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Assessment of Gender Based Difference in Occurrence of Periodontal Diseases: A Retrospective Study

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Abstract: Gingivitis is defined as the inflammation of the soft tissues of the oral cavity, without the apical migration of the junctional epithelium. Periodontitis is an inflammatory condition which affects the soft tissues leading to the apical migration of the junctional epithelium. The aim of the study was to assess the gender based difference in the occurrence of periodontal diseases. A retrospective study was conducted using the case records of patients in a private institution between June 2019 to March 2020. A total of 4000 patients were recruited. The study participants were divided into 2 based on gender (Group 1 - 2000 males, Group 2 - 2000 females). Data regarding the periodontal status of the patients were collected from their records. Descriptive and inferential statistics were done using SPSS software. Prevalence of periodontitis was higher among males (31.08%) when compared to females (27.28%). Prevalence of gingivitis was higher in females (22.73%) when compared to males (18.93%). There was a statistically significant association between the gender and periodontal disease ($p<0.05$). Also, the prevalence of periodontitis was higher among the age group of 56-65 years (19.38%) and gingivitis was higher among the age group of 15-25 years (19.85%). There was a statistically significant association between age and periodontal disease ($p<0.05$). The finding of the present study showed that prevalence of periodontitis was higher in males when compared to females.

Keywords: defense Age; Gender; Gingivitis; Periodontitis.

INTRODUCTION

Gingivitis is defined as the bleeding of the gums at least on one site of the tooth. It is a reversible dental plaque inflammation of the gingiva without clinical attachment loss or alveolar bone loss.(Nanaiah, Nagarathna and Manjunath, 2013),(Ramesh, Sheeja Saji Varghese, *et al.*, 2016) Gingivitis is established when the gum tissue is inflamed, with appearance of redness, edema, bleeding on probing, which is reversible, but may not progress to other areas leading to bone loss.(Thiele, Bolte and for the GME Study Group, 2011)

It is manifested by bleeding on probing. It is known to have a multifactorial etiology such as bacterial biofilm, genetic, socioeconomic status, demographic, iatrogenic, and behavioral factors. Factors which contribute to the formation of dental periodontal diseases are formation of biofilm, medication, systemic diseases, bruxism, nutritional deficiency, stress, smoking, hormonal changes, which leads to gingivitis and finally, leading to periodontitis. (Reddy, 2011),(Spezzia, 2017),(Ramesh, Sheeja S. Varghese, *et al.*, 2016)

There are different types of gingivitis such as plaque-induced, steroid hormone related, eruption, pregnancy etc. The most commonly diagnosed is plaque-induced gingivitis which is seen due to poor oral hygiene. (Locker, Slade and Murray, 1998),(Ramesh, Ravi and Kaarthikeyan, 2017) Gingivitis is of various types such as chronic gingivitis,(Thiele, Bolte and for the GME Study Group, 2011; Ramesh *et al.*, 2019) which may or may not be plaque induced, drug-related, steroid hormone related, pregnancy gingivitis, etc. The most common type is the chronic gingivitis. (Ramfjord, 1961),(Rao and Bharambe, 1993)

Periodontitis is defined as the apical migration of junctional epithelium, along with the alveolar bone loss.(Varghese *et al.*, 2015) It is known to be caused by various complex communities of the bacteria which are grown on the tooth surface, leading to the destruction of bone and the periodontium.(Mootha *et al.*, 2016) It is an inflammatory response leading to the tissue deterioration. (Chrysanthakopoulos, 2012),(Ravi *et al.*, 2017) Periodontitis is a chronic multifactorial disease characterized by an inflammation of the periodontal tissue

mediated by the host, which is associated with dysbiotic plaque biofilms, resulting in the progressive destruction of the tooth-supporting apparatus and loss of periodontal attachment. (Priyanka *et al.*, 2017)

Periodontitis is known to be caused by pathological microorganisms such as gram negative bacteria and anaerobes. Bacteria is the primary etiological agent known for the cause of periodontitis.(Thamaraiselvan *et al.*, 2015) Over 250 species are capable of colonizing in the mouth. But, the most common organisms responsible are Porphyromonas gingivalis, Prevotella intermedia, Actinobacillus Actinomycetemcomitans, as well as treponemes. (Kavarthapu and Thamaraiselvan, 2018),(Panda *et al.*, 2014) Macrophages are an important source of proinflammatory and potentially destructive molecules for tissues,(Ramamurthy and Mg, 2018) such as interleukin-1 (IL-1), tumor necrosis factor alpha (TNF-α), MMP, and prostaglandin E2, which play an important role and are elevated in the gingival tissue and in the gingival crevicular fluid of patients with chronic periodontitis. (Khalid *et al.*, 2016),(Khalid, 2017)

