THE ASSOCIATION BETWEEN LIFESTYLE AND PERIODONTAL HEALTH

ПОВРЗАНОСТА ПОМЕЃУ НАЧИНОТ НА ЖИВОТ И ПАРОДОНТАЛНОТО ЗДРАВЈЕ

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Abstract

Introduction: It is well known that microorganisms from dental plaque, immunological and genetic factors play a significant role in the etiology of periodontal disease. However, the influence of lifestyle and psychological factors as risk factors for periodontal disease is also mentioned in the literature. Periodontal disease is associated with cigarette smoking, alcohol consumption and physical activity. **Aim of the study:** To determine the relationship between lifestyle and periodontal health. **Material and methods:** A cross-sectional epidemiological study was conducted over a period of 3 months at the Clinic for Oral and Periodontal Diseases at UDCC „St. Panteleimon" in Skopje, as well as in three other private dental institutions. The study included 420 subjects who came for dental examination and treatment. A lifestyle questionnaire was administered to them, and the following clinical parameters were recorded: Loe and Silness index of gingival inflammation, Silness-Loe dental plaque index, Ramfjord index, depth of periodontal pockets; clinical attachment loss and number of extracted teeth. The collected data were statistically analyzed using Chi-square and Mann-Whitney U tests in SPSS Statistica 20 for Windows. A confidence interval (CI) p<0.05 was considered significant. The results were tabulated. **Results:** We registered a statistically significant association between lifestyle and the Ramfjord index (Pearson Chi-square: 50.2193, p=0.000000). During the study, we registered higher average values of the number of extracted teeth, dental plaque index, gingival inflammation index, depth of periodontal pockets, and the clinical attachment loss in subjects with unhealthy lifestyle compared to those with a healthy lifestyle. According to the Mann-Whitney U test, the observed difference was found to be statistically significant for p<0.05. **Conclusion:** Lifestyle factors such as cigarette smoking, alcohol consumption, physical activity and diet type, play a significant role not only in the occurrence and progression of periodontal diseasebut also in the prognosis and treatment planning of this disease. **Key words:** lifestyle, alcohol, cigarettes, physical activity, periodontal health.

Апстракт

Вовед: Добро е познато дека микроорганизмите од денталниот плак, имунолошките и генетските фактори имаат значајна улога во етиологијата на пародонталната болест, но, сепак во литературата се спомнува и влијанието на начинот на живот и на психичките фактори како фактори на ризик за пародонтопатија. Пародонталната болест се поврзува со пушењето на цигари, конзумирањето на алкохолни пијалоци и физичката активност. **Цел на трудот:** Да се утврди поврзаноста помеѓу начинот на живот и пародонталното здравје. **Материјал и методи:** На Клиниката за болести на устата и пародонтот при УСКЦ „Св. Пантелејмон" во Скопје, како и во други три приватни стоматолошки установи, беше спроведена епидемиолошка студија на пресек, во период од 3 месеци. Во студијата беа вклучени 420 испитаници кои доаѓаа за стоматолошки преглед и третман. Кај нивбеше спроведен прашалник за начинот на живот и беа нотирани следниве клинички параметри: индекс на гингивална инфламација Loe и Silness; индекс на дентален плак по Silness-Loe; индекс на Ramfjord; длабочината на пародонталните џебови; клиничкиот губиток на припојот; бројот на екстрахирани заби. Колекционираните податоци беа статистички обработени во SPSS Statistica 20 for Windows, со користење на Хи-квадрат и Mann-Whitney U тестовите. За confidence interval (CI) беше земено p<0.05. Резултатите беа прикажани табеларно. **Резултати:** Регистриравме статистички сигнификантна асоцијација помеѓу начинот на живот и индексот на Ramfjord (Pearson Chi-square: 50.2193, p=0.000000).Во текот на истражувањето регистриравме повисоки просечни вредности на бројот на екстрахирани заби, на индексот на дентален плак, на индексот на гингивална инфламација, на длабочината на пародонталните џебови и на клиничкото губење на припојот, кај испитаниците кои имаат нездрав начин на живот во споредба со испитаниците кои имаат здрав начин на живот. Според Mann-Whitney U тест, разликата која се регистрира е статистички сигнификантна за p<0.05. **Заклучок:** Начинот на живот, односно, пушењето на цигари, конзумирањето на алкохол, физичката активност и типот на исхрана, имаат значајна улога не само во настанувањето и прогресијата на пародонталната болест, туку и во прогнозата и планот на терапија на ова заболување. **Клучни зборови:** Начин на живот, алкохол, цигари, физичка активност, пародонтално здравје.

