic regression analysis: age (years, continuous), sex (reference category: females), BMI status (reference category: obese), maternal and paternal educational level (reference category: primary school and below), and socioeconomic status of family (reference category: level 1, low prosperity). In addition, with the KIDMED index as the dependent variable regression analysis was performed with age-matching. Conditional logistic regression models were used to estimate odds ratios (ORs) and 95% confidence intervals (CI).  $P < 0.05$  was considered statistically significant.

### Ethical concerns

The study was approved by ethical committee of University of Health Sciences, Antalya Education and Research Hospital (registry url: 2019-17/2). The study was con-

**Table 1** Characteristics of the cases and controls

Variable	Cases (n = 221)	Controls (n = 230)	P-value <sup>a</sup>
<b>Age in years, mean (SD)</b>	9.0 (3.8)	9.1 (3.2)	0.247
<b>Sex, female, no. (%)</b>	122 (52.2)	118 (51.3)	0.487
<b>BMI in kg/m<sup>2</sup>, mean (SD)</b>	18.8 (3.1)	18.3 (3.2)	0.835
<b>BMI category, no. (%)</b>			0.285
Underweight	11 (5.0)	12 (5.2)	
Normal weight	135 (61.1)	158 (68.7)	
Overweight	55 (24.9)	47 (20.4)	
Obese	20 (9.0)	13 (5.6)	
<b>Maternal educational level, no. (%)</b>			0.301
Primary school and below	69 (31.2)	55 (23.9)	
Secondary school	117 (52.9)	123 (53.5)	
University	35 (15.8)	52 (22.6)	
<b>Paternal educational level, no. (%)</b>			0.235
Primary school and below	40 (18.1)	31 (13.5)	
Secondary school	86 (38.9)	84 (36.5)	
University	95 (43.0)	115 (50.0)	
<b>Socioeconomic status of family, no. (%)</b>			0.065
Level 1 (low status)	41 (18.6)	34 (14.8)	
Level 2 (moderate status)	141 (63.8)	135 (58.7)	
Level 3 (high status)	39 (17.6)	61 (26.5)	
<b>KIDMED index score, mean (SD)</b>	4.0 (2.5)	6.3 (2.4)	< 0.001
<b>Adherence to Mediterranean diet, no. (%)</b>			< 0.001
Low ( $\leq 3$ )	95 (43.0)	25 (10.9)	
Moderate (4–7)	108 (48.9)	124 (53.9)	
High ( $\geq 8$ )	18 (8.1)	81 (35.2)	

BMI= body mass index; SD= standard deviation;

<sup>a</sup>P < 0.05 statistically significant.

ducted in accordance with the Declaration of Helsinki. Informed consent was obtained from the parent or legal guardian and the children signed a consent form (or gave verbal consent if they could not sign).

## Results

### Participant characteristics

A total of 451 participants completed a study, 221 functional constipation cases and 230 controls. The demographic characteristics of the cases and controls are shown in Table 1. There were no statistically significant differences between cases and controls for age, sex, BMI, socioeconomic status of family, and maternal and paternal education.

### KIDMED score and constipation

KIDMED index scores in cases and controls were 4.0 (SD 2.5) and 6.3 (SD 2.4), respectively (Table 1), a statically significant difference ( $P < 0.001$ ). Adherence to the Mediterranean diet was high in only 8.1% of the cases, compared with 35.2% of the controls ( $P < 0.001$ ). The OR were 0.23 (95% CI: 0.1–0.38) for KIDMED index 4–7 and 0.06 (95%

CI, 0.03–0.11) for KIDMED index  $\geq 8$  compared with the lowest category (KIDMED index  $\leq 3$ ;  $P < 0.001$ ).

There were statistically significant differences between cases and controls in their responses to selected KIDMED questions (Table 2). For example, daily consumption of fruits and vegetables was significantly lower in cases compared with controls (40.3% versus 60.0%, and 12.2% versus 32.6%, respectively;  $P < 0.001$ ), while consumption of sweets several times a day was significantly higher in cases than controls (68.7% versus 52.1% respectively;  $P < 0.001$ ). However, in a conditional logistic regression analysis, only consumption of vegetables regularly was significantly associated with functional constipation (OR = 0.44; 95% CI: 0.24–0.81).

Analysis by age groups showed that high-school students had lower KIDMED index scores than elementary school students, although the difference was not statistically significant (Table 3). In a linear regression model with KIDMED score as the dependent variable, a negative correlation was found between age and adherence to a Mediterranean diet ( $B = -0.128$ ;  $P = 0.001$ ).

The association between adherence to a Mediterranean diet and risk of functional constipation is shown in

**Table 2 KIDMED questions among the groups and conditional logistic regression analysis of predictive factors for constipation**

Variable	Cases (n = 221) No. (%)	Controls (n = 230) No. (%)	P-value <sup>b</sup>	OR (95% CI) <sup>a</sup>
<b>Consumes fruit regularly (at least two portions a day)</b>			< 0.001	
Yes	89 (40.3)	138 (60.0)		0.69 (0.45–1.05)
No (Ref)	132 (59.7)	92 (40.0)		
<b>Consumes vegetables regularly (at least two portions a day)</b>			< 0.001	
Yes	27 (12.2)	75 (32.6)		0.44 (0.24–0.81)
No (Ref)	194 (87.8)	155 (67.4)		
<b>Consumes fish regularly (at least two–three portions a week)</b>			< 0.001	
Yes	28 (12.7)	63 (27.4)		0.64 (0.41–1.02)
No (Ref)	193 (87.3)	167 (72.6)		
<b>Consumes olive oil at home</b>			< 0.001	
Yes	158 (71.5)	209 (90.9)		0.78 (0.53–1.10)
No (Ref)	63 (28.5)	21 (9.1)		
<b>Likes and consumes pulses (more than once a week)</b>			0.010	
Yes	150 (67.9)	182 (79.1)		0.86 (0.64–1.21)
No (Ref)	71 (32.1)	48 (20.9)		
<b>Consumes sweets several times a day</b>			< 0.001	
Yes (Ref)	152 (68.8)	120 (52.2)		1.35 (0.96–1.91)
No	69 (31.2)	110 (47.8)		

OR= odds ratio; CI= confidence interval; Ref= reference category.

<sup>a</sup>Adjusted for age, sex, body mass index, maternal and paternal educational level and socioeconomic status of family.<sup>b</sup>P < 0.05 statistically significant.

Table 4. Higher adherence to a Mediterranean diet (as measured by increasing KIDMED scores) was associated with a lower risk of constipation: fully adjusted OR for constipation = 0.71 (95% CI: 0.51–1.00) for moderate KIDMED score and 0.35 (95% CI: 0.22–0.59) for a high KIDMED score compared with a low KIDMED score. The OR for an increase in 1 point in the KIDMED score was 0.84 (95% CI: 0.78–0.91).

## Discussion

In this study, we observed that the KIDMED index score was inversely associated with risk of functional constipation in children, independent of confounding variables. Thus, children with functional constipation have lower

compliance with the Mediterranean diet. In addition, adherence to the Mediterranean diet decreased with age.

Previous studies have shown that lower consumption of vegetables and fruits causes functional constipation (17,18), both of which are components of the Mediterranean diet. One of the most important causes of chronic constipation in children is insufficient dietary fibre intake (17–19). Unrefined whole cereal products and pulses are an important component of the Mediterranean diet – the Mediterranean diet provides 30–50 g/day of fibre (20). Oxidative stress has been observed in patients with constipation, as in those with colorectal cancer and other chronic illnesses (21). Oxidative stress causes intestinal dysmotility which in turn can lead to oxidative stress in a vicious circle (22). Olives and olive oil,

**Table 3 KIDMED index scores among children in the two age-related subgroups**

Variable	Elementary school students (n = 288)	High-school students (n = 163)	P-value
<b>KIDMED index score, mean (SD)</b>	5.2 (2.6)	4.7 (2.8)	0.066
<b>Diet adherence, no. (%)</b>			0.179
Low ( $\leq 3$ )	77 (26.7)	53 (32.5)	
Moderate (4–7)	150 (52.1)	82 (50.3)	
High ( $\geq 8$ )	61 (21.2)	28 (17.2)	

SD= standard deviation.



**Table 4 Association between adherence to a Mediterranean diet and functional constipation: conditional logistic regression analysis**

Adherence	OR (95% CI) <sup>a</sup>	OR (95% CI) <sup>b</sup>
Low ( $\leq 3$ )	Ref	Ref
Moderate (4–7)	0.74 (0.54–1.05)	0.71 (0.51–1.00)
High ( $\geq 8$ )	0.38 (0.23–0.65)	0.35 (0.22–0.59)
Continuous OR <sup>c</sup>	0.86 (0.81–0.86)	0.84 (0.78–0.91)

OR= odds ratio; CI= confidence interval; Ref= reference category.

<sup>a</sup>Adjusted for age and sex.

<sup>b</sup>Adjusted for age, sex, body mass index, maternal and paternal educational level and socioeconomic status of family.

