ORIGINAL ARTICLE

PERIODONTAL DISEASE AND OBESITY: A HOSPITAL BASED CROSS-SECTIONAL STUDY

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ABSTRACT

The aim of the present study was to investigate whether there was an association between obesity and periodontal condition in patients aged 11-89years.

A cross-sectional hospital based study was carried out in patients who visited the Out Patient Department of Jinnah Dental Hospital. Written informed consent was taken. Convenience sampling technique was used. 192 patients of both genders were included in the study irrespective of their educational level and social economic status, the subjects with any systemic diseases and deleterious habits were excluded. Data were analyzed by SPSS 20 version. Statistical analysis was performed by Chi-square test. The values were considered statistically significant when $P < 0.05$.

Out of 192 participants, 39 responders belonged to low socioeconomic status, 128 participants belonged to middle socioeconomic status and 25 individuals were from high socioeconomic status. According to gingival index 24 % participants had normal gingiva, but 45.3% individuals suffering from mild inflammation. On the other hand 22.4 % responders were suffering from moderate inflammation and 8.3 % participants having severe inflammation. According to plaque index, 21.9% participants did not have plaque, 45.8% patients had mild accumulation of plaque, 23.4% had moderate accumulation however 8.9% patients should abundance of it.

In this study significant relationship was found between periodontal disease and socioeconomic status as well as educational levels. Healthy nutrition and adequate physical activity likely to reduce risk of developing obesity.

Key words: *Periodontal Disease, Obesity, Body Mass Index (BMI)*

INTRODUCTION

Periodontal disease is extremely common global condition and represents a major public health problem for developed and developing countries.[1] It is a chronic inflammatory condition induced by dental bio-film buildup on tooth surfaces.[2] Obesity is a major health issue with regard to the economics of developed nations. It is considered that it spreading at an alarming rate across the globe, mainly in the Asia Specific Region. The global prevalence of obesity is 27.8 %[3] and Pakistan is ninth most obese population in the world.[4]

Periodontal disease is assessed by different ways. Two of them are Probing pocket depth and Clinical attachment level. Pocket depth is defined as "the distance to which probe penetrates into the pocket". Clinical attachment level is the distance between the base of pocket and a fixed point on the crown such as cemento-enamel junction.[5] Changes in the level of attachment can be the result of gain or loss of attachment and either an improved sign of the degree of periodontal damage and increase the probing pocket depth alone. Many Studies of risk assessment can be identified the including age, male, smoking, stress and diabetes mellitus as linked with the periodontal disease severity, progression and development.[6]

Obesity is defined by the World Health Organization as "the unusual or unnecessary growth of adipose tissue that can be harmful to health".[7] If this occur

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approximately the waist, it is called abdominal obesity, which is powerfully related with complications such as diabetes mellitus, insulin resistance, hypertension, Stroke, cardiovascular disease or dyslipidemia.[8,9]

According the WHO Global InfoBase, the prevalence of obesity between American adults in 2010 was 44.2% in men and 48.3% in women, and epidemically increases the worldwide.[10]This disease is more common among the world population and important contributors to poor health.[11] This is a very difficult and multi-factorial disease arising from unnecessary storage of fat, resulting from the contribution of social, behavioral, cultural, psychological, metabolic and genetic factors.[12]

In modern studies, it has been observed that the growth of adipose tissue in the hip acts as a protective factor. Hence, it is proposed to measure abdominal fatness, thus dividing abdominal circumference by hip circumference.[13]

According to the figures provided by the WHO, in 2014, more than 1.9 billion adults were found to be obese, with over 600 million among them falling under the group of obese persons.[14]

Prevalence of obesity has increased comparatively over a short period of time, repetition in adults and tripling in children and teenagers[15], 31% that is 59 million of US adults are obese and over 65% report BMI $\geq$ 25. Additionally, 15.8% of children 6 to 11 years old and l6.1% of youngsters 12 to 19 years are obese.[16]

A medical study done in Udaipur, India also concludes a high prevalence of periodontal disease among overweight patients.[17] An additional new study by researcher concludes that obesity is related with deep periodontal pockets. Another researcher analyzed the National Health and Nutrition Examination and Survey (NHANES III) data, showed a positive relation between BMI and periodontal attachment loss, although obesity is becoming an international problem, there is a little number of works committed to this problem, specially about the correlation between obesity and periodontal disease.[18]

The aim of the present study was to investigate whether there was an association between obesity and periodontal condition. The mechanism of how obesity affects the periodontium is currently poorly understood. It is known that obesity has several harmful biological effects that might be related to the pathogenesis of periodontitis. The high prevalence of both obesity and periodontal disease (PD) poses a substantial public health risk.[19]

METHODOLOGY

A cross-sectional study was conducted from September 2017 to February 2018 on subjects who visited the Out Patient Department (OPD) of Jinnah Sindh Medical University, Karachi. Verbal informed consent was taken from every respondent prior to conducting the study. Convenience sampling technique was used. A total of 192 patients of both genders were included in this study irrespective of their educational level and social economic status. The subjects with any systemic diseases and deleterious habits were excluded from the study. The self-structured questionnaire were designed and used for data collection. Questionnaire was divided into three parts. Part 1 included the socio-demographic status was assessed, part 2 integrated the body mass index (BMI) individuals were categorized into normal, overweight and obese based on the WHO criteria, gingival index (Silness and Loe 1963) and plaque index (Silness and Löe, 1964) was used to check the plaque accumulation on the tooth surface, swelling and redness of the gingiva were assessed. Part 3 based on food items (snacks, dairy products, oily products and beverages).

