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Association of obesityandperio dontal Disease Among The Urban Population Residing In Sambhal, Inda- A Cross-Sectional Survey

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ABSTRACT

Background: Obesity is a growing public health concern and has been linked to various systemic diseases, including cardiovascular diseases, diabetes, and certain cancers. Periodontal disease is a major cause of tooth loss and is influenced by several risk factors, including obesity. Despite efforts to control obesity and improve oral hygiene, the association between obesity and periodontal disease remains unclear, particularly in the urban population of Sambhal, India. This study aims to evaluate the relationship between obesity and periodontal disease and its impact on general and oral health.

Materials & Methods: A cross-sectional study was conducted among 600 adults aged 18-80 years in urban Sambhal over two months. The sample was selected using a purposive sampling technique. Participants were classified as obese (BMI ≥30) or non-obese (BMI <30) based on WHO criteria. Periodontal health was assessed using the Community Periodontal Index (CPI) and loss of attachment (LOA) criteria. Statistical analysis was performed using SPSS 21, with the chi-square test used to determine significance ($p<0.05$).

Results: The prevalence of periodontal disease was 61.3% in the study population. Among obese individuals, 74.3% had periodontal disease compared to 58.5% in the non-obese group ($p=0.002$). A significant association was found between obesity and CPI scores ($p=0.020$) as well as obesity and LOA ($p=0.013$). The risk of developing periodontal disease was 1.4 times higher in obese individuals, particularly in younger adults (20-39 years).

Conclusion: The study confirms a significant association between obesity and periodontal disease, particularly in younger adults. Given the systemic implications of obesity, primary care physicians should focus on preventive measures, lifestyle modifications, and awareness programs to reduce the risk of periodontal disease and improve overall health.

Keywords: *Obesity, Periodontal Disease, Body Mass Index*

1. INTRODUCTION

Obesity has been the most neglected public health problem by primary care providers.[1] It has a potential impact on various comorbidities, mortality, and the cost of health care.[2] According to the World Health Organization (WHO), obesity has been defined as a multifactorial disease in which there is an excessive accumulation of fat in the body as a result of the interaction of environmental and genetic factors.[3]

Obesity is a multisystem condition which predisposes to many life-threatening medical conditions including arterial hypertension, various cardiovascular diseases, diabetes mellitus, various cancers, like cancer of the esophagus, thyroid, kidney, uterus, colon, and osteoarthritis.[4]

According to the global health survey of the WHO, obesity or overweight is the leading cause of death each year worldwide for at least 2.8 million people.[5] It is a systemic condition which contributes to an increase in the overall inflammatory condition through its various parameters increasing its susceptibility to periodontal disease.[6,7] Besides other risk factors, periodontitis is responsible for the destruction of the peri-tooth components that support the tooth.[8,9]

Periodontal diseases are one of the major causes of tooth loss in India. These include pathological conditions of the supporting structures of the teeth, i.e. gingiva, alveolar bone, periodontal ligament and cementum. Gingival and periodontal diseases affect 90% of the population.[5] Prevalence of periodontal disease depends on variables like age, sex, race, ethnicity, education, geographic and environmental status, oral hygiene habits, living patterns, social characteristics and dental awareness.[10]

Despite tremendous efforts by primary care physicians to reduce obesity and their link with oral hygiene among the masses, the gap between them remains the same. Thus, the exact link between obesity and periodontitis is yet to be found.[11]

There is no documentation about the relationship between obesity and periodontal disease in the population of Sambhal. By keeping the above facts in mind, research was conducted to evaluate the relationship between obesity and periodontal disease among adult patients to know its impact on oral as well as general health.

2. MATERIAL & METHODS

A population representative cross-sectional study of adults aged 18-80 years of urban Sambhal was conducted from two months. Ethical clearance for the study was obtained from Institutional Ethical Committee. For estimating the sample size, the minimum expected prevalence of periodontal diseases was considered as 86%. This was based on results obtained during the pilot study conducted in study area. The sample size was estimated to obtain the true value at 5% level of significance. Estimated sample size of 600 subjects was calculated. Purposive Sampling Technique was used. Inclusion criteria included >18yrs subjects residing in a urban area for 10 and more years were considered eligible for the study. Exclusion criteria included edentulous persons, on medication and those who were medically compromised.

