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Relationship between nutrition and periodontitis in the Turkish population: a pilot study

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ABSTRACT

Aims: Periodontitis is a chronic, multifactorial inflammatory disease affecting the tooth-supporting structures and is influenced by lifestyle-related risk factors, including nutrition. This pilot study aimed to evaluate the relationship between nutritional and periodontal status of Turkish population using the Mini Nutritional Assessment® (MNA) tool.

Methods: A total of 50 systemically healthy, non-smoking individuals were enrolled, of whom 25 were periodontally healthy, and 25 had periodontitis. Participants underwent full-mouth periodontal examinations. Nutritional status was assessed using the MNA questionnaire, individuals were categorized as having normal nutrition, being at risk of malnutrition, or malnourished. Statistical analyses were performed using tests appropriate to data distribution, including T tests, Mann-Whitney U, Kruskal-Wallis H, Chi-square, and Fisher's exact tests, with normality assessed via Shapiro-Wilk, histograms, skewness, and kurtosis.

Results: 56% of the participants had normal nutritional status, while 44% were at risk of malnutrition. A higher percentage of individuals at risk were observed in the periodontitis group (52%) compared to the control group (36%), though the difference was not statistically significant. Daily intake of dairy products (p=0.235) and meat/fish/poultry (p=0.345) were more common in the control group, while fruit and vegetable (p=0.762) consumption were more in periodontitis group. Notably, 69.6% of participants who perceived their nutrition as adequate were in the control group, compared to only 30.4% in the periodontitis group (p=0.028), suggesting a link between perceived nutrition quality and periodontal health. Although no significant differences in clinical periodontal parameters were observed based on specific dietary components or MNA scores, the overall trend suggested that individuals with better nutritional status had healthier periodontal conditions.

Conclusion: This study highlights the potential role of nutrition, particularly the intake of animal proteins and dairy products, in maintaining periodontal health. The MNA tool may serve as a valuable adjunct for determining the nutritional status and integrating dietary evaluation into personalized periodontal care. Further large-scale, multi-center studies incorporating biochemical markers and gender-specific analyses are recommended to validate and build upon these findings.

Keywords: Periodontitis, nutrition, MNA score, Turkish population

INTRODUCTION

Periodontitis is a chronic inflammatory condition of the tooth-supporting tissues and has progressive characteristics. If left untreated, periodontitis can lead to tooth loss in susceptible individuals. An imbalance between microbial dental biofilm and the host response initiates the disease;[1] but periodontitis is a multifactorial disease in which several risk factors have been identified to modify its progression rate. Smoking and diabetes are well-established risk factors associated with periodontitis; however, other conditions such as genetic dispositions, stress, socioeconomic status and nutrition are thought to be important in disease progression.[2]

A balanced diet is necessary to maintain the periodontal health; nutrients are categorized as macronutrients and micronutrients that affect the inflammatory status of individuals. For example, a diet rich in refined carbohydrates and saturated fat leads to the formation of excess reactive oxygen species (ROS) which overwhelms the antioxidant defense mechanism and causes high oxidative stress.[3] Oxidative stress plays an important role in the onset and progression of periodontal disease, and in the relationship between the periodontal diseases and systemic disorders.[4] On the other hand, antioxidants attenuate the tissue damage caused by ROS; therefore, foods rich in natural antioxidants are recommended as adjunctive supplements in the prevention and treatment of periodontitis.[5] Studies have shown that high-glycemic index foods increase the risk of periodontal disease while a complex-carbohydrate diet reduces it.[6] Similarly, micronutrients deficiency is closely associated with the increased severity of periodontitis.[7,8]

Thus, it has become necessary to develop systemic and standardized tools to determine the nutritional status of patients. These tools should be easy to use, fast, validated, standardized, and economical.[9] Mini Nutritional Assessment®

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(MNA; Nestle Nutrition, Vevey, Switzerland) was initially developed in the early 1990s to screen the nutritional status of the elderly population. MNA is a rapid, easily performed tool developed in 4 categories including; anthropometric measurements (body mass index calculated from weight and height, weight loss, arm and calf circumferences), general assessment (lifestyle, medication, mobility, and presence of signs of depressions or dementia) dietary assessment (number of meals, food and fluid intake) and subjective assessment (self-perception of health and nutrition). The MNA test shows 96% sensitivity and 98% specificity and it takes less than 15 minutes to complete the test.[10,11]