The development of gingivitis and periodontitis can be divided into a series of stages: initial, early, established, and advanced lesions. (Avinash, Malaippan and Dooraiswamy, 2017) It is well known that the microorganisms and immunological factors that play an important role. Clinical signs such as bleeding on probing, clinical attachment loss, calculus formation, loss of furcation and mobility are associated parameters of periodontitis. (Silveira *et al.*, 2019),(AlGhamdi *et al.*, 2020),(Breuer and Cosgrove, 1989)

Disproportionate disparities by gender were found to exist with respect to demographics and behavioural predictors. Males are found to be associated with periodontal diseases because of their poor oral hygiene and females due to the estrogen levels. (Liu *et al.*, 2018)

Our department is passionate about research we have published numerous high quality articles in this domain over the past years ((Kavitha *et al.*, 2014) , (Praveen *et al.*, 2001),(Devi and Gnanavel, 2014), (Putchala *et al.*, 2013), (Vijayakumar *et al.*, 2010), (Lekha *et al.*, 2014a, 2014b) (Danda, 2010) (Danda, 2010) (Parthasarathy *et al.*, 2016) (Gopalakannan, Senthilvelan and Ranganathan, 2012), (Rajendran *et al.*, 2019), (Govindaraju, Neelakantan and Gutmann, 2017), (P. Neelakantan *et al.*, 2015), (PradeepKumar *et al.*, 2016), (Sajan *et al.*, 2011), (Lekha *et al.*, 2014a), (Neelakantan, Grotra and Sharma, 2013), (Patil *et al.*, 2017), (Jeevanandan and Govindaraju, 2018), (Abdul Wahab *et al.*, 2017), (Eapen, Baig and Avinash, 2017), (Menon *et al.*, 2018), (Wahab *et al.*, 2018), (Vishnu Prasad *et al.*, 2018), (Uthrakumar *et al.*, 2010), (Ashok, Ajith and Sivanesan, 2017), (Prasanna Neelakantan *et al.*, 2015)

In this context, the present study was undertaken to assess the gender based differences in the occurrence of periodontal diseases.

MATERIALS AND METHODS

A retrospective study was conducted among 4000 patients in a private institution from June 2019 to March 2020. Prior permission to utilize the data for study and analysis was obtained from the Institutional Research Committee of the University under ethical approval number SDC/SIHEC/2020/DIASDATA/0619-0320. The study participants were divided into two groups based on gender (Group 1 - 2000 males, Group 2 - 2000 females). Both males and females of the age group 15-65 years of age were taken into account.

Consecutive sampling method was carried out. Cross verification of data was done via photographs, data evaluation was done with two reviewers and cross verified with third reviewer. Relevant data such as age and gender were recorded. Repeated and incomplete data records were excluded. Data was verified by an external reviewer. Data regarding the periodontal status of the patients were collected from the case records and analysed.

Data was retrieved and entered in Microsoft Excel sheet and later exported to SPSS software (version 23.0) for statistical analysis. Descriptive (frequency distribution and percentage) and inferential statistics (chi-square test) were done using SPSS software. Level of significance was set as $p<0.05$ for this study.

RESULTS AND DISCUSSION

A total of 4000 patients were recruited in the study. Among the 4000 patients, 2000 were males and 2000 were. Among 2000 males, 1243 (62.1%) were diagnosed with periodontitis, while 757 (37.9%) were diagnosed with gingivitis. Among 2000 females, 1100 (55%) were diagnosed with periodontitis, while 900 (45%) were diagnosed with gingivitis. Prevalence of periodontitis was higher in males than females. Association between gender and periodontal status was assessed using Chi-square test and was found to be statistically significant with the p value of 0.000. (Figure 1)

The study population was divided based on their age as follows: 15-25 years, 26-35 years, 36-45 years, 46-55 years and 56-65 years. Among 15-25 years, 794 (19.85%) had gingivitis and 6 (0.15%) had periodontitis. Among 26-35 years, 573 (14.33%) diagnosed with gingivitis and 227 (5.68%) had periodontitis. Among 36-45 years, 674 (16.85%) were diagnosed with periodontitis, while 126 (3.15%) were diagnosed with gingivitis. Among 45-55 years, 652 (16.30%) diagnosed with periodontitis, 126(3.70%) diagnosed with gingivitis. Among 56-65 years, 775 (19.38%) diagnosed with periodontitis, while 25 (0.63%) diagnosed with gingivitis. Prevalence of periodontitis was higher among patients within the age group of 56-65 years. Prevalence of gingivitis was

higher among patients within the age group of 15-25 years. Association between age and periodontal status was assessed using Chi-square test and was found to be statistically significant with the p value of 0.000. (Figure 2)
The present study assessed the association between periodontal diseases with age and gender. In the present study, it was reported that the prevalence of periodontal diseases was most commonly seen in the age group of 55-65 years. Genco et al stated that periodontal disease is more severe in elderly people because of cumulative tissue destruction. Age is also considered a risk factor for severe periodontal disease. (Genco, 1996) Our findings are in accordance with the previous study. Studies reported by Yadav et.al (Yadav, 2017) showed that periodontitis was less common among the adolescents aged between 15-25 years but few cases of gingivitis were in this age group. The most common reason stated for the gingival diseases was poor oral hygiene. Studies reported by Siddi et. al (Sidi and Ashley, 1984) reported that there was no significant relationship present between age and periodontal disease, which were similar to our results. The reason might be that oral hygiene can differ in different age groups. Our finding is in accordance with the previous study.
In our study, it was seen that males had high prevalence of periodontal diseases compared to female patients. Similar results were reported by Clerehugh et.al (Clerehugh, Tugnait and Chapple, 2019) that males had a higher prevalence to periodontal diseases as they have poorer oral hygiene when compared to female subjects. This finding was in accordance with our study. But, the studies reported by Lang et.al (Lang, Schätzle and Löe, 2009) reported that females had increased periodontal diseases than males due to increased estrogen level. Significant relationship was seen between gender and periodontal disease, and Lopez et. al, (López, Fernández and Baelum, 2006) reported that a significant relationship was seen with males showing a higher prevalence. Our finding is in accordance with the previous study.
The present study showed that prevalence of periodontitis was higher among males when compared to females. However the other risk factors associated with the development of periodontal diseases were not considered in the present study. Therefore, more studies need to be conducted to confirm this finding.

CONCLUSION

Within the limitations of the study, it can be concluded that prevalence of periodontitis was higher among males when compared to females. Also, there was a statistically significant association between gender and periodontal diseases.

Authors Contributions

Palak Mayur Shah performed the analysis, and interpretation and wrote the manuscript. Arvina Rajasekar contributed to conception, data design, analysis, interpretation and critically revised the manuscript. Manjari Chaudhary participated in the study and revised the manuscript. All the three authors have discussed the results and contributed to the final manuscript.

CONFLICT OF INTEREST

None declared.

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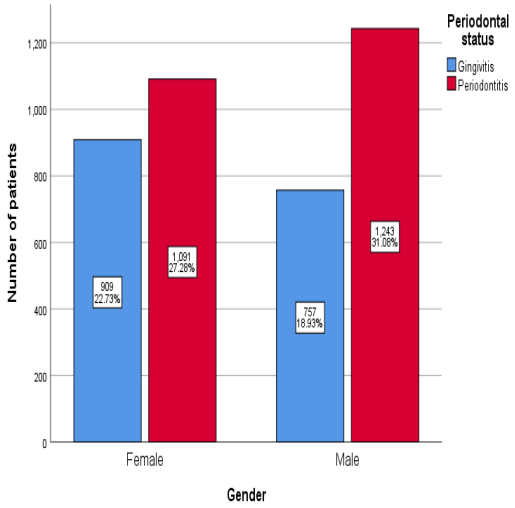

Fig.1: Bar graph depicting the association between the gender and periodontal diseases. X-axis depicts the gender of the patient and y-axis depicts the number of patients. From the graph it can be inferred that prevalence of periodontitis (red) was higher in males when compared to females. Whereas, prevalence of gingivitis (blue) was higher in females when compared to males. Pearson's chi-square, p value=0.000, (p<0.005). Thus, there is a significant association presence of gender and periodontal diseases.

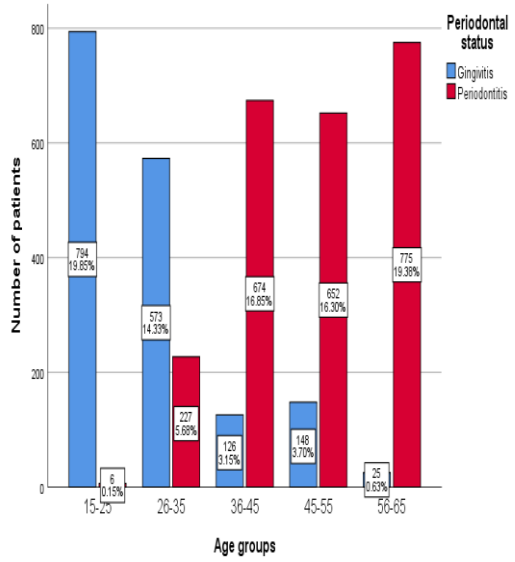

Fig.2: Bar graph depicting the association between different age groups and periodontal diseases. X-axis depicts the age group of the patient and y-axis represents the number of patients. From the graph it can be inferred that prevalence of periodontitis (red) was higher among patients within 56-65 years of age. Whereas, prevalence of gingivitis (blue) was higher among patients within 15-25 years of age. Pearson's chi-square, p value=0.000, (p<0.005). Thus, there is a significant association presence of age group and periodontal diseases.