Introduction

Chronic periodontitis is an inflammatory disease affecting the supporting structure of the teeth. It is primarily caused by bacteria present in the supragingival and subgingival biofilm. The bacterial products lead to the destruction of periodontal connective tissue and alveolar bone. If left untreated, this disease can result in

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premature tooth loss for many individuals. Moreover, periodontal disease has long-term consequences on general health. The disease can be a risk for type 2 diabetes, certain metabolic syndromes, cardiovascular diseases, premature delivery and lower birth weight in infants.

The etiology of periodontal disease is multi factorial, with numerous risk factors associated with its development. In addition to inadequate oral hygiene, smoking, age, diabetes and socio-economic status of the individual have been indicated as potential risk factors for the initiation and progression of periodontal disease.

A large number of epidemiological studies[1-9] have highlighted the prevalence of periodontal diseases in a significant portion of the population. While it is well established that microorganisms from dental plaque, immunological and genetic factors play a significant role in the etiology of periodontal disease, these studies also emphasize the influence of lifestyle and psychological factors as risk factors for periodontal disease[10]. Research has shown an association between periodontal disease and cigarette smoking, consumption of alcoholic beverages, and physical activity[11].

The association between a healthy lifestyle and overall health has been emphasized in several studies[12-16]. These studies have shown that individuals who maintain a healthy lifestyle experience fewer issues with their teeth and gums compared to individuals who lead an unhealthy lifestyle. Rupasree and Vijay[17] demonstrated a positive correlation between lifestyle and periodontal condition in their study. Similar results were obtained by Rajala et al.[11], indicating a positive association between dental health and healthy lifestyle indicators. Individuals with an unhealthy lifestyle have a poorer condition of their periodontal tissues due to lack of regular tooth brushing and the detrimental effects of smoking, which is a very common habit among them. According to Revicki et al.[18], smokers can be considered as leading an unhealthy lifestyle. Therefore, the association between smoking and periodontal disease is not solely attributed to poorer oral hygiene in smokers, but also to their overall unhealthy lifestyle.

In neighboring countries, Pejcic et al.[19] conducted a study indicating a higher prevalence of periodontal disease among individuals with higher body weight. Their findings suggest that lifestyle factors influence the condition of the periodontium. Specifically, patients with periodontal disease had elevated lipoprotein concentrations, engaged in less physical activity, and had lower socio-economic status.

Considering the literature indicating the influence of lifestyle on periodontal health, the aim of our research was to determine the relationship between lifestyle and periodontal health.

Materials and method

To achieve the set objective, an epidemiological cross-sectional study was conducted at the Clinic for Oral and Periodontal Diseases at UDCC „St. Panteleimon" in Skopje, as well as in three other private dental institutions located in the neighborhoods of Chair and Shuto Orizari. The study was conducted over a period of 3 months, specifically - March, April and May, 2013. The study included patients who visited the Clinic and private dental facilities for examination and treatment. Patients of both sexes, regardless of their current periodontal status, were included in the study. The patients were randomly selected, and their informed consent was obtained for participation in the study. The following criteria had to be met for patients to be included in the research:

  - The patients had to be over 35 years of age;
  - The patients had to have more than 15 teeth present in their mouth;

  For all patients the following procedures were performed:

1. A survey was conducted[17], consisting of questions related to lifestyle. Based on their responses, the patients were divided into two categories: patients who lead a healthy lifestyle and patients who do not lead a healthy lifestyle.

2. The following indices were determined, including the Silness-Loe dental plaque index[20], the Loe and Silness gingival inflammation index[21], and the Ramfjord index[22].

3. Measurements of periodontal pocket depth and attachment loss were taken on the Ramfjord's group of teeth (16, 21, 24, 36, 41, 44) using a graduated periodontal probe.

4. The number of extracted teeth was recorded.

The collected data were statistically analyzed using Statistica 20 for Windows. The statistical tests employed for analysis included the Chi-square and Mann-Whitney U tests. A confidence interval (CI) of $p < 0.05$ was considered significant. The results of the analysis were tabulated.

Results

A total of 420 respondents participated in the study. Among them, 48.8% were male, and 51.2% were female (Table 1). The percentage difference between the sexes was not found to be statistically significant for $p > 0.05$, indicating that the study population was homogeneous in terms of gender.

Table 1. Distribution of respondents by gender

Sex	Number of respondents	%
Male	205	48.8
Female	215	51.2
Total	420	100.0

Table 2. Presentation of average age of the respondents in total, by gender and by age

Age	Number of respondents	Average	Min.	Max.	St.Dev.
Total	420	53.5	35.0	77.0	11.5
Male	205	53.2	35.0	77.0	11.9
Female	215	53.7	35.0	75.0	11.0

The average age of the respondents is 53.5 ± 11.5 years. The difference registered in the average age between male and female gender was not found to be statistically not significant for p>0.05 (Table 2).