The nutritional habits of the Turkish population have been shown in various studies,[12,13] but there is no study evaluating the effect of nutrition on periodontal disease. Previously, the dietary approach to stop hypertension (DASH) and Mediterranean diet have been used to investigate the effect of nutritional habits on the development of periodontitis in northern population, particularly in Hamburg, Germany. The results showed that adherence to a high DASH and Mediterranean diet significantly reduced the risk of periodontitis.[14] In this study, we tested the hypothesis that nutrition status and periodontal status are inversely related. We aimed to determine the nutritional status of the patients using MNA tool and analyze its effect on the prevalence of periodontitis.

METHODS

Study Population

A total of 50 individuals aged between 30 and 50, who applied to İstinye Dent Hospital between November 2024 and February 2025 were included in this study. The study was approved by the İstinye University Human Researches Ethics Committee (Date: 22.11.2024, Decision No: 2024/10-24-250), and was conducted in full accordance with the ethical principles including the World Medical Association's Declaration of Helsinki. Study principles were explained to all participants, and written informed consent was obtained.

Detailed medical and dental histories were taken from each participant. Exclusion criteria were as follows: 1) having systemic/immunosuppressive disease 2) having used medications such as immunosuppressive agents, anti-inflammatory drugs or antibiotics within the last 6 months 3) having received periodontal treatment in the last 6 months 4) currently smoking/stopped smoking in the last 6 months 5) pregnant/ breastfeeding women 6) having used vitamin/ nutritional supplement.

Subjects were selected from systemically healthy, non-smoker individuals (or those who had quit smoking 6 months ago) who had never used vitamin or nutritional supplement. Participants were equally divided into two groups 1) Control (n=25) 2) Periodontitis (n=25) according to the diagnostic criteria proposed by the 2017 International Workshop on the Classification of Periodontal and Peri-implant Diseases and Conditions.[2] The control group consisted of participants with ≤10% BOP of (+) and ≤3 mm PD on intact periodontium. Participants having interdental clinical attachment loss (iCAL) at least two non-adjacent teeth were considered to have periodontitis. Generalized stage III, grade B patients were included in the periodontitis group. Stage III periodontitis patients had iCAL >5 mm at least 4 teeth due to periodontitis with radiographic bone loss reaching to the mid-third of the root or beyond. Patients were graded according to the bone loss (%)/age index (grade B, 0.25-1.00).[2]

Whole mouth clinical periodontal examination was performed with the single examiner (FO). Plaque Index (PI), bleeding on probing (BOP), probing depth (PD), and CAL were measured on six surfaces (mesio-buccal, buccal, disto-buccal, mesio-lingual/palatinal, lingual/palatinal, disto-lingual/palatinal) of each tooth except third molars using periodontal probe (William`s periodontal probe, Hu Friedy, Chicago, IL). Panoramic radiographs were used to detect the alveolar bone loss.

Nutritional Assessment

Nutritional assessment was analyzed using the MNA tool. The "user agreement special terms" was signed between the Mapi Research Trust and the user before starting the study. Participants were asked to fill the questionnaire following periodontal intervention. Participants` body-mass index (BMI), mid-arm and calf measurements were recorded and scored according to the tool. Then, participants answered a total of 12 questions in different categories; 1) General lifestyle/medical/psychological questions; 2) Specific dietary components and daily/weekly food consumption; 3) Self-nutrition/health assessment. Each question has a score written in bold. The total score for each patient was calculated by adding scores from each question with the scores received from the measurements and BMI. Patients were divided into three categories: those with a total score of less than 17 points were considered as malnourished, 17-23.5 points meant they were at risk for malnutrition and those with a score of more than 23.5 were considered to have normal nutritional status.[15]

Statistical Analysis

The sample size was determined by one-way ANOVA test using the G*power 3.1 Software Package based on the previous studies.[15] When the effect size was taken as f=0.973, it was calculated that at least 21 participants should be included in each group with a confidence interval of 95% at 80% power. Data were analyzed using IBM SPSS Statistics version 26. Descriptive statistics, including mean, standard deviation, minimum, and maximum values, were used to summarize the data. The normality of the data distribution was assessed using the Shapiro-Wilk test, as well as histogram plots, skewness, and kurtosis values. To compare independent groups, appropriate tests were selected based on the distribution of the data. For normally distributed variables, the independent samples t-test was used, while the Mann-Whitney U and Kruskal-Wallis H tests were applied for non-normally distributed variables. Categorical variables such as responses to MNA, dairy milk, meat/fish/poultry, fruit/vegetable, and self-nutrition were analyzed by group using the Chi-square test and Fisher's exact test where applicable.

