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Prevalence and Severity of Gingivitis Among 19–22-Year-Old Patients Attending Private Dental College, Chennai: A Hospital Based Cross-Sectional Study

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Abstract: Gingivitis is the most common form of periodontal disease which is considered to be the second most common oral disease affecting more than 75% of the population worldwide. The main objective of this study was to evaluate the prevalence and severity of gingivitis among 19-22 years old South-Indian population visiting Saveetha dental college , Chennai. This study included the data of 165 patients who visited Saveetha Dental college in the period of June 2019 - March 2020. The required data was collected from the patient records and their Gingival index score was taken into account. Data was entered in Microsoft excel spreadsheet and analysed using IBM SPSS software version 20.O(Armonk, NY: IBM. Corp).Numerical data were presented as mean and standard deviation values. For the test, a p value of <0.05 is to be considered statistically significant.Shapiro Wilks test used to test the normality of the data set.Gingival index scores were continuous variables. Hence, it was presented as mean and standard deviation values. Independent T test was used to find the difference between the different age groups and gender with respect to the mean Gingival index score. Of the 165 people, 109 were male and 56 were female patients of the age group 19-22 years. Gingivitis is found to be more severe in 21-22 year old patients than patients who are 19-20 years old. Also, Gingivitis is highly prevalent in the male population with the mean gingival index score of 1.29 than females.

Keywords: Adults ; Gingival index ; Gingivitis ; innovation; Prevalence.

INTRODUCTION

Gingivitis is one of the most commonly seen diseases in humans.(Addy and Adriaens, 1998) (Mohapatra et al., 2019) It involves only the inflammation of gingival tissue and is reversible when appropriate treatment measures are used.(Prabakar, John and Srisakthi, 2016; Prabakar, John, Arumugham, Kumar and Sakthi, 2018a) Gingivitis is the gingival inflammation in the absence of clinical attachment loss.('Parameter on plaque-induced gingivitis. American Academy of Periodontology', 2000) Redness, edema, and bleeding on probing characterize this condition.(Ower, 2003)When treated, gingivitis is reversible with no permanent damage. Untreated cases may lead to a more complex and destructive entity known as chronic periodontitis,(Baehni and Takeuchi, 2003) which has been linked to various systemic conditions(Craig, 2009) (e.g. cardiovascular diseases, ischemic stroke, diabetes mellitus), as well as tooth loss. Consequently, prevention of plaque accumulation and early treatment of gingivitis reduces the risks associated with the development of a more destructive periodontal disease.(Baehni and Takeuchi, 2003)

Numerous treatment methods and approaches have been used along with receiving professional care such as regular dental prophylaxis, patients can choose from various oral hygiene products for controlling plaque-induced gingivitis. Studies have demonstrated good oral hygiene practices, including tooth brushing and flossing, using proper mouthrinses, and receiving periodical dental prophylaxis, can maintain gingival health.(Ower, 2003; S and Shetty, 2016) Also, various toothpastes and mouthrinses, which have been shown to be effective in controlling gingivitis, have become widely available to the public.(Mallatt et al., 2007; Dadlani, Mehta and Triveni, 2010) Numerous methods and approaches, including dietary modifications, have been used for combating gingivitis.(Prabakar, John, Arumugham, Kumar and Srisakthi, 2018)(Kannan et al., 2017; Kumar and Preethi, 2017; Kumar, Pradeep Kumar and Vijayalakshmi, 2017)Studies show that good oral hygiene

practice including proper tooth brushing usage of mouthwash reduces gingivitis. (Pavithra and Jayashri, 2019; Samuel, Acharya and Rao, 2020)With recent advances toothpaste and mouth rinses show to be effective in reducing and controlling the gingival inflammation. (Khatri et al., 2019; Mathew et al., 2020)

The clinical features of gingivitis are the following signs : erythematous and spongy , changes in contour, bleeding upon stimulation, presence of calculus and crystal bone loss. Clinically the severity of gingival inflammation can be expressed by the means of gingival index by Löe and Silness. According to this gingival index, gingival inflammation can be classified as mild , moderate and severe.

Understanding the epidemiological pattern of gingival inflammation is essential for planning appropriate public health services. (Leelavathi, 2019; Neralla et al., 2019)It has been clearly demonstrated that plaque induced gingivitis is common in all ages of dentate population.(Prabakar, John, Arumugham, Kumar and Sakthi, 2018b; Pratha and Prabakar, 2019) In recent decades, cross-sectional and longitudinal epidemiological studies on periodontitis were performed in Chile by Gamonal J et al , and in Brazil by Haas et al. (Gamonal et al., 2010; Haas, Wagner and Oppermann, 2014)

According to WHO , oral health is integral to general health which is essential for the well-being of the human population . Surveillance of oral health should be properly done at regular intervals to ensure good oral hygiene .Studies focusing on the prevalence and/or severity of gingivitis and plaque in South Indian adult populations are few. Most research has involved patients of little diversity in gender, age, and/or occupations, had a small pool of participants, and/or provided inadequate demographic information of the study population.Consequently, it is necessary to determine the prevalence and severity of gingivitis and plaque in South Indian adults in order to help develop oral hygiene products that will be applicable to the Indian population.

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). Therefore the aim of this retrospective study was to investigate the prevalence and severity of gingivitis among 19-22 year old adults visiting Saveetha dental college, Chennai, India**.**

MATERIALS AND METHODS

Study design

In this cross sectional study, Data of 165 patients in the age group of 19-22 years old visiting Saveetha dental college were collected from Dental records. At data extraction all information was anonymised and tabulated into a spreadsheet.

Ethical Approval

The study was commenced after approval from the institutional review board (Ethical approval number : SDC/SIHEC/2020/DIASDATA/0619-0320).

Informed consent

A written informed consent was obtained from all the study subjects.

Subjects and Procedures

Data were collected from June 2019 to March 2020 The following data retrieved from the dental records: patient age , gender, and Gingival index score .

Inclusion criteria :

- Patients in the age group of 19-22 years
- Patients with approved gingival index form
- Limited time period- June 2019- March 2020

Exclusion criteria :

- Patients without gingivitis
- Patients with developmental and systemic disorders.

Assessment of Gingival status using Gingival Index (Loe and Silness;1963)

Gingival index was recorded for the entire dentition and in all the surfaces of the teeth prior to oral prophylaxis. The surfaces include

- Distobuccal
- Mid Buccal
- Mesiobuccal
- Palatal surface.

The scores are

- Score 0 - No inflammation.
- Score 1 - Mild inflammation , slight change in colour , slight edema , no bleeding on probing.
- Score 2 - Moderate inflammation , moderate glazing, redness , bleeding on probing.
- Score 3 - severe inflammation , marked redness and hypertrophy , ulceration , tendency to spontaneous bