DOI: https://doi.org/10.54393/pjhs.v4i12.1208

PAKISTAN JOURNAL OF HEALTH SCIENCES

https://thejas.com.pk/index.php/pjhs

Volume 4, Issue 12 (December 2023)

Original Article

Association between Obesity and Dental Caries among Young Population Presenting at Tertiary Care Hospital

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ARTICLE INFO

Key Words:
Dental Caries, Obesity, Tertiary Care Hospital

How to Cite:
Khatoon, R., Bughio, R. I., Memon, K. N., Memon, S. M., Soomro, Z. A., & Kandhro, R. (2023). Association between Obesity and Dental Caries among Young Population Presenting at Tertiary Care Hospital : Association Between Obesity and Dental Caries . Pakistan Journal of Health Sciences, 4(12). https://doi.org/10.54393/pjhs.v4i12.1208

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Received Date: 2nd December, 2023
Acceptance Date: 22nd December, 2023
Published Date: 31st December, 2023

ABSTRACT

Globally, dental caries and obesity are becoming issue of public health concern. There are inconsistent and contrasting results drawn from numerous studies seeking the association between obesity and dental caries. **Objective:** To ascertain the relationship between childhood obesity and dental caries at a tertiary care hospital. **Methods:** A cross-sectional descriptive research was carried out at department of dentistry of LUMHS hospital Jamshoro/Hyderabad.161 obese patients aged 18 to 35 years of both genders having BMI ≥ 25kg/m2 were selected by convenience sampling technique. After taking detailed history, clinical examination of mouth of each patient was performed by using mouth mirror and probe. Dental caries was recorded according to the WHO criteria using decayed, missing, and filled teeth (DMFT) index and the G. V. Black classification, while height and weight was measured using BMI index. All data were recorded in standard proforma for analysis by using SPSS version 23.0. **Results:** There was male preponderance i.e. 86(53.42%)males as compared to 75(46.58%) females. Themeanagerecordedwas25.7 ± 6.1 years. Majority of the subjects were belonged to rural areas (91.30%). THEMEAN and standard deviation of BMI was29.0 ± 3.1(25.0-40.7) Kg/m2. The mean and standard deviation of DMFT score was 0.57 ± 1.0 with the range of 0-4. Dental caries was present in 45 (27.95%) patients and absent in 116 (72.05%) presents. The highly significant association was observed between high BMI AND dental caries (p< 0.001). **Conclusions:** Dental caries and obesity are significantly associated among young population. As the obesity level increased, risk of dental caries can also be increased.

INTRODUCTION

Two growing threats to public health are obesity and dental decay common condition that affects people all throughout the world is dental caries [1-3]. From 60 to 90% the pervasiveness of dental caries ranges in school children [4]. Young adults (18–25 years old) are a transitional age between adolescence and adulthood, a time when people take charge of their health and form their own health-related behavior. They go through stages of biological, psychological, and social development throughout this time. It is reasonable to presume that dental caries and obesity share risk factors based on the existing data [5, 6]. Moreover, obesity and caries are imperative issues of health concern and affect a large figure of children and youngsters [7, 8]. Therefore, a correlation between obesity and dental caries seems reasonable. Both have undesirable impacts on health and quality of life and are connected with noteworthy expenses to the society [9]. Further knowledge of this affiliation could facilitate the improvement of more effective and proficient targeted public health initiatives to diminish the prevalence obesity and dental caries [10]. Several studies have observed the relationship between obesity and dental caries in different countries, and in both primary and permanent dentitions [11]. The literature on dental caries right through the globe gives the substantiation that, caries experience gives association with body mass index,

diet practice and oral hygiene practices, samples having higher body mass index would give positive association with dental caries[12-15].

The outcomes, meanwhile, have consistently been debatable and ambiguous. Regarding the kind and direction of the relationship, the findings are contradictory. This study was planned to determine the association between dental caries and obesity among young population at tertiary care hospital. This study would reorient the concepts of preventive strategies regarding dental caries and obesity.