RESULTS

Table 1 shows the demographic characteristics of the participants. 46% of the subjects were female (48% in control, groups 44% in periodontitis) and 54% were male (52% in control, groups 56% in periodontitis). Mean age of the participants was 35.16 (±6.09) and 38.24 (±7.87) in control and periodontitis groups, respectively. There was no significant difference in terms of age and gender between the control and periodontitis groups (p=0.343 and p=0.777, respectively). Table 2 shows the clinical periodontal parameters. PI, BOP, PD, and CAL were significantly more in periodontitis group compared to the control group (p<0.05).

Table 1. Demographic parameters

	Control		Periodontitis	
	n	%	n	%
Female	11	44.0	12	48.0
Male	14	56.0	13	52.0
Age	35.16±6.09		38.24±7.87	

Chi-square test was performed to compare the age and gender in control and periodontitis groups, p=0.343 for age, p=0.777 for gender

Table 2. Clinical periodontal parameters

		Mean	SD	p
PI	Control	1.3	0.2	.000
	Periodontitis	2.8	0.5	
BOP%	Control	12.08	4.16	.000
	Periodontitis	38.92	12.32	
PD	Control	2.43	.41	.000
	Periodontitis	5.54	1.01	
CAL	Control	2.58	.39	.000
	Periodontitis	6.01	.91	

PI: Plaque Index, BOP: Bleeding on probing, PD: Pocket depth, CAL: Clinical attachment loss, SD: Standard deviation
The independent t-test was used to compare the PI, PD and CAL values; Mann Whitney U test was performed to compare the BOP between control and periodontitis groups.

Table 3 shows the distribution of MNA scores of the participants. According to the MNA scores, 56% of the overall subjects had a MNA score higher than 23.5, therefore they were accepted as normal nutritional status; however, the MNA score of the remaining 44% were between 17 and 23.5. These patients were categorized as at risk of malnutrition. Difference was observed between the control and periodontitis groups; while the risk of malnutrition in the periodontitis group was 52%, this rate was 36% in the control group. The normal nutrition status rate was 64% in control group, with being higher than the periodontitis group which was 48%.

Table 3. Distribution of participants` MNA score in the control and periodontitis groups

	Total		Control		Periodontitis	
	n	%	n	%	n	%
17-23.5	22	44	9	36	13	52
>23.5	28	56	16	64	12	48

The responses to specific questions in the assessment tool were then analyzed to further assess participants` dietary habits. Table 4 shows the distribution of the meat/fish/poultry and dairy product (milk/cheese/yogurt) intake, and vegetable/fruit consumption in control and periodontitis groups. Participants were also asked to self-assess their dietary habits as inadequate, no idea, and adequate. The data showed that 94% of the participants consume dairy product daily. All individuals in the control group consume dairy products, while this rate was 88% in the periodontitis group. Overall animal protein consumption was reported as 72%; while this rate was 80% and 64% in control and periodontitis groups, respectively. The rate of those who did not consume meat, fish or chicken was higher in the periodontitis group (36%). Only 32% of the participants stated that they consume vegetables and fruits more than twice a day. This rate was slightly higher in the periodontitis group (36%) compared to the control group (32%). While 46% of the participants found their nutrition adequate, 24% found it inadequate and 30% had no opinion on this issue. The rate of those who find their nutrition adequate in the control group was 64%, while this rate was only 28% in the periodontitis group.