<sup>c</sup>For an increase of 1 point in the KIDMED score.

important components of the Mediterranean diet exhibit antioxidant, antimicrobial and anti-inflammatory effects (23). A decrease in bifidobacteria and lactobacilli levels and an increase in *Bacteroidetes* spp. have been reported in adults with constipation compared with those without constipation (24–27). Although this finding has not been confirmed in children with constipation, intestinal flora disturbances such as increased *Clostridium* spp. and Enterobacteriaceae that are rarely seen in healthy children have been reported in children with functional constipation (28). Positive effects on intestinal microbiota have been reported in parallel with adherence to a Mediterranean diet in some studies (29–31). For instance, closer adherence to a Mediterranean diet has been shown to be associated with higher faecal short-chain fatty acids and lower levels of *Firmicutes* and *Bacteroidetes* species (31). However, the evidence for a positive effect of the Mediterranean diet on the microbiome is still insufficient (32).

A previous case–control study in adult reported lower adherence to a Mediterranean diet in patients with functional gastrointestinal system disease compared with a healthy control group (33). Another study in adults showed that low adherence triggered functional gastrointestinal symptoms (34). That study observed a lower adherence to the Mediterranean diet in people with functional gastrointestinal symptoms in younger age groups (17–24 years and 24–34 years) compared with older age groups. In a paediatric cohort study, less functional gastrointestinal disease was reported in children with good adherence to a Mediterranean diet (11). Functional constipation represented a significant proportion of the functional gastrointestinal diseases in that study (66%) and KIDMED scores were significantly lower compared with the control group. However, KIDMED scores did not differ significantly between the group with functional constipation and groups with other functional gastrointestinal diseases. As a result, lack of adherence to a Mediterranean diet was identified as an independent predictor in the development of functional constipation. In our study, adherence to a Mediterranean

diet was significantly lower in children with functional constipation than in healthy children.

In our study, 35.2% of the healthy children had good compliance with the Mediterranean diet, while 10.9% showed poor compliance, while most (53.9%) had a moderate compliance. A study in Turkey with healthy adolescents aged 10–14 years reported that 17.9% of the participants had a poor compliance with the Mediterranean diet, 59.2% moderate compliance and 22.9% good compliance (35). In our study, the proportion of children with good adherence to the Mediterranean diet was higher than previously reported. This difference between the results of the two studies may be due to the difference in age groups. Indeed, in our study, adherence to the Mediterranean diet was better in the elementary school students than in the high-school students. Adolescence is a period of transition from childhood to adulthood in which physical and psychological changes occur, involving various health problems caused by environmental stressors, risky behaviour and psychosocial needs. The tendency to eat outside the home increases during adolescence and changes in eating habits, including skipping main meals and fast-food snacking between meals, also develop. Sitting for extended periods and snacking while watching the television and using the computer is widely observed in adolescents. Children in this age group are therefore irregularly nourished, consume far less than the recommended portions of fruit and vegetables and consume high levels of saturated fat and sodium (36–38).

Our study has some limitations. The first is the relatively small sample size. Furthermore, the sample represented Turkish families with a moderate income. The results therefore cannot be generalized to other populations. Second, we did not evaluate the physical activities of the children taking part in the study.

In conclusion, we found a decrease in the development of functional constipation in children as adherence to the Mediterranean diet increased. The Mediterranean diet is an inexpensive regimen with protective health benefits. It can also be a therapeutic option in children with functional constipation, particularly in regions where its components of the Mediterranean diet are widely produced and consumed. Adherence to the Mediterranean diet among children in our study also decreased with age. With its psychological, physiological and social characteristics, adolescence is an important time of transition between childhood and adulthood that results in changes in feeding habits. The provision of education on nutrition and health in schools and particularly in the family is warranted to help maintain and improve the health of young people in Turkey.

**Funding:** None.

**Competing interests:** None declared.

## Observance du régime méditerranéen et risque de constipation fonctionnelle chez les enfants en Turquie : étude cas-témoins

### Résumé

**Contexte :** Une constipation fonctionnelle est souvent observée chez les enfants, ce qui affecte la qualité de vie et impose une charge considérable aux services de soins de santé. Le régime méditerranéen est associé à un risque plus faible de troubles gastro-intestinaux fonctionnels.

**Objectifs :** La présente étude visait à évaluer la relation entre la constipation fonctionnelle et l'observance du régime méditerranéen chez des enfants turcs âgés de 6 à 18 ans.

