



ARAŞTIRMA / RESEARCH

Is obesity a problem that threatens oral health in adults?

Obezite yetişkinlerde ağız sağlığını tehdit eden bir sorun mu?

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Cukurova Medical Journal 2021;46(3):1215-1221.

Abstract

Purpose: Obesity is one of the increasingly negative factors affecting oral and dental health directly or indirectly in many developed and developing countries. The aim of this study was to determine the relationship between obesity and dental problems in adults and to investigate the effect of obesity on oral and dental health.

Materials and Methods: 200 patients over the age of 18 who applied with various dental complaints were examined clinically and radiologically. They were classified as 50 healthy females, 50 healthy males, 50 obese females, and 50 obese males according to the body mass index determined by the World Health Organization (healthy individual < 30.0 kg / m² and 30.0 kg / m² ≤ obesity individual). Sociodemographic characteristics, dental health status, and data of all patients were examined.

Results: A statistically significant relationship was found between obesity and the number of tooth loss, the number of dental caries, educational status, and the frequency of applying to the dentist. Periodontitis was detected at a higher rate in the obesity group (58 %) compared to the control group, but the relationship between obesity and periodontal status was not statistically significant.

Conclusion: Dental problems such as tooth loss, the number of dental caries, and periodontitis were higher in the obesity group, and this result showed that obesity threatens oral and dental health. To prevent these problems, there is a need for preventive strategies and increasing awareness of oral and dental health in obese patients.

Keywords: Obesity, body mass index, oral health

Öz

Amaç: Obezite, birçok gelişmiş ve gelişmekte olan ülkede ağız ve diş sağlığını doğrudan veya dolaylı olarak etkileyen, giderek artan olumsuz faktörlerden biridir. Bu çalışmada yetişkinlerde obezite ile diş problemleri arasındaki ilişkinin belirlenmesi ve obezitenin ağız ve diş sağlığı üzerindeki etkisinin araştırılması amaçlanmıştır.

Gereç ve Yöntem: Çeşitli diş şikayetleri ile başvuran 18 yaş üstü 200 hasta klinik ve radyolojik olarak muayene edildi. Dünya Sağlık Örgütü'nün belirlediği vücut kitle indeksine göre 50 sağlıklı kadın, 50 sağlıklı erkek, 50 obez kadın ve 50 obez erkek (sağlıklı birey < 30.0 kg / m² ve 30.0 kg / m² ≤ obez birey) olarak sınıflandırıldı. Tüm hastaların sosyodemografik özellikleri, dental sağlık durumları ve bulguları incelendi.

Bulgular: Obezite ile diş kaybı sayısı, çürük diş sayısı, eğitim durumu ve diş hekimine başvuru sıklığı arasında istatistiksel olarak anlamlı fark vardı. Obezite grubunda (%58) kontrol grubuna göre daha yüksek oranda periodontitis saptandı, buna karşın obezite ve periodontal durum arasındaki ilişki istatistiksel olarak anlamlı değildi.

Sonuç: Diş kaybı sayısı, çürük sayısı, periodontitis gibi dental problemler obezite grubunda daha fazlaydı ve bu sonuç obezitenin ağız ve diş sağlığını tehdit ettiğini göstermiştir. Bu sorunları önlemek için obez hastalarda önleyici stratejilere ve ağız ve diş sağlığı konusunda farkındalıklarının artırılmasına ihtiyaç vardır.

Anahtar kelimeler: Obezite, vücut kitle indeksi, ağız sağlığı

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Geliş tarihi/Received: 09.06.2021 Kabul tarihi/Accepted: 14.07.2021 Çevrimiçi yayın/Published online: 23.07.2021

INTRODUCTION

World Health Organisation (WHO) defines 'Obesity' as abnormal or excessive fat accumulation that damages health, and individuals with a body mass index (BMI) of 30.0 kg / m² and above are diagnosed with obesity¹. Being overweight and excessive food consumption, which are among the main reasons, cause obesity to reach pandemic rates by affecting children and young people as well as adults. Nowadays, it is estimated that the global prevalence of obesity, which is one of the increasing factors affecting health negatively in many developed and developing countries, will reach 18% in males and 21% in females by 2025^{2,3}.