Table 4. Distribution of participants` dairy product, meat/fish/poultry, fruit/vegetable consuming, and self-nutrition assessment responses in the control and periodontitis groups

		Total		Control		Periodontitis	
		n	%	n	%	n	%
Dairy milk	Yes	47	94	25	100	22	88
	No	3	6	-	-	3	12
Meat/fish/poultry	Yes	36	72	20	80	16	64
	No	14	28	5	20	9	36
Fruit/vegetable	Yes	16	32	7	28	9	36
	No	34	68	18	72	16	64
Self nutrition assessment	Inadequate	12	24	9	36	3	12
	No idea	15	30	9	36	6	24
	Adequate	23	46	7	28	16	64

Table 5 shows the comparison of MNA scores; consumption of dairy product, meat/fish/poultry, fruit/vegetable consuming; and self-nutrition assessment responses by the control and periodontitis groups. The results showed that 57.1% of participants with good nutritional status were in the control group; which was more than the periodontitis group (p=0.393). Patients who consumed meat/fish/poultry and dairy products were slightly more in the control group than in the periodontitis group (p=0.345 and p=0.235, respectively). On the other hand, fruit/vegetable consumption was more frequent in periodontitis group than in the control group (p=0.762). Participants who answered "adequate" to the self-nutrition assessment question were significantly more in the control group than in the periodontitis group (p=0.028). Table 6 shows the results of PI, BOP, PD, and CAL measurements in response to MNA scores; dairy product, meat/fish/poultry, fruit/vegetable consuming; and self-nutrition assessment results in control and periodontitis groups. No significant

differences were observed in clinical periodontal parameters depending on the variables in both groups.

DISCUSSION

Periodontitis is the 6th most prevalent non-communicable disease globally, with its incidence rising alongside increased life expectancy. Incidence and prevalence of periodontitis show variations between regions and countries.[16] In Turkiye, it has been shown that 61.9% of the population have periodontitis, with 16.8% suffering from severe cases,[17] higher than the global rate of the advanced periodontitis which stands at 11%.[16] Multifactorial etiology of the periodontitis leads to emerge "personalized periodontics" treatment approaches rather than the "one size fits all" treatment models. This emerging approach, emphasizes the identification of individual risk factors that compromise dental health, particularly in complex and severe cases; allowing for targeted preventive strategies in conjunction with conventional periodontal therapies.[18]

Among these strategies, dietary modification represents a simple yet effective way to provide benefits in the long term, not only for periodontal health but also for overall health. Before implementing dietary recommendations on individual basis, it is essential to understand the general dietary patterns within populations and their association with periodontal diseases. Dietary habits of populations are shaped by various factors including politics, religion, historical context, and cultural traditions. To determine the health status, or nutrition status such as in this study, by self-reported questionnaire, cross-cultural differences should be considered to ensure accurate translation and cultural relevance.[19] Therefore, in this pilot study, it is aimed to assess the relationship between the nutritional and the periodontal status within the Turkish population using the MNA tool. The results showed that individuals with better nutritional status and a more positive perception of their diet tended to have healthier periodontal conditions, however no significant differences in specific

Table 5. Comparison of MNA scores; dairy product, meat/fish/poultry, fruit/vegetable consuming; and self-nutrition assessment responses by the control and periodontitis groups

		MNA score*		Dairy product**		Meat/fish/poultry***		Fruit/vegetable#		Self-nutrition assessment##		
		17-23.5	>23.5	Yes	No	Yes	No	Yes	No	Ade	Ni	InAde
Control	n	9	16	25	0	20	5	7	18	16	6	3
	%	40.9	57.1	53.2	0	55.6	35.7	43.8	52.9	69.6	40	25
Periodontitis	n	13	12	22	3	16	9	9	16	7	9	9
	%	59.1	42,9	46.8	100	44.4	64.3	56.3	47.1	30.4	60	75
Total	n	22	28	47	3	36	14	16	34	23	15	12

Ade: Adequate, Ni: No idea, InAde: Inadequate, Fisher`s exact test was performed to examine the differences of MNA score, dairy product, meat/fish/poultry, and fruit/vegetable consumption; Chi-square test was performed to examine the difference of self-nutrition assessment in control and periodontitis groups. MNA: Mini Nutritional Assessment*
*X^2=1.29, SD=1, p=.39, **X^2=3.191, SD=1, p=.23, ***X^2=1.587, SD=1, p=.345, #X^2=.368, SD=1, p=.762, ##X^2=7.122, SD=2, p=.028