METHODS

Descriptive cross-sectional study was organized in Department of Dentistry, Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro and Hyderabad, in time duration of six months i.e., from 01-08-2021 to31-01-2022 by Non probability convenience sampling technique. Sample size was calculated by online Rao soft sample size calculator. Using Rao soft sample calculator, 95% confidence interval, 5% margin of error and prevalence of 12% caries among over weight male patients, calculated sample size of study was 161 [14]. All consenting obese patients, aged between 18 to 35 years and having BMI ≥ 25Kg/m2 were included and patients with systemic disease, having orthodontic treatment and who didn't participate in the study were blocked form the study. Data were collected after the approval of Research Ethics committee of LUMHS Jamshoro (NO. LUMHS/REC/125). Clinical examination of mouth was done using mouth mirror and probe. Dental caries was recorded according to the WHO criteria using DMFT index and the Greene Vardiman Black (G. V. Black) classification, while height and weight was measured using BMI index [15, 16]. All the information was recorded in self-made proforma. The continuous variables like age, BMI and DMFT score were calculated as mean ± standard deviation. Frequency and percentages were counted for categorical variables like sex, residential status, occupation and caries status. Stratification with respect to the effect modifiers was done. SPSS version 23.0 was used for data analysis. Chi square test was applied between caries and obesity to check the statistical significance. The p-value ≤ 0.05 was measured as significant.

RESULTS

Table 1 presents sociodemographic arrangement of study subjects where male preponderance is shown i.e., 86 (53.42%) were males as compared to 75 (46.58%) females. Age of subjects was divided into groups as 18-23 years 83 (51.56%), 24-29 years 22 (13.66%) and 30-35 years age group, 56 (34.78%) patients. Where mean ±standard deviation for age was 25.7 ± 6.1 years. 147 (91.30%) enrolled patients were from rural areas and 14 (8.70%) patients were from urban areas. In this study enrolled patients' occupation was distributed into the categories of government servant having 31 (19.25%) patients, private servant having 19 (11.80%) patients, house wife having 52 (32.30%) patients, labor having 9 (5.60%) patients and student having 50 (31.15%) patients.

Table 1: Demographic Information of Subjects

Variables	Frequency (%)
Gender	
Male	86 (53.42)
Female	75 (46.58)
Age	
18-23	83 (51.56)
24-29	22 (13.66)
30-35	56 (34.78)
Residential status	
Urban	14 (8.70)
Rural	147 (91.30)
Occupation	
Government servant	31 (19.25)
Private servant	19 (11.80)
House wife	52 (32.30)
Student	50 (31.15)
Labour	9 (5.60)

Table 2 describes descriptive statistics of continuous variable of BMI (Kg/m2) in patients, where mean and standard deviation of BMI was 29.0 ± 3.1 (25.0-40.7) Kg/m2. The distribution of BMI basis among obese patients is assessed. In this study enrolled patients were grouped as overweight 34 (21.11%) patients, obese 121 (75.15%) patients, normal weight 4 (2.48%) patients and in underweight 2 (1.26%) patients. Continuous variable of DMFT score in obese patients was assessed, where mean and standard deviation of DMFT score was 0.57 ± 1.0 with the range of 0-4. The assessment of dental caries status among obese patients is depicted. As this study shows caries was present in 45 (27.95%) patients and absent in 116 (72.05%) patients. Out of 45 patients reported with dental caries, 35 (77.80%) patients were reported with class-I and 10 (22.20%) patients were reported with class-II as indicated in table 2.