Albeit, there is a link between obesity and many systemic problems such as cardiovascular diseases, insulin resistance, hyperglycemia, hypertension, stroke, inflammation, gastroesophageal reflux, some types of cancer, obstructive sleep apnea, osteoarthritis, polycystic ovary syndrome, its effects in the oral region are still debated^{4,6}. The mechanism of this discussed relationship is based on the fact that obesity causes changes in the morphology of the salivary gland, which plays an important role in oral health, affects regular secretory activity, and causes alterations in components of saliva. These unfavorable changes in saliva flow negatively affect the protection of soft and hard tissues, resulting in dental caries, tooth loss, and pathological changes in oral tissues. In this respect, although obesity has a multifactorial etiology, it can be considered as a threat in terms of oral and dental health by preparing the environment for dental caries, xerostomia, and periodontal diseases on account of carbohydrate-based and high carbohydrate-calorie diet. Therefore, dentists should be aware of how nutrition can affect oral health and should make dental treatment plans for obese individuals in a way to reduce the problems that may arise related to this condition⁷.

In the systematic review of Suvan et al., it was stated that there was a link between BMI, obesity and periodontitis, obesity increases the risk of periodontal complications in individuals over the age of 18 and is a health problem that requires attention⁸. Furthermore, Roa and Del Sol reported that despite the multifactorial nature of dental caries, obesity leads to the progression of caries by affecting the dental remineralization process⁷. Meisel et al. found that the dental caries rate was 28.4% in males with BMI \geq 30 and 22.3% in females, and pointed to an increase in

caries in obese individuals. They also declared that there is a strong relationship between BMI increase and tooth loss, especially in males, and obesity may cause periodontal inflammation and associated multiple teeth loss by increasing systemic inflammatory mediators⁹.

To the best of our knowledge, although the researchers in the literature as mentioned before have tried to explain the relationship of obesity with pathologies such as dental caries and periodontal diseases in the oral cavity structures, they have not reached a definite consensus that it threatens oral health. For this reason, it is thought that our study will contribute to the evaluation of the effect of obesity on oral and dental health in adult female and male patients from the perspective of dentists.

MATERIALS AND METHODS

This study was approved by Baskent University Medical and Health Sciences Research Board on 13/01/2021 (Project number: D-KA 20/43), supported by Baskent University Research Fund, and complied with the Helsinki Declaration Principles. All likely patients provided signed informed consent before the commencement of patient assessments either themselves or legally charged deputies for procurement and interpretation of sociodemographic, dental, and medical records, dental X-ray data, and academic publications.

Sample

Medical and dental data of 200 patients over the age of 18 were obtained from the Institutional database maintained and updated by Baskent University Adana Research and Practice Hospital Oral and Dental Health Clinic between January 2018 and December 2020 and were retrospectively examined by an experienced dentomaxillofacial radiologist.

Procedure

According to the data identified by WHO, the BMI values found by dividing the weight by the square of the height were analyzed¹. All patients were first divided into two groups according to their BMI values, and then into two subgroups per their gender. Among these patients, 50 female and 50 male patients without systemic disease were accepted as healthy individuals because their BMI values were below 30.0 kg / m² according to WHO and they were included

in the control group (CG). Furthermore, BMI values of 50 female and 50 male patients were equal to or above 30.0 kg / m² and were included in the obesity group (OG). For sociodemographic characteristics, the educational status of the patients was grouped as primary school, high school, and university according to their final school grades from the general database. Frequency of applying to the dentist (none, once a year, twice a year), frequency of brushing teeth (none, once a day, twice a day), and smoking habits (yes or no) were obtained from dental data.

The dental database was determined by analyzing radiological data obtained with clinical and panoramic images (Veraviewepocs 2D, J. Morita, Japan). Except for the third molars, the number of tooth loss (0, 1-3, 4-6, 7 or more), the number of the tooth with an apical lesion that did not undergo endodontic treatment (0, 1-4), and the number of dental caries detected in enamel, dentin, and cementum (0, 1-3, 4-6, 7 or more) were noted. The diagnosis of healthy, gingivitis, and periodontitis in the clinical periodontal examination outcomes was recorded for periodontal status¹⁰.