Table 6. Comparison of PI, BOP, PD, and CAL results in response to MNA scores, and dairy product, meat/fish/poultry, fruit/vegetable consuming, self-nutrition assessment results in control and periodontitis groups

		Control				Periodontitis			
		PI	BOP%	PD	CAL	PI	%BOP	PD	CAL
MNA	>23.5	1.1±0.4	12.63±3.96	2.46±0.38	2.6±0.37	2.94±0.23	42.42±11.41	5.72±0.94	6.11±0.98
	17-23.5	0.68±0.2	11.11±4.57	2.38±0.48	2.53±0.43	2.71±0.15	35.69±12.67	5.37±1.09	5.92±0.87
Dairy product	Yes	1.3±0.3	12.08±4.16	2.43±0.41	2.58±0.39	2.84±0.25	39.23±12.74	5.44±1.01	5.95±0.87
	No		-	-	-	2.61±0.28	36.67±1.41	6.23±0.87	6.4±1.31
Meat/fish/poultry	Yes	1.5±0.5	12.45±4.43	2.4±0.42	2.57±0.39	2.91±0.48	39.06±12.25	5.38±0.96	5.86±0.81
	No	1.2±0.9	10.6±2.7	2.56±0.38	2.62±0.41	2.24±0.21	38.67±13.18	5.81±1.11	6.28±1.06
Fruit/vegetable	Yes	1±0.3	13±3.06	2.41±0.43	2.54±0.43	2.74±0.57	39.89±15.51	5.37±0.99	6.03±0.82
	No	0.8±0.2	11.72±4.55	2.44±0.42	2.59±0.38	2.63±0.39	38.38±10.65	5.63±1.05	5.99±0.99
Self-nutrition assessment	Adequate	1.4±0.5	11.43±5.65	2.31±0.32	2.53±0.17	2.88±0.53	39.31±12.68	5.54±0.92	5.94±0.85
	No idea	1.6±0.3	13.22±3.63	2.53±0.37	2.64±0.41	2.94±0.74	41.5±10.6	6.2±0.86	6.4±1.04
	Inadequate	1.4±0.1	11.44±3.54	2.42±0.52	2.54±0.5	2.75±0.43	31.67±15.28	4.2±0.35	5.6±1.06

PI: Plaque Index, BOP: Bleeding on probing, PD: Pocket depth, CAL: Clinical attachment loss, MNA: Mini Nutritional Assessment*
Mann-Whitney U-test was performed to examine the PI, BOP%, PD, and CAL results in response to MNA scores, and dairy product, meat/fish/poultry, fruit/vegetable consuming; Kruskal-Wallis test was used to examine the PI, BOP%, PD, and CAL results in response to self-nutrition assessment in control and periodontitis groups.
In the control group;
MNA scores; PI (U(23)=60.500) (BOP% (U(23)=57.500), PD (U(23)=65.500), CAL(U(23)=65.500) p>0.05
Meat/fish/poultry consumption; PI (U(23)=37.000), BOP% (U(23) = 33.500), (PD (U(23) = 39.000), CAL (U(23)=44.000), p>0.05
Fruit/vegetable consumption; PI (U(23)=55.500), BOP% (U(23) = 52.500), PD (U(23)=62.000), CAL (U(23)=60.000), p>0.05
Self-nutrition assessment: PI (X^2=1.038), BOP% X^2=.938), PD (X^2=1.115), CAL (X^2=0.956), p>0.05
In the periodontitis group;
MNA scores; PI (U(23)=7.500), BOP% (U(23)=6.500), PD (U(23)=14.194), CAL(U(23)=17.318) p>0.05
Dairy product; PI (U(23)=21.000), BOP% (U(23)=30.000), PD (U(23)=18.000), CAL(U(23)=23.000)
p>0.05)
Meat/fish/poultry consumption; PI (U(23)=51.500), BOP% (U(23)=68.500), PD (U(23)=54.500), CAL (U(23)=52.000) p>0.05
Fruit/vegetable consumption; PI (U(23)=62.500), PD (U(23)=60.500), CAL(U(23)=69.000), BOP (%) (U(23)=67.000) p>0.05
Self-nutrition assessment: PI (X^2=1.61), BOP% (X^2=1.161) p>0.05, PD (X^2=7.264, p<.05), CAL(X^2=1.886) p>0.05

dietary components were observed between the groups. Based on these results, a validated questionnaire can be developed that incorporates both cultural and dietary variables. Such a tool could be instrumental in future population-based cohort studies aimed at investigating the role of diet in periodontal disease.