Table 3. Distribution of respondents by smoking status

Smoking status	Number of respondents	%
Smoker	130	30.9
Non-smoker	290	69.1
Total	420	100.0

Table 3 shows the distribution of respondents according to smoking status. 69% of respondents are non-smokers and 31% are smokers.

Table 4. Distribution of respondents by alcohol consumption

Alcohol	Number of respondents	%
Heavy consumer	20	4.8
Moderate	118	28.1
Non-consumer	282	67.1
Total	420	100.0

67% of the respondents reported not consuming alcohol, while 28% were moderate consumers, consuming less than 7 drinks per week. Additionally, 5% of the respondents were classified as heavy consumers of alcohol, consuming more than 7 drinks per week (Table 4).

Table 5. Distribution of respondents by lifestyle

Lifestyle	Number of respondents	%
Unhealthy	223	53.1
Healthy	197	46.9
Total	420	100.0

According to respondents' answers to questions regarding their lifestyle, it was found that 53% of them reported living unhealthy lifestyles, while 47% reported living healthy lifestyles (Table 5).

Table 6. Distribution of respondents by lifestyle and Ramfjord index

Ramfjord	Unhealthy	Healthy	Total
1	4	2	6
2	3	19	22
3	0	7	7
4	65	85	150
5	132	84	216
6	19	0	19
Total	223	197	420

A statistically significant association was observed between Ramfjord's index and lifestyle (Pearson Chi-square: 50.2193, p=0.000000).

Table 7 shows the average values of dental plaque, gingival inflammation, periodontal pocket depth, clinical attachment loss and the number of extracted teeth in relation to lifestyle.

During the research, higher average values were recorded for the number of extracted teeth, the dental plaque index, the gingival inflammation index, the depth of periodontal pockets and the clinical attachment loss in subjects with an unhealthy lifestyle compared to those with a healthy lifestyle (Table 7). According to the

Table 7. Presentation of the average values of dental plaque, gingival inflammation, periodontal pocket depth, clinical attachment loss and number of extracted teeth in relation to lifestyle

Lifestyle/ Dental plaque	Average	Number of respondents	St.Dev.	Min.	Max.
Unhealthy	1.9	223	0.463521	1.0	3.0
Healthy	1.6	197	0.360432	1.0	2.6
Gingival inflammation					
Unhealthy	2.1	223	0.489736	1.0	3.0
Healthy	1.7	197	0.348014	1.1	2.5
Periodontal pocket depth					
Unhealthy	3.0	223	1.068049	1.4	8.0
Healthy	2.4	197	0.608216	1.5	4.16
Clinical attachment loss					
Unhealthy	4.1	223	1.586144	0.0	7.1
Healthy	3.0	197	1.628562	0.0	5.5
Number of extracted teeth					
Unhealthy	6.6	223	3.885881	0.0	14.
Healthy	3.8	197	3.162867	0.0	13.0

Table 8. Mann-Whitney U test plot between lifestyle and dental plaque, gingival inflammation, periodontal pocket depth, clinical attachment loss and number of extracted teeth

	Rank Sum	Rank Sum	U	Z	p-level
Dental plaque	32189.50	56220.50	12686.50	-7.47421	0.000000
Gingival inflammation	32024.50	56385.50	12521.50	-7.60712	0.000000
Periodontal pocket depth	32984.50	55425.50	13481.50	-6.83384	0.000000
Clinical attachment loss	33494.00	54916.00	13991.00	-6.42344	0.000000
Number of extracted teeth	32514.00	55896.00	13011.00	-7.21282	0.000000

Mann-Whitney U test, the difference registered between the two groups was found to be statistically significant for $p<0.05$ (Table 8).

Discussion

The term "lifestyle" is used to describe the conditions in which people live, their habits as well as their patterns (models) of behavior that are related to by he socio-cultural characteristics of the individual's living environment. An individual's lifestyle can be characterized as a pattern that is beneficial or harmful to health. Numerous studies, including the study of Wiley et al.[12] have confirmed the positive correlation between a healthy lifestyle and overall health, including dental health. It has also been confirmed that people who lead an active, healthy lifestyle have fewer problems with teeth and gingival/periodontal diseases.

Our research included a total of 420 subjects, with, 48.8% being male, and 51.2% female (Table 1). The difference in percentages between the sexes is statistically insignificant for p>0.05. The average age of the respondents was 53.5 ± 11.5 years. The difference that was registered in the average age between male and female gender is statistically insignificant for p>0.05 (Table 2). The absence of a significant difference between the gender and age of the respondents included in this study indicates that it is a homogeneous group.