The data were kept confidential and the names of the respondents were not recorded. Data were analyzed by using SPSS 20 version. Statistical analysis was performed by Chi-square test. The values were considered statistically significant when $P < 0.05$.

RESULTS

TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS

Variables	Frequency	Percent %
Age Groups		
11-25	97	50.52
26-35	35	18.22
36-45	28	14.58
46-55	16	8.33
56-65	07	3.64
66-75	06	3.12
76-85	02	1.04
86-95	01	0.52
Educational level		
Uneducated individuals	03	1.6
Matric	29	15.1
Inter	38	19.8
Graduates	118	61.5
Post graduates	4	2.1
Marital status		
Unmarried	113	58.9
Married	79	41.1

TABLE 2: FACTORS ASSOCIATED WITH PERIODONTAL DISEASE

Variables	Loe & Silness Gingival index				Chi square	P-Value
Educational level	**Normal gingiva**	**Mild inflammation**	**Moderate inflammation**	**Severe inflammation**		
Uneducated individuals	03	0	0	0	36.537	.000
Matric	02	10	11	6		
Inter	02	23	11	2		
Graduates	38	52	20	8		
Post graduates	01	02	01	0		
Plaque index						
Educational level	0	1	2	3		
Uneducated individuals	3	0	0	0	38.160	.000
Matric	1	11	11	6		
Inter	1	22	12	3		
Graduates	36	53	21	8		
Post graduates	1	2	1	0		
Loe & Silness Gingival index						
Socio economic status	Normal gingiva	Mild inflammation	Moderate inflammation	Severe inflammation		
Low	02	18	14	05	19.373	.004
Middle	35	54	28	11		
High	09	15	01	0		
Plaque index						
Socio economic status	0	1	2	3		
Low	01	18	13	07	23.117	.001
Middle	31	56	31	10		
High	10	14	01	0		

TABLE 3: BODY MASS INDEX (BMI)

BMI	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Normal or Healthy Weight
25.0 – 29.9	Overweight
30.0 and Above	Obese

DISCUSSION

Periodontitis have been suggested to be associated with overweight and obesity, however this link may have significant implications for public health because both diseases are essential risk for coronary heart disease, metabolic syndrome, diabetes mellitus, preterm low birth weight and osteoarthritis, can lead to oxidative stress, adipokines and other related hormones. They are considered as factors related to the reduction in quality of life and increase in mortality due to which prevalence of overweight and obesity has increased in recent years.[20,21]

The obesity effects on systemic health by varying the host susceptibility to periodontitis due to inflammatory mediators and there are controversies about finding studies nevertheless this association is not exclusively strong in the literature.[22]

A recent meta-analysis determined that an increase in body mass index (BMI), waist circumference (WC), and other indicators of obesity were significantly linked

with a greater prevalence of periodontal disease. In addition to relating obesity to general chronic diseases, several authors have researching continuously which are supports the role of overweight and obesity as an independent risk factor for the increase of an aggravation of many chronic diseases.[23]

The biometric measurement for measuring obesity was determined by Body Mass Index hence it is an indicator for overall adiposity, and it was calculated from weight in kilograms divided by square height in meters and the World Health Organization had also recognized that BMI offers the most valuable population-level measure of overweight and obesity same for both sexes and as well as all ages of adults, therefore, in this study BMI was used as a tool to measure obesity.[24] The overall gingival index score 22.4% in the present study but in Bhardwaj et al 29.2%[25] and Kumar et al[26] had reported advanced prevalence rate.

This was in keeping with a number of studies which have suggested that obesity is associated with oral diseases, particularly periodontitis.[27] Previously results show that there are several factors, such as bad oral hygiene, diet, socioeconomic status, lack of access to oral health services had recognized to progression of periodontal disease in their studies. A statistically significant difference was found for age, gender, level of education, socioeconomic status, smoking, and alcohol however, this relationship was much stronger in individuals with severe periodontitis than in the subjects with moderate periodontitis. However periodontal disease is prevalent among developed countries.[28-29] In this study, there is a significant relationship between periodontal disease and socioeconomic status as well as educational levels.

One of the major limitations of this study was data collection was restricted to a single hospital, which might affect the generalizability of the study, therefore multicenter method suggested for future studies. In this study cross-sectional study design was used that's why it limits the ability to detect causality between obesity and periodontal disease, however, in this concern longitudinal study design will be require to explore cause and effect relationships as well as oral health-care professionals should take basic steps towards arranging dental screening camps among the exposed groups for early detection of periodontal disease and recognize patients at risk to advocate promotion of healthy dietary practices and physical activity to prevent the progression of obesity and periodontal disease.

Another limitations of this study was excluding the patients with systemic diseases, few may affect the BMI and periodontal status of an individual as well as we did not include the individual markers and confounding factors at a molecular level which may lead to obesity. However, participants self-reported their nutritional practices which may be a source of bias.

CONCLUSION

In this study there was a significant relationship between periodontal disease and socioeconomic status as well as educational levels, but further longitudinal / prospective studies are needed to address, if obesity is true risk factor for periodontitis. The obesity has been implicated as a risk factor for several systemic as well as local conditions including cardiovascular disease, diabetes, etc. Therefore, healthy nutrition and adequate physical activity prevent or reduces risk of developing obesity and benefits both general as well as oral health.

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4 Raza Abbas:	Data analysis.