The MNA tool has previously been validated in Turkish,[20] and has been used to evaluate the impact of oral health on nutritional status of elderly populations. Previous data indicated that, 52.2% of the participants had a normal nutritional status while the remaining 44.2% and 3.6% were determined to be at risk of malnutrition and had malnutrition, respectively. The oral health impact profile was found to be a significant factor contributing to the increased risk of malnutrition.[21] Another study conducted in different region of Turkiye showed that 44% of the participants had normal nutrition status, and the rest 56% were either at risk of malnutrition or had malnutrition;[22] however, 34% of the participants were found to at risk of malnutrition.[23] It is important to note that differences in age and region are major factors influencing the nutritional status of populations; in this study, 56% of the overall subjects had normal nutritional status, and the remaining 44% were at risk of malnutrition. Notably, no cases of malnutrition were detected in this cohort. Although malnutrition is not exclusive to older people, it is more commonly observed at older ages due to factors such as reduced mobility, food intake and regenerative capacities.[21] Therefore, when the MNA is applied to the general, systemically healthy population extremely low MNA scores- and thus, evident malnutrition- are not typically expected.

Originally developed to assess nutrition status in older adults, the MNA has also been applied in younger individuals. High significant difference was observed in MNA scores between control and periodontitis groups, with lower scores reported in the periodontitis group among populations aged 30 to 70 years.[15] Consistent with these findings, in this study MNA scores were higher in the control group compared to those with periodontitis reinforcing the association between good nutritional status and periodontal health.

To further explore the impact of specific food groups on periodontal health, responses to individual dietary questions were analyzed. In this study, dairy products emerged as the most frequently consumed food group, followed by meat/fish/poultry and fruit/vegetables. A study conducted in another region of Turkiye also identified milk product as the most commonly consumed; but differing from results of this study fruit-vegetable intake were more than meat/poultry intake.[12] In current study total fruit and vegetable intake was relatively low, reported by only 32% of participants. 56.3% of those who did consume fruits and vegetables belong to the periodontitis group. Vitamin C is a key antioxidant reducing the pathologic effects of free radicals and reactive oxygen species. 90% of the daily vitamin C intake comes from fruit and vegetables where its deficiency is mainly caused by poor diet. The non-linear relationship has been observed between vitamin C and periodontitis; both low and excessively high vitamin C levels have been associated with increased the severity of periodontitis.[24] In this study only 36% of the participants reported consuming fruits and vegetables more than twice daily but on the contrast; fruit and vegetable consumption of the Turkish population has been found significantly more than other countries;[25] therefore, vitamin C might not be indicated as a predictable risk factor for periodontitis development.

Conversely, participants in the control group reported higher daily consumption of dairy products compared to those with periodontitis group. Dairy products are known as the best sources for calcium, which is prerequisite for alveolar bone homeostasis. Additionally, they provide essential nutrients such as protein, magnesium, potassium, zinc and phosphorus more than any other source.[26] These components play a central role in supporting periodontal health. Studies have shown that, frequent intakes of milk and dairy products decrease the periodontitis prevalence by 26% indicating the positive association between calcium intake and periodontal health.[27] Moreover, probiotic dairy products modify the oral microbiota with the beneficial species they contain and help to maintain the periodontal homeostasis.[26] In Turkish population, yogurt is the most frequently consumed dairy product followed by cheese and milk; overall dairy products constitute 47.1% of daily food intake.[28] In this study, 53.2% of the individuals who consumed at least one dairy product per day exhibited healthy periodontium; given the high frequency of dairy intake and its evident association with periodontitis. Lastly, a notable association was observed between perceived nutritional adequacy and periodontal status. Among participants who reported feeling adequately nourished, 69.6% belonged to the control group, compared to only 30.4% in periodontitis group which shows a strong connection between oral health and emotional well-being. It has also been shown that 50% of the gender-based food choice is affected from different views about health beliefs.[30] The relationship between fat and fat-free tissue composition, and periodontitis has been found different per sex. Only in women, higher adipose concentration was associated with increased risk of periodontitis.[30] Therefore, gender-based difference should be considered in future studies. For the proper validation of a tool like the MNA, it is recommended to include a sample size at least 5-6 times larger than the minimum required.[19]