A self-designed questionnaire was used, to record the demographic. Periodontal healthwas assessed using WHO criteria (1997) which included Community Periodontal Index (CPI) and loss of attachment (LOA) assessment.[12] Weighing machine and height measuring tape were used to assess the Body Mass Index (BMI). Thestatus ofobesitywas evaluated using BodyMass Index, inaccordancewith WHO guidelines. Those with BMI $\leq$30 was considered as non-obese and subjects with BMI $\geq$ 30 were considered obese.

Clinical examination was performed by one single examiner. Intra-examiner calibration was performed before the study began. The intra-examiner degree of agreement (k = 0.91, 0.86, 0.84, and 0.81) for calculus detection, bleeding on probing, probing depth and clinical attachment loss, respectively. The data collected were analysed using SPSS 21 (Statistical Package for the Social Sciences 21, IBM Corporation, United States). Chi-square test was used to test the level of significance of differences among the groups. The level of significance was set at $P < 0.05$.

3. RESULTS

The demographic characteristics of the study population show that the total sample size was 600 individuals. The majority of participants were in the 20-29 age group (26%), followed by 30-39 years (25.3%), 40-49 years (18.7%), 50-59 years (14.7%), 60-69 years (8.7%), and 70-79 years (4.7%), with only 2% under 20 years of age. The mean age of the population was 40.49±3.24 years. Among the participants, 257 (42.8%) were male and 343 (57.2%) were female.

The distribution of the study population by obesity status and periodontal disease indicates that among the 109 obese individuals, 81 (74.3%) had periodontal disease, while 28 (25.7%) did not. In the non-obese group, 287 (58.5%) had periodontal disease, while 204 (41.5%) did not. The overall prevalence of periodontal disease in the total population was 61.3% (368 out of 600), while 38.7% (232 out of 600) were free from periodontal disease. The association between obesity and periodontal disease was statistically significant with a chi-square value of 9.461 and a p-value of 0.002.

The association between obesity and CPI (Community Periodontal Index) scores shows that among obese individuals, 28 (25.7%) were classified as healthy, 0 (0.0%) had bleeding, 18 (16.5%) had calculus, 25 (22.9%) had a pocket depth of 4-5mm, and 38 (34.9%) had a pocket depth of 6mm or more. In the non-obese group, 201 (40.9%) were healthy, 5 (1.0%) had bleeding, 75 (15.3%) had calculus, 94 (19.1%) had a pocket depth of 4-5mm, and 116 (23.6%) had a pocket depth of 6mm or more. The total distribution for the population was 229 (38.2%) healthy, 5 (0.8%) with bleeding, 93 (15.5%) with calculus, 119 (19.8%) with a pocket depth of 4-5mm, and 154 (25.7%) with a pocket depth of 6mm or more. The chi-square test showed a significant association between obesity and CPI scores, with a chi-square value of 11.667 and a p-value of 0.020.

The association between obesity and loss of attachment (LOA) indicates that among the obese group, 38 (34.9%) had LOA, while 71 (65.1%) did not. In the non-obese group, 115 (23.4%) had LOA, while 376 (76.6%) did not. In the total study population, 153 (25.5%) had LOA, while 447 (74.5%) did not. The chi-square test demonstrated a significant association between obesity and loss of attachment, with a chi-square value of 6.146 and a p-value of 0.013.

Table1. Demographic characteristics of study population

	N	%
Age Group (Years)		
<20	12	2
20-29	156	26
30-39	152	25.3
40-49	112	18.7
50-59	88	14.7
60-69	52	8.7
70-79	28	4.7
Total	600	100.0
Mean±SD	40.49±3.24	
Gender		
Male	257	42.8
Female	343	57.2

Table2. Distribution of Study Population by Obesity Status and Periodontal Disease

	Periodontal Disease	
Obesity Status	PresentN(%)	Absent N(%)
Obese	81 (74.3%)	28 (25.7%)
Non-Obese	287 (58.5%)	204 (41.5%)
Total	368 (61.3%)	232 (38.7%)

Chi-Square Test: $\chi^2 = 9.461$, p-value = 0.002

Table3. Association Between Obesity and CPI (Community Periodontal Index) Scores

Obesity Status	Healthy N(%)	Bleeding N(%)	Calculus N(%)	Pocket Depth 4-5mm N(%)	Pocket Depth ≥6mm N(%)
Obese	28 (25.7%)	0 (0.0%)	18 (16.5%)	25 (22.9%)	38 (34.9%)
Non-Obese	201 (40.9%)	5 (1.0%)	75 (15.3%)	94 (19.1%)	116 (23.6%)
Total	229 (38.2%)	5 (0.8%)	93 (15.5%)	119 (19.8%)	154 (25.7%)

Chi-Square Test: $\chi^2 = 11.667$, p-value = 0.020

Table4. Association Between Obesity and Loss of Attachment

Obesity Status	LOA present N(%)	LOA Absent N(%)
Obese	38 (34.9%)	71 (65.1%)
Non-Obese	115 (23.4%)	376 (76.6%)
Total	153 (25.5%)	447 (74.5%)

Chi-Square Test: $\chi^2 = 6.146$, p-value = 0.

4. DISCUSSION

Obesity has become a major public health problem. It has become a fast-growing disease worldwide including developing countries like India. Some of the health professionals have suggested that obesity and periodontitis is associated with each other affecting the systemic health of the individual.[13]

The WHO had also recognized that BMI is the most important tool to measure the overweight and obese population for all age groups. Hence, the BMI was used to measure obesity in this study.[14]

The findings of our study showed significant association between obesity and periodontal disease which is in accordance with the previous studies [15,16] and it is comparable in relation to age, sex, obesity and prevalence of periodontal disease.

Among 109 obese individuals, males were 45 (17.5%) and females were 64 (18.7%). Our observation regarding equal prevalence of obesity among males and females is in contrast with the previous study where they found that over weight/obesity was higher among females than in males.[17]

The main purpose behind this study was to assess the association between periodontaldisease and obesity. After analyzing our results we found that there was associationbetweenObesityandPeriodontaldisease. Our results to greater extent are in agreements withmany previous studies[18,19]

The main purpose behind this study was to assess the association between periodontaldisease and obesity. After analyzing our results authors found that there was associationbetween Obesity and Periodontaldisease. Our results to greater extent are in agreements withmany previous studies.[18,19]

In current study 81(74.3%) of obese individuals had periodontitis which was statisticallysignificant[p.002].It was also seen that obese in dividualswereat1.4timesatriskfordevelopingperiodontaldiseaseswhencomparedtonon obese individuals.

All these obese individuals with periodontitis were in the age group of 20- 39years i.e. young adults. Significant association was found between Obesity and Periodontaldisease in younger age groups. These findings are inconsistent with previous reports that found a stronger association between obesity and periodontitis in younger age groups only. Early onset of obesity that continues to adulthood is supposed to be more harmful than that appears in adulthood. [20]

Obesity is a multifactorial and complex disease. It is a public health concern in both developed and developing countries. It has been implicated as the highest risk factor for other systemic diseases like cardiovascular diseases, diabetes, strokes, and hypertension. The main aim is to find and control the risk factors and eliminate them. Our study confirms that obesity is one of the risk indicators of periodontitis.

As primary care physicians, it ought to be our primary responsibility to reduce the burden of diseases by health education, adopting healthy practices, and modifying diet to lead a happy and productive life. An effort should be taken to ensure the causative factor, monitoring, and preventive role in the obese people and to make them aware of the risk of neglecting the treatment and its possible consequences on the oral as well as general health.

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