Statistical analysis

SPSS (Version 25.0) program was used for analyzing the data, firstly the general profile of the study group was performed with descriptive statistics. The sociodemographic characteristics of 100 male and female patients, each in the CG and the OG, and the frequency (n) and percentiles (%) of dental evaluation results were examined. Also, Chi-square test was used to determine the relationship between sociodemographic characteristics (educational status, frequency of applying to the dentist, frequency of brushing teeth, and smoking) and dental status (number of tooth loss, number of dental caries, periodontal status, number of tooth with apical lesion) of the patients in the CG and the OG. In addition, independent sample t-test and ANOVA statistics were used to examine the differences between the sociodemographic characteristics and dental status of the CG and the OG participants, and it was revealed whether there were differences between the groups in terms of variables. The level of significance was determined as 0.05.

RESULTS

In this study, data of a total of 200 patients, including 100 patients (50 females, 50 males) in the CG and 100

patients (50 females, 50 males) in the OG, were analyzed. The mean age was 37.7 years (\pm 8.66) in the CG and 55.4 years (\pm 11.75) in the OG. Besides, systemic disease has been identified, including hypertension and/or diabetes (type 1 or type 2) in 40% of males in the OG and 28% of females.

The distribution of dental evaluation data of the CG and the OG (educational status, frequency of applying to the dentist, frequency of brushing teeth, smoking) are shown in Table 1. Both 56% of the females and 50% of the males in the CG, and 56% of the females and 74% of the males in the OG, the educational status of patients was mostly graduated from high school, and a statistically significant relationship was found between both groups and educational status ($p=0.008$).

All patients were examined in terms of the frequency of applying to the dentist, and it was determined that 50% of the females in the CG visited the dentist twice a year. It was determined that 46% of the males in the CG, 52% of the females, and 54% of the males in the OG did not apply to the dentist. A statistically significant correlation was found between the CG and the OG and the frequency of applying to the dentist ($p=0.002$).

When evaluated in terms of the frequency of brushing teeth, it was observed that 48% of the females in the CG brush their teeth twice a day, and 52% of the males once a day. In the OG, it was determined that 42% of females brush their teeth once a day, and 50% of the males did not brush their teeth. It was found that there was no statistically significant relationship between the frequency of brushing teeth and both groups ($p=0.071$).

Both groups were statistically examined in terms of smoking and it was revealed that 58% of the females in the CG do not smoke, while this situation is equal for males, 50%. In the OG, it has been observed that 72% of the females did not smoke, and 62% of the males smoked. No statistically significant difference was found between smoking and both groups ($p=0.888$) (Table 1).

Dental evaluation outcomes of all patients in the CG and the OG are examined in Table 2. When the number of tooth losses in the CG was examined, it was found that 54% of the females had 1-3 teeth losses, and 46% of the males did not have any tooth loss. On the other hand, it was determined that 40% of females in the OG and 44% of the males had 7 or more teeth losses. A statistically significant

relationship was found between the number of tooth loss and the CG and the OG ($p= 0.000$). As a result of our evaluation of the patients according to the number of dental caries, it was determined that while 6% of the males had 7 or more dental caries, the females did not have 7 or more dental caries in the

CG. In the OG, it was observed that 16% of females and 10% of males had 7 or more dental caries. Accordingly, statistical analysis revealed a significant difference between the number of dental caries and both groups ($p= 0.000$).

Table 1. Distribution of sociodemographic characteristics of the control group and the obesity group

		Control group (n=100)		Obesity group (n=100)		p
		Female	Male	Female	Male	
		n (%)	n (%)	n (%)	n (%)	
Educational status	Primary school	6 (12)	8 (16)	11 (22)	9 (18)	0.008*
	High school	28 (56)	25 (50)	28 (56)	37 (74)	
	University	16 (32)	17 (34)	11 (22)	4 (8)	
Frequency of applying to the dentist	None	12 (24)	23 (46)	26 (52)	27 (54)	0.002*
	Once a year	13 (26)	17 (34)	15 (30)	15 (30)	
	Twice a year	25 (50)	10 (20)	9 (18)	8 (16)	
Frequency of brushing teeth	None	9 (18)	14 (28)	12 (24)	25 (50)	0.071
	Once a day	17 (34)	26 (52)	21 (42)	14 (28)	
	Twice a day	24 (48)	10 (20)	17 (34)	11 (22)	
Smoking	Yes	21 (42)	25 (50)	14 (28)	31 (62)	0.888
	No	29 (58)	25 (50)	36 (72)	19 (38)	

* $p < 0.05$

Gingivitis was observed commonly in the CG, 52% in females and 58% in males when the groups were examined according to their periodontal status. Also, in the OG, this situation was mostly determined as periodontitis in 58% of both females and males. When the relationship between periodontal status

and the CG and the OG was examined, a statistically significant relationship was not found ($p= 0.853$). Finally, the number of teeth with apical lesions was not determined in most of the patients in both groups. Thus, no statistically significant difference was found ($p= 0.757$) (Table 2).

Table 2. Distribution of dental evaluation results of the control group and the obesity group

		Control group (n=100)		Obesity group (n=100)		p
		Female	Male	Female	Male	
		n (%)	n (%)	n (%)	n (%)	
Number of tooth loss	0	13 (26)	23 (46)	6 (12)	10 (20)	0.000*
	1-3	27 (54)	22 (44)	17 (34)	8 (16)	
	4-6	9 (18)	2 (4)	7 (14)	10 (20)	
	≤7	1 (2)	3 (6)	20 (40)	22 (44)	
Number of dental caries	0	25 (50)	16 (32)	13 (26)	18 (36)	0.000*
	1-3	25 (50)	29 (58)	20 (40)	18 (36)	
	4-6	0 (0)	2 (4)	9 (18)	9 (18)	
	≤7	0 (0)	3 (6)	8 (16)	5 (10)	
Periodontal status	Gingivitis	26 (52)	29 (58)	21 (42)	13 (26)	0.853
	Periodontitis	8 (16)	6 (12)	29 (58)	29 (58)	
	Healthy	16 (32)	15 (30)	0 (0)	8 (16)	
Number of tooth with apical lesion	0	43 (86)	29 (58)	38 (76)	32 (64)	0.757
	1-4	7 (14)	21 (42)	12 (24)	18 (36)	

* $p < 0.05$

DISCUSSION

Since the prevalence of obesity, which has increased in recent years due to lack of physical activity, poor eating habits, and socioeconomic conditions, has increased gradually in general health, oral and dental health⁷, by comparing the CG group and the OG, we tried to bring a new and broad perspective to possible dental complications with this study. The results of our research showed that obesity has statistically significant effects on the number of tooth loss and the number of dental caries, which are indicators of oral and dental health.

It has been reported that obesity causes a decrease in saliva flow and quality and is an important factor in the progression of dental caries by affecting the remineralization process⁷. González et al. explained the relationship between dental caries and obesity with the increase in weight due to diet, especially with the increase in the number of cariogenic microorganisms due to high sugar consumption¹¹. In contrast to these studies, some authors did not report a link between dental caries and obesity^{12,13}. As stated in the literature, it was observed that the individuals included in the OG of our study had a statistically significant increase in dental caries compared to the CG^{11,14,15}. Per to the current results, food addiction accompanied by psychological factors, eating disorders, and especially high glycemic index carbohydrates may be the cause of increased dental caries in obese individuals¹⁶.

The relationship between periodontitis and obesity is a new area of research and its underlying biological mechanisms are discussed. However, it has been stated that the probable cause of obesity affecting the periodontal tissues may be the secretion of proinflammatory cytokines from adipose tissue¹⁷. Besides, it has been reported that with excessive weight gain, the tissue expands, restricts blood vessels, and causes macrophages to migrate to periodontal tissues¹⁸. It has been determined that there was an increase in the depth of periodontal pockets in patients with obesity, and the increase in body weight caused the progression of periodontal disease¹⁹. Therefore, oral healthcare professionals draw attention to the importance of maintaining healthy body weight and applying good oral hygiene procedures in the treatment of periodontitis in obese people¹⁷. In our study, no significant relationship was found between obesity and periodontal status, but periodontitis was detected in a large number of

individuals in the OG. Although these results did not reveal a certain association between obesity and periodontitis, the high rate of periodontitis can be attributed to the presence of inadequate oral hygiene in obese individuals whose socialization skills are weaker due to insufficient self-confidence. Besides, periodontal diseases are thought to increase because these patients did not pay attention to their personal oral care due to common psychological disorders such as dislike of their own body²⁰.