Limitations

This study has several limitations. First, it was conducted at a single center; therefore, limits the generalizability of the findings to the broader Turkish population. Second, the sample size was relatively small. Additionally, the study relied solely on self-reported data, including biochemical parameters could have strengthened the findings. Another limitation is the lack of gender-specific analysis; differences in nutritional habits and hormonal factors between males and females could potentially influence the results. For example, female sex tends to accumulate more lipid due to estrogen hormone, on the other hand male sex is more associated with protein metabolism.

CONCLUSION

Overall, the findings of this pilot study show a positive association between good nutritional status and periodontal health. Regular consumption of dairy and meat/fish/poultry

products may support both the nutritional and periodontal health. The MNA tool, which takes 15 minutes to complete and does not require any extra cost, can be easily applied to the patients in university hospitals, general hospitals, and private practices by specialists, general dentists and dental students. It can immediately provide feedback to the patients about their nutritional status and its possible impact on periodontal health. Based on the outcomes of this pilot study, a more comprehensive tool can be developed incorporating cultural factors and dietary influences to further develop population-based cohort studies on periodontal health.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of the İstinye University Human Researches Ethics Committee (Date: 22.11.2024, Decision No: 2024/10-24-250).

Informed Consent

All patients signed and free and informed consent form.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

1. Hajishengallis G. Periodontitis: from microbial immune subversion to systemic inflammation. *Nat Rev Immunol*. 2015;15(1):30-44. doi:10.1038/nri3785
2. Tonetti MS, Greenwell H, Kornman KS. Staging and grading of periodontitis: framework and proposal of a new classification and case definition. *J Periodontol*. 2018;89(Suppl 1):S159-S172. doi:10.1002/JPER.18-0006
3. Chapple IL. Potential mechanisms underpinning the nutritional modulation of periodontal inflammation. *J Am Dent Assoc*. 2009;140(2):178-184. doi:10.14219/jada.archive.2009.0131
4. Sczepanik FSC, Grossi ML, Casati M, et al. Periodontitis is an inflammatory disease of oxidative stress: We should treat it that way. *Periodontol 2000*. 2020;84(1):45-68. doi:10.1111/prd.12342
5. Ritchie CS, Kinane DF. Nutrition, inflammation, and periodontal disease. *Nutrition*. 2003;19(5):475-476. doi:10.1016/s0899-9007(02)01043-2
6. Dattani V, Patel H, Ahmad R, et al. Aspects of nutriment in maintaining gum wellbeing: a literature review. *J Appl Pharmaceut Sci*. 2024;14(9):76-97.
7. Amaliya, Timmerman MF, Abbas F, et al. Java project on periodontal diseases: the relationship between vitamin C and the severity of periodontitis. *J Clin Periodontol*. 2007;34(4):299-304. doi:10.1111/j.1600-051X.2007.01053.x
8. Luo PP, Xu HS, Chen YW, Wu SP. Periodontal disease severity is associated with micronutrient intake. *Aust Dent J*. 2018;63(2):193-201. doi:10.1111/adj.12606
9. Reber E, Gomes F, Vasiloglou MF, Schuetz P, Stanga Z. Nutritional risk screening and assessment. *J Clin Med*. 2019;8(7):1065. doi:10.3390/jcm8071065
10. Guigoz Y. The Mini Nutritional Assessment (MNA) review of the literature-what does it tell us? *J Nutr Health Aging*. 2006;10(6):466-485.
11. Bauer JM, Kaiser MJ, Anthony P, Guigoz Y, Sieber CC. The Mini Nutritional Assessment-its history, today's practice, and future perspectives. *Nutr Clin Pract*. 2008;23(4):388-396. doi:10.1177/0884533608321132