**Méthodes :** Dans cette étude cas-témoins, 221 enfants souffrant de constipation fonctionnelle (cas) ont été sélectionnés dans une clinique de gastro-entérologie pédiatrique entre mai 2018 et septembre 2019. En outre, 230 enfants sans constipation (témoins) ont été sélectionnés aléatoirement parmi ceux qui effectuaient une visite de contrôle. Les cas et les témoins étaient appariés sur la base du sexe, de l'âge et des caractéristiques socio-économiques. L'observance du régime méditerranéen a été évaluée à l'aide du score KIDMED. Une analyse de régression logistique multivariée a été utilisée pour analyser les données.

**Résultats :** Les scores KIDMED chez les cas et les témoins étaient de 4,0 (écart type (ET) 2,5) et 6,3 (ET 2,4), respectivement ( $p < 0,001$ ). Les odds ratios pour la constipation fonctionnelle étaient de 0,23 (intervalle de confiance (IC) à 95 % : 0,13-0,38) pour le score KIDMED 4-7 et de 0,05 (IC à 95 % : 0,03-0,11) pour le score supérieur ou égal à 8 par rapport à la catégorie la plus faible (score  $\leq 3$  ;  $p < 0,001$ ). Une corrélation négative a été observée entre l'âge et l'observance du régime méditerranéen.

**Conclusion :** Une bonne observance du régime méditerranéen était associée à un risque plus faible de constipation fonctionnelle, et cette observance diminuait avec l'âge. L'éducation nutritionnelle et sanitaire est nécessaire pour aider à maintenir et à améliorer la santé des jeunes en Turquie.

### الالتزام بالنظام الغذائي المتوسطي، وخطر الإصابة بالإمساك الوظيفي لدى الأطفال في تركيا: دراسة حالات فردية مقترنة بحالات ضابطة

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#### الخلاصة

**الخلفية:** يُلاحظ الإمساك الوظيفي عادةً في الأطفال، وهو ما يؤثر على جودة الحياة، ويفرض عبئاً كبيراً على خدمات الرعاية الصحية. ويرتبط النظام الغذائي المتوسطي بمخاطر أقل من حيث الاضطرابات المعدية المعوية الوظيفية.

**الأهداف:** هدفت هذه الدراسة إلى تقييم العلاقة بين الإمساك الوظيفي والالتزام بالنظام الغذائي المتوسطي بين الأطفال الأتراك الذين تتراوح أعمارهم بين 6 و18 عاماً.

**طرق البحث:** في هذه الدراسة، اختبر 221 طفلاً مصاباً بإمساك وظيفي (الحالات) من إحدى عيادات الأطفال للأمراض المعدية المعوية في الفترة بين مايو/ أيار 2018 وسبتمبر/ أيلول 2019، واختبر عشوائياً 230 طفلاً غير مصاب بالإمساك (الحالات الضابطة) من بين الأطفال الأصحاء الذين يجرون فحصاً. وقورنت الحالات والحالات الضابطة بناءً على نوع الجنس والعمر والخصائص الاجتماعية والاقتصادية. وقيم الالتزام بالنظام الغذائي المتوسطي باستخدام درجة مؤشر جودة النظام الغذائي المتوسطي. واستُخدم أيضاً تحليل الانحدار اللوجستي المتعدد المتغيرات لتحليل البيانات.

**النتائج:** كانت درجات مؤشر جودة النظام الغذائي المتوسطي في الحالات والحالات الضابطة 4.0 (بانحراف معياري 2.5) و6.3 (بانحراف معياري 2.4)، على التوالي (القيمة الاحتمالية  $> 0.001$ ). وكانت نسب الأرجحية للإمساك الوظيفي 0.23 (بفاصل ثقة 95%: 0.13-0.38) لدرجات مؤشر جودة النظام الغذائي المتوسطي (KIDMED) التي تتراوح بين 4-7، و0.05 (بفاصل ثقة 95%: 0.03-0.11) للدرجات  $\geq 8$ ، مقارنة بأدنى فئة (الدرجة  $\geq 3$ ؛ القيمة الاحتمالية  $> 0.001$ ). ولوحظ أن هناك ارتباطاً سلبياً بين العمر والالتزام بالنظام الغذائي المتوسطي.

**الاستنتاجات:** ارتبط الالتزام الجيد بالنظام الغذائي المتوسطي بانخفاض خطر الإصابة بالإمساك الوظيفي، ولكن انخفاض الالتزام بالنظام الغذائي المتوسطي مع تقدم العمر. وهناك حاجة إلى التثقيف بشأن التغذية والصحة للمساعدة في الحفاظ على صحة الشباب في تركيا وتحسينها.

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