When compared to individuals with obesity and healthy individuals, it has been reported that tooth loss is higher in obese individuals and based on this, a clear relationship between tooth loss and obesity has been demonstrated²¹. In the study of Chari and Sabbah, 6 or more teeth losses were found in individuals with a high prevalence of obesity²². Since the number of natural teeth is accepted as an effective and reliable indicator of oral health, the number of tooth loss of the individuals in the OB and the CG was evaluated in our study, and similar to the results of the literature in the obesity group, it was determined that the number of teeth losses of 7 or more in this group is higher²³. Our study evaluated the relationship between obesity and tooth loss and showed that in parallel with the findings of previous studies, tooth loss was significantly higher in the OG compared to the CG, and obesity was a risk factor for tooth loss^{21,22}. This result can be explained by the increase in the risk of dental caries and periodontitis together with the high consumption of highly processed carbohydrates, which is one of the main causes of obesity, and thus the occurrence of multiple teeth losses. Besides, changes in the microflora of the oral cavity due to obesity, negative effects of psychosocial stress on metabolism and, food choice may have contributed to this result^{7,20}. The tooth loss to be added to the existing oral findings may also increase nutritional disorders and psychosocial stress.

Studies on obesity from past to present in the literature emphasized that this health problem depends on the educational status, which can be considered as a measure of the socioeconomic status of the individual²⁴⁻²⁶. Besides, studies are emphasizing that those with lower educational status are more frequently exposed to work stress and work difficulties, and this situation is strongly associated with obesity^{27,28}. In our study, there was a statistically significant difference between educational status and obesity, and individuals in all groups mostly had high school education. This result can be explained by the

fact that the distribution of the individuals in our study could not be spread to the general population and was limited to the patients who applied to the clinic, and therefore the educational status might have been collected in a certain group. Therefore, it is thought that conducting prospective studies in the general population to evaluate the link between education and obesity will contribute to the literature. The high rate of dental problems such as tooth loss, dental caries, and periodontitis in the OG can be associated with the lower frequency of applying to the dentist of individuals in this group than in the CG.

In this research, it is among the limitations of the study that detailed BMI limit values were not determined in obesity classification, psychological factors, and eating habits could not be evaluated, and the number of individuals in the groups did not spread to the large population. Besides, the absence of data on children and adolescents may limit the evaluation of the effects of obesity on oral and dental health.

This present study has some limitations. In the first place, obesity alone may cause oral health problems, and the food components which can be threatening oral health were not examined in the study (such as carbohydrate-rich diet, fatty foods, high cariogenic food consumption, sugary liquid consumption). Secondly, in obese individuals, especially at night, nasal congestion and sleeping with an open mouth may affect oral health. Therefore, there is a requirement for more studies evaluating the effect of obesity on oral and dental health in the literature.

Our study reveals that obesity is associated with oral and dental health problems such as tooth loss, dental caries, and periodontitis. Considering the increase in the prevalence of obese populations all over the world, increasing the awareness of obese individuals and dentists on oral and dental health on this issue will help to plan new treatments that will help alleviate the effects of obesity on the oral cavity.

Yazar Katkıları: Çalışma konsepti/Tasarımı: BY, ES; Veri toplama: BY, ES; Veri analizi ve yorumlama: BY, ES; Yazı taslağı: BY, ES; İçeriğin eleştirilip incelenmesi: BY, ES; Son onay ve sorumluluk: BY, ES; Teknik ve malzeme desteği: BY, ES; Süpervizyon: BY, ES; Fon sağlama (mevcut ise): yok.

Etik Onay: Bu çalışma için Başkent Üniversitesi Tıp ve Sağlık Bilimleri Araştırma Kurulu tarafından proje onayı alınmıştır.

Hakem Değerlendirmesi: Dış bağımsız.

Çıkar Çatışması: Yazarlar çıkar çatışması beyan etmemişlerdir.

Finansal Desteği: Bu çalışma (Proje numarası: D-KA 20/43) Başkent Üniversitesi Araştırma Fonu tarafından desteklenmiştir.

Author Contributions: Concept/Design : BY, ES; Data acquisition: BY, ES; Data analysis and interpretation: BY, ES; Drafting manuscript: BY, ES; Critical revision of manuscript: BY, ES; Final approval and

accountability: BY, ES; Technical or material support: BY, ES; Supervision: BY, ES; Securing funding (if available): n/a.

Ethical Approval: For this study, the project was approved by the Başkent University Medical and Health Sciences Research Board.

Peer-review: Externally peer-reviewed.

Conflict of Interest: Authors declared no conflict of interest.

Financial Disclosure: This study (Project number: D-KA 20/43) was supported by Baskent University Research Fund.

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