12. Hoşcan Y, Yiğit F, Müderrisoğlu H. Adherence to Mediterranean diet and its relation with cardiovascular diseases in Turkish population. *Int J Clin Exp Med*. 2015;8(2):2860-2866.
13. Buyukuslu N, Hizli H, Esin K, Garipagaoglu M. A cross-sectional study: nutritional polyamines in frequently consumed foods of the Turkish population. *Foods*. 2014;3(4):541-557. doi:10.3390/foods3040541
14. Altun E, Walther C, Borof K, et al. Association between dietary pattern and periodontitis-a cross-sectional study. *Nutrients*. 2021;13(11):4167. doi:10.3390/nu13114167
15. Bhatsange A, Kamble SP. Assessment of nutritional status in chronic periodontitis patients: a cross-sectional study. *J Indian Soc Periodontol*. 2024;28(2):231-243. doi:10.4103/jisp.jisp_263_23
16. Kassebaum NJ, Bernabé E, Dahiya M, Bhandari B, Murray CJ, Marcenes W. Global burden of severe periodontitis in 1990-2010: a systematic review and meta-regression. *J Dent Res*. 2014;93(11):1045-1053. doi:10.1177/0022034514552491
17. Germen M, Baser U, Lacin CC, Fıratlı E, İşsever H, Yalcin F. Periodontitis prevalence, severity, and risk factors: a comparison of the AAP/CDC case definition and the EFP/AAP classification. *Int J Environ Res Public Health*. 2021;18(7):3459. doi:10.3390/ijerph18073459
18. Bartold PM. Lifestyle and periodontitis: the emergence of personalized periodontics. *Periodontol 2000*. 2018;78(1):7-11. doi:10.1111/prd.12237
19. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine (Phila Pa 1976)*. 2000;25(24):3186-3191. doi:10.1097/00007632-200012150-00014
20. Sarikaya D, Halil M, Kuyumcu ME, Kiliç MK, Yesil Y. A Validity Study of Long and Short (MNA-SF) Forms of Mini Nutritional Assessment (MNA) Test in Geriatric Patients. Presented in the 7th Academic Geriatrics Congress Abstract, Antalya, Turkiye, 2014.
21. Akın S, Kesim S, Manav TY, et al. Impact of oral health on nutritional status in community-dwelling older adults in Turkey. *Eur J Geriatric Gerontol* 2019;1(1):29-35. doi:10.4274/ejgg.galenos.2019.55
22. Nazan S, Buket K. Evaluation of nutritional status of elderly patients presenting to the family health center. *Pak J Med Sci*. 2018;34(2):446-451. doi:10.12669/pjms.342.14936
23. Ekici E, Vatansever N, Çolak M, Kozan EH. Validity and reliability of Turkish Self-Mini Nutritional Assessment Scale. *Elderly Health J*. 2021;7(1):32-38. doi:10.18502/ehj.v7i1.6549
24. Li W, Song J, Chen Z. The association between dietary vitamin C intake and periodontitis: result from the NHANES (2009-2014). *BMC Oral Health*. 2022;22(1):390. doi:10.1186/s12903-022-02416-7
25. Küçük N, Urak F, Bilgic A, Florkowski WJ, Kiani AK, Özdemir FN. Fruit and vegetable consumption across population segments: evidence from a national household survey. *J Health Popul Nutr*. 2023;42(1):54. doi:10.1186/s41043-023-00382-6
26. Farias da Cruz M, Baraúna Magno M, Alves Jural L, et al. Probiotics and dairy products in dentistry: a bibliometric and critical review of randomized clinical trials. *Food Res Int*. 2022;157:111228. doi:10.1016/j.foodres.2022.111228
27. Lee K, Kim J. Dairy Food Consumption is inversely associated with the prevalence of periodontal disease in Korean adults. *Nutrients*. 2019;11(5):1035. doi:10.3390/nu11051035
28. Buyukuslu N, Hizli H, Esin K, Garipagaoglu M. A cross-sectional study: nutritional polyamines in frequently consumed foods of the Turkish population. *Foods*. 2014;3(4):541-557. doi:10.3390/foods3040541
29. Grzymisławska M, Puch EA, Zawada A, Grzymisławski M. Do nutritional behaviors depend on biological sex and cultural gender? *Adv Clin Exp Med*. 2020;29(1):165-172. doi:10.17219/acem/111817
30. Zhu P, Li A, Cai Q, et al. Sex differences in the association between dual-energy X-Ray absorptiometry-measured body composition and periodontitis. *J Periodontol*. 2024;95(3):219-232. doi:10.1002/JPER.23-0162