In addition to alcohol consumption and cigarette smoking, nutrition and physical activity also play a role in an individual's lifestyle. Therefore, it is essential to include questions about diet and physical activity to determine whether an individual leads a healthy or unhealthy lifestyle. We believe that these factors influenced the results regarding the lifestyle of our respondents. Despite of the relatively low percentage of consumers of cigarettes (31%), and alcohol consumers (5%), the percentage of individuals with an unhealthy lifestyle is higher, amounting to 53% (Table 3, 4 and 5).

In order to assess the lifestyle of our respondents, a survey questionnaire was conducted in which, apart from smoking and alcohol, questions related to nutrition and physical activity were also included. By assigning appropriates cores to these parameters, a cumulative score was calculated to assess whether a particular respondent leads a healthy or unhealthy lifestyle. Our findings revealed a statistically significant association between lifestyle (unhealthy and healthy) and the Ramfjord index (Pearson Chi-square: 50.2193, p=0.000000).

Among respondents with an unhealthy lifestyle, 67.7% exhibited Ramfjord index values of 5 and 6, indicating a distance over 3mm from the enamel-cement junction to the bottom of the periodontal pocket. From the group of respondents who have a healthy lifestyle, 42.6% have an index value according to Ramfjord 5 (distance from the enamel-cement junction to the bottom of the periodontal pocket over 3mm). In contrast, among those respondents with a healthy lifestyle, we did not register a single respondent with the highest Ramfjord index value (Table 6). The percentage difference registered between respondents with Ramfjord index values 5 and 6, who had a healthy lifestyle, compared to respondents with the same Ramfjord index values who have an unhealthy lifestyle, was statistically significant for p=0.0000.

Table 7 provides the average values of dental plaque, gingival inflammation, periodontal pocket depth, clinical attachment loss and the number of extracted teeth in relation to lifestyle. Our study revealed significantly higher average values for the number of extracted teeth, dental plaque index, gingival inflammation index, the depth of periodontal pockets and the clinical attachment loss among subjects with an unhealthy lifestyle compared to subjects with a healthy lifestyle. According to the Mann-Whitney U test, the difference registered is statistically significant for p<0.05 (Table 8).

Our findings are consistent with the findings of Rupasree[17], Revicki[18] and Rajala[11]. The authors' research has confirmed an association between bad habits, unhealthy lifestyle and poorer periodontal health. In our study, we confirmed the association between alcohol and cigarette consumption and periodontal status. The detrimental effects of smoking on the periodontium have been extensively discussed. Individuals who consume a large amount of alcohol and cigarettes not only experience the direct harmful effects of these habits but also tend to have poorer oral hygiene habits. Consequently, a greater amount of bacterial bio film accumulates on the surface of the teeth. Furthermore, lifestyle choices, including dietary habits, play a significant role. Individuals who consume softer and less abrasive foods, tend to have higher amounts of dental plaque. On the other hand, the composition of the ingested nutrients also has an impact on periodontal health. If a sufficient amount of natural minerals and vitamins, which possessan antioxidant effect, is not included in the diet, it can negatively affect the reparative and regenerative processes of periodontal tissues. The harmful effects of free radicals in the pathogenesis of periodontal disease have been well-established. Based on our findings, we believe that the worse poorer clinical characteristics of periodontal disease in our respondents with an unhealthy lifestyle are due to the harmful effects of smoking and alcohol consumption, as well as the insufficient intake of natural antioxidants through the diet. Physical activity is inversely associated with periodontal disease in cross-sectional[23–27] and prospective studies[28]. Physical activity has been hypothesized to affect periodontal health by increasing insulin sensitivity[24,27,28] reducing inflammation[29], and reducing obesity[24,29]. Finally, physical activity could reduce stress which has also been associated with a higher prevalence of periodontitis[23,30].

Conclusion

The statistically significant higher representation of respondents with Ramfjord index values of 5 and 6 among respondents who have an unhealthy lifestyle, as well as the statistically significantly higher average values of the other parameters (number of extracted teeth, dental plaque index, gingival inflammation index, depth of periodontal pocket and clinical attachment loss) in subjects, indicate the influence of lifestyle on periodontal health.

Specifically, based on the data from the literature and the results of our research, we can conclude that the lifestyle factors, namely, cigarette smoking, alcohol consumption, physical activity and diet type, have a significant role not only in the occurrence and progression of periodontal disease but also in the prognosis and treatment planning for this disease.

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