Table 1: Descriptive Statistics of BMI, DMFT Score, Caries Status and Classification

Variable	BMI (Kg/m2)
N	161
Minimum	25.0
Maximum	40.7
Mean	29.0
SD	3.1

DMFT Score	
N	161
Minimum	0
Maximum	4
Mean ± SD	0.57 ± 1.0
Variable	**Frequency (%)**
Weight status	
Obese	121 (75.15)
Over weight	34 (21.11)
Normal	4 (2.48)
Underweight	2 (1.26)
Dental caries	
Yes	45 (27.95)
No	116 (72.05)
Classification	
Class I	35 (77.80)
Class II	10 (22.20)

Table 3 indicates dental caries was present in 25 (55.55%) male patients and 20 (44.45%) female patients, whereas dental caries was absent in 61 (52.60%) male patients and 55 (47.41%) female patients. There was statistically insignificant association between gender and occurrence of dental caries (p= 0.73, chi-square value = 0.115 at df =1). Dental caries was present in different age groups; in 18-23 years 29 (64.44%) patients, in 24-29 years 2 (4.44%) patients and in 30-35 years 14 (31.11%) patients. Dental caries was absent in different age groups; in 18-23 years 54 (46.55%) patients, in 24-29 years 20 (17.24%) patients and in 30-35 years 42 (36.21%) patients. The statistically significant association was revealed (p=0.04) at df=2, chi-square value= 6.141. Dental caries was present in 38 (84.44%) patients who were from rural areas and 7 (15.56%) patients who were from urban areas. Dental caries was absent in 109 (93.96%) patients who were from rural areas and 7 (6.04%) patients who were from urban areas. On applying chi-square test p-value was 0.054 at df =1, chi square value=3.702.

Table 3: Stratification of Dental Caries Status with Respect to Gender and Residential Status

Gender	Dental Caries Status		p-value
	Yes (%)	No (%)	
Male	25 (55.55%)	61 (52.60%)	0.73
Female	20 (44.45%)	55 (47.41%)	
Residential status	**Caries status**		0.05*
	Yes	**No**	
Urban	7 (15.56%)	7 (6.04%)	
Rural	38 (84.44%)	109 (93.96%)	

*Significant association

Dental caries was present in different occupations; government servant 9 (20.00%) patients, private servant 4 (8.88%) patients, house wife 18 (40.00%) patients and student 14 (31.12%) patients. Dental caries was absent in different occupations; government servant 22 (19.00%) patients, private servant 15 (12.93%) patients, house wife 34 (29.3%) patients, labour 9 (7.76%) patients and student 36 (31.00%) patients. On applying Fischer Exact test, p-value was computed as p=0.27 at df=4 and statistic value as 5.105, as shown in table 4. Dental caries was present in different obese patients; in obese 27 (60.00%) patients, overweight 12 (26.66%) patients, normal 4 (8.90%) patients and in underweight 2 (4.44%) patients. Dental caries was absent in different obese patients; in obese 94 (81.00%) overweight 22 (19.00%) patients. On applying Fischer Exact test p-value was found as <0.001 i.e. highly significant association was shown at df =3 and 18.286.

Table 4: Stratification of Dental Caries Status with Respect to Occupation and Weight Status

Occupation	Dental Caries Status		p-value
	Yes (%)	No (%)	
Government Servant	9 (20.00%)	22 (19.00%)	0.27
Private servant	4 (8.88%)	15 (12.93%)	
House wife	18 (40.00%)	34 (29.31%)	
Labour	0 (0.00%)	9 (7.76%)	
Student	14 (31.12%)	36 (31.00%)	
Weight status			
Obese	27 (60.00%)	94 (81.00%)	<0.001*
Over weight	12 (26.66%)	22 (19.00%)	
Normal	4 (8.90%)	0 (0.00%)	
Under weight	2 (4.44%)	0 (0.00%)	

*Significant association

DISCUSSION

The prevalence of dental caries in Pakistan was originated to be around 60%. Bacteria, time, susceptible tooth surface and fermentable carbohydrates are the main elements associated with the expansion of tooth decompose, whereas lifestyle, smoking, xerostomia, fluorosis, and poor oral hygiene are also causative agents to its widespread division [16]. Abundant studies have documented the alliance between obesity and dental caries in different states. The data are inconsistent regarding the existence of a relationship and the nature and direction of the association. In this study most of the obese patients were male 86 (53.42%) and remaining 75 (46.58%) patients were female. Similar to our study Alswat et al., also reports that males were more to be overweight than females and 61.6% of the parents were full time employed and 38.4% were unemployed [17]. Out of 59 patients who were overweight/obese, male was 61.0% and females were 39.0%. Another study by Yadav et al., also reports that 72.8% patients were male and 27.2% were

