

Association between Gender and Gingivitis among Adults - A Retrospective Study

Research Article

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Abstract

Gingivitis is the inflammation of gums most commonly caused due to plaque accumulation. It predisposes to periodontitis, which can have a negative effect on oral and overall health. Understanding how gender differences in oral health behaviours affect gingival condition may enable efficient prevention of periodontitis through improved therapeutic approaches against gingivitis. The aim of this study was to evaluate the association between gender and gingivitis among adults. A retrospective study was conducted using the patient records of University hospital from June 2019 - April 2020. The study population included adults with recorded gingival index scores. Consecutive case sheets with recorded gingival index scores irrespective of age was retrieved and analysed. Data was collected and then subjected to statistical analysis. Descriptive and inferential statistical tests were employed with a level of significance set at $p < 0.05$. The mean age among the patients with gingivitis was 35.55 ± 11.88 years. About 60.5% of the population were males and 39.45% were females. About 3.30% of males and 1.71% of females had severe gingivitis. Though there was a higher prevalence of gingivitis among males, there was no statistically significant association between gender and gingivitis ($p = 0.551$). There was a positive weak correlation between age and gingival index. Elderly males have high gingival index scores with no association between gender and gingivitis.

Keywords: Adults; Gingivitis; Gender; Oral health.

Introduction

The health of the oral cavity can have wide reaching effects on overall health [1, 2]. Poor oral health may occur concomitantly with a more serious underlying disease process or may predispose an individual to other health conditions [3, 4]. Protecting oral health is therefore critical in maintaining overall health [5, 6].

Periodontium refers to the supporting structures around the tooth - namely gingiva, cementum, periodontal ligament and alveolar bone [7]. Gingivitis is the inflammation of gums most commonly caused due to plaque accumulation [8]. The signs and symptoms include pain, swelling, bleeding on brushing and bleeding on probing etc. If left untreated it can lead to periodontitis and ultimately loss of teeth [9].

Oral health behaviors such as frequency of tooth brushing, use

of dental floss, and frequency of dental visits are associated with various factors, including knowledge, attitude, lifestyle, stress, education level, and socioeconomic status [10, 11]. Of these six factors, knowledge, attitude, and lifestyle have been related to gender differences [12, 13]. Understanding how gender differences in oral health behaviors affect gingival condition may enable efficient prevention of periodontitis through improved therapeutic approaches against gingivitis [14-16].

Sexual dimorphisms exist in the prevalence and severity of many human conditions and diseases [17]. Gender is known to be a modifier of the initiation & outcome of many conditions [18]. There are many oral lesions where gender plays an important role in the disease severity. Oral stomatitis, denture related hyperplasia and angular cheilitis were associated significantly with men than women [19]. The prevalence of HIV related oral lesions, especially oral candidiasis was higher in women when compared to men

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[20]. Men had a higher prevalence of dental caries when compared to women [21]. Establishing whether sex differences exist in the development and progression of gingivitis is important for both, understanding pathogenesis and developing models of risk assessment [22].

Previous studies have shown that gingival diseases have a higher prevalence among males than in females [23]. A study carried out to assess the gingival health status among men and women, has concluded that males have significantly higher levels of bleeding on probing than females [24]. It has been proven that females generally had a healthier lifestyle and better oral health when compared to males [25, 26].

The present study was carried out to establish gender differences in the prevalence of gingivitis which is important in treatment planning and prevention of periodontitis by early intervention. The aim of this study was to evaluate the association between gender and gingivitis among adults.

Materials and Methods

Study design and setting

This retrospective study was conducted by reviewing 86,000 case records of patients from authors University hospital for a period of ten months (June 2018 - April 2019).

Ethical approval

Prior permission to utilize the data for the study and analysis was obtained from the Institutional Research Committee of the University (SDC/SIHEC/2020/DIASDATA/0618-0319).

Data collection

Consecutive case records containing information about Loe and Silness gingival index score of adults pertaining to both males and females was retrieved. Case records with history of any systemic diseases and medications that affect gingival health were not included. Subjecting to the selection criteria; a total of 1833 patient records with the above mentioned information was obtained. After removing the duplicates and incomplete information records; a final data of 1759 patient records were entered and subjected to statistical analysis.

Loe and Silness gingival index

The gingival status of the patients was assessed using Loe and Silness Gingival Index (GI), 1963 which assess the gingival condition and record qualitative changes in the gingiva. It scores the marginal and interproximal tissues separately on the basis of 0 to 3.

The criteria are:

- 0= Normal gingiva;
- 1= Mild inflammation – slight change in color and slight edema but no bleeding on probing;
- 2= Moderate inflammation – redness, edema and glazing, bleeding on probing;

3= Severe inflammation – marked redness and edema, ulceration with tendency to spontaneous bleeding.

The bleeding is assessed by probing gently along the wall of soft tissue of the gingival sulcus. The scores of the four areas of the tooth (mesial, distal, middles and lingual/palatal) can be summed and divided by four to give the score for a tooth. The GI of the individual can be obtained by adding the values of each index tooth (16, 12, 24, 36, 32, 44) and dividing by the number of teeth examined. The Gingival Index may be scored for all four surfaces of all or selected indexed teeth (16, 12, 24, 36, 32, 44). The total gingival index score was interpreted as:

- 0.1-1.0 = mild inflammation;
- 1.1-2.0 = moderate inflammation
- 2.1-3.0 = severe inflammation.

The GI may be used for the assessment of prevalence and severity of gingivitis in populations, groups and individuals [27].

Statistical analysis

Data was recorded in Microsoft Excel 2016 (Microsoft office 10) and later exported to the Statistical Package for Social Science (SPSS IBM version 20.0) and subjected to statistical analysis. Descriptive statistics, Chi-square association, bi-variate correlation and One-way ANOVA tests were employed with a level of significance set at $p < 0.05$.

Results and Discussion

The mean gingival index among patients less than 20 years was 0.993 ± 0.514 , between 20 to 40 years was 1.079 ± 0.581 , between 40 to 60 years was 1.208 ± 0.602 and between 60 to 80 years was 1.304 ± 0.623 [Figure 1]. Tukey's HSD post hoc pairwise comparison shows a significant difference in mean gingival index among the age groups < 20 years and 40-60 years and 60-80 years ($p < 0.05$). A significant mean difference seen between 20-40 years and 40-60 years and 60-80 years of age groups ($p < 0.05$). No significant mean difference between the 40-60 years and 60-80 years age group. The significant mean difference in the gingival index score was due to difference in the age group < 20 years and 40-60 years, 60-80 years [Table 1].

Males had a higher prevalence of gingivitis (80.5%) when compared to females (39.45%) [Figure 2]. Among the male population, 31.61% had mild gingivitis, 25.64% had moderate gingivitis and 3.30% had severe gingivitis. In the female population, 20.81% had mild gingivitis, 16.94% had moderate gingivitis and 1.71% had severe gingivitis. Though there was a higher prevalence of gingivitis among males, chi-square test showed no statistically significant association between gender and gingivitis ($p > 0.05$) [Figure 3].

A bivariate correlation test between age and gingival index scores using Pearson's test had shown a significant weak positive correlation between age and gingival index scores with a correlation coefficient of $r = 0.122$ [Table 2].

The data for this retrospective study was based on residents of Chennai seeking treatment at private dental college in Chennai.

Figure 1. Mean distribution and mean comparison of gingival index among the age groups.

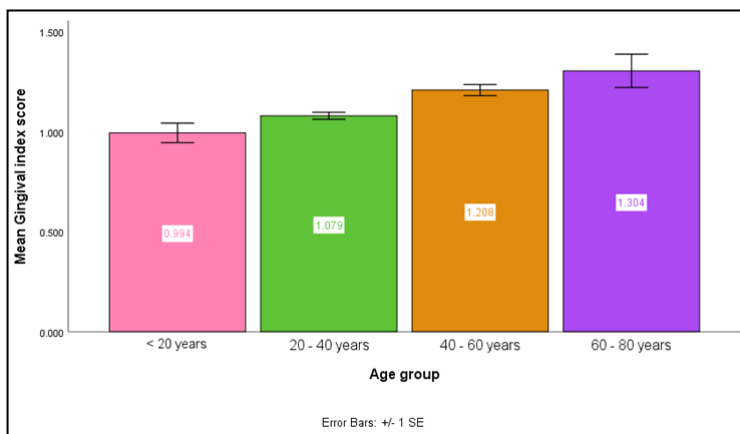


Table 1. Pair-wise comparison of mean gingival index using TUKEY’S HSD post hoc analysis.

Age group (I)	Age group (J)	Mean difference	P value	95 % Confidence Interval
< 20 years	40 - 60 years	-0.214	0.003	-.3727 to -.0554
< 20 years	60 - 80 years	-0.310	0.007	-.5567 to -.0638
20-40 years	40 - 60 years	-0.128	0	-.2108 to -.0458
20-40 years	60 - 80 years	-0.225	0.026	-.4304 to -.0186

Figure 2. Bar graph representing the gender distribution among patients with gingivitis.

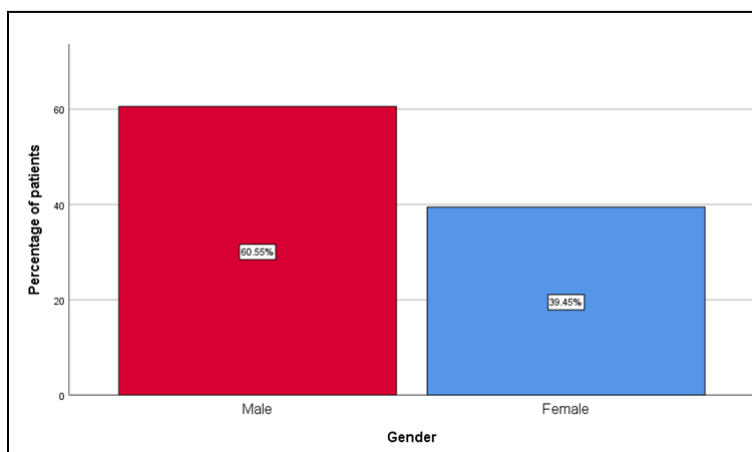


Figure 3. Clustered bar graph representing the association between gender and gingivitis among adult patients.

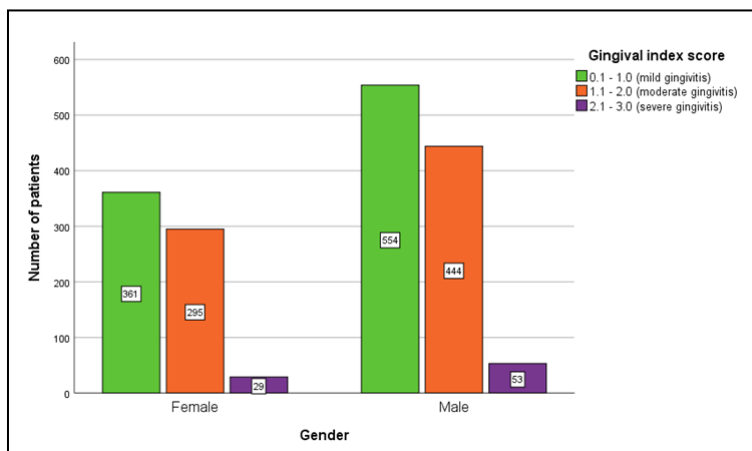


Table 2. Bivariate correlation between age and gingival index scores.

Independent Variable	Dependent variable	Pearson's Correlation coefficient (r)	P value
Age	Gingival index scores	0.122	0.000

Currently there are no existing studies investigating the association between gender and gingivitis among the South Indian population. The results of this study show that although there was higher prevalence of gingivitis among males, there was no significant association between gender and gingivitis among adults.

According to a study done by Sarah Ali et al, about the prevalence of gingivitis among patients visiting Islamic International Dental Hospital, out of the total sample 53% of males and 47% of females suffered from gingivitis. Hence he concluded that there was no significant association between gender and gingivitis [28].

Another study by Orozco et al., on Mexican population, showed that 47.7% of men and 41% of women had gingivitis, showing a male predilection, however there was no statistically significant association between gender and gingivitis [29]. In a survey by Abrahamson et al, it was revealed that there was higher prevalence of plaque and gingivitis among male than female adolescents but none were statistically significant [30].

A study by Kailio et al, showed no gender predilection for gingivitis among adolescents in Helsinki [31]. In contrast to this study, Chelani L et al concluded that there were significant differences between males and females ($P < 0.001$) when the oral health status was compared [32].

Also, another study by Augusta R et al, showed statistically significant association between gender and the prevalence of gingivitis, with 72% of males and 28% females being affected [33]. The reason why gingivitis was more prevalent among males though females have many contributing factors for gingivitis like puberty, pregnancy, menopause ...and hormonal alterations was because females had better oral health behaviours and a healthier lifestyle than males. Males are more prone to gingivitis because of tobacco smoking and a general lack of concern for gingival health.

Even though a few studies show a significant association between gender and gingivitis, the majority of highly cited literature concludes that gender based differences among gingival diseases is not very significant, thus being in agreement with the findings of the present study [34, 35].

The results of this study have to be interpreted with the geographic limitation of the study population. Hence it cannot be generalized to other adult populations of geographic and cultural variation.

Conclusion

Within the limits of this study, there was a significant weak positive correlation between age and gingivitis with no association between gender and gingivitis among adults. Elderly males have high gingival index scores. Emphasis on oral hygiene instructions and patients should be educated about the importance of gingival health.

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