females [18]. Kim et al., also reports that 57.8% patients were male and 42.2% were females in ≥18 years patients [19]. In this study mean age of obese patients was 25.7 ± 6.1 years with range of 18-35years. Yadav et al., also reports the mean age of 28.39 ± 11. 4years [18]. A study by Al-Hussaini et al., reported the higher mean age of 45.44 years [20]. Most of the studies reports that children and young adults are mostly obese and are at a higher risk of dental caries. In this study the majority of the obese patients were from countryside areas 147(91.30%) and 14 (8.70%) patients were from urban areas. In this study most of the obese patients were housewife 52 (32.30%) and student 50 (31.15%) followed by government servant 31 (19.25%), private servant 19 (11.80%) and labor 9 (5.60%). Al-Hussaini et al., conducted the study on children and adolescents and reports that majority of the parents 57.6% were worker followed by unemployed 26.7%, office clerk 8.7% and Trader/professional 7.0% [20]. In this study mean BMI of the obese patients was 29.0 ± 3.1 Kg/m2. Most of the obese patients were overweight 121 (75.15%) followed by high weight 34 (21.11%), very high weight 4 (2.48%) and extremely high weight 2 (1.26%). Al-Hussaini et al., reports the overall frequency of overweight and obesity was 13.4% (14.2% for girls and 12% for boys) and 18.2% (18% for girls and 18.4% for boys) correspondingly [20]. Peres et al., reports the higher mean BMI but lower than our study i.e., 26.55 ± 6.3 3.72 Kg/m2 [21]. Al-Ansari et al., reports the lower mean BMI i.e., 23.42 ± 6.82 Kg/m2 [22]. Most of the patients were normal 40.0% followed by underweight 25.0%, obese 18.0% and overweight 17.0%. Difference in BMI was observed due to selection of patients. In our study all obese patients were selected whereas in other studies all patients including underweight, normal, overweight and obese patients. In this study mean DMFT score of the obese patients was 0.57 ± 1.0 and lower prevalence of dental caries i.e.27.95%. Al-Zahrani et al., reports the higher mean of DMFT score i.e., 2.06 ± 2.43 and higher prevalence of dental caries i.e., 60.9% [23]. Alshihri et al., reports the higher mean of DMFT score i.e., 3.55 ± 2.94and higher prevalence of dental caries i.e.,79.8% [24]. In our study low DMFT index score indicates the lower prevalence of dental caries, whereas a high DMFT index score indicates the development of dental caries and further reflects the deterioration of oral hygiene. In this study dental caries was diagnosed in 35 (77.80%) obese patients among which 35 (77.80%) patients were reported with class-I and 10 (22.20%) patients with class-II. Dental caries was significantly (p-value = <0.001) associated with obesity and diagnosed in 27 (60.00%) overweight patients, 12 (26.66%) high weight patients, 4 (8.90%) patients very high weight and 2 (4.44%) extremely high weight patients. Cheng et al., reported the 20.1% prevalence of dental caries in obese patients having ≥ 18 years of age. Based on BMI criteria in China, 70.28% of students were categorized as having normal weight, and about 20.23% were overweight or obese with significant (p-value = <0.001) association with dental caries [25]. However, not all similar studies have found a positive association between BMI and dental caries, as some studies suggest that there is no relationship and others show significant relationship. But all studies show that young obese people have a higher risk of dental caries.

CONCLUSIONS

The prevalence of dental caries was high in male subjects.18-23 years age group, house wives, obese patients and having rural areas residency were mostly affected by the presence of caries. Insignificant association between gender and occurrence of dental caries was found(p=0.73).

Authors Contribution

Conceptualization: RK
Methodology: RK
Formal analysis: RIB, SMM
Writing-review and editing: KNM, SMM, ZAS, RK
All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

Source of Funding

All authors have read and agreed to the published version of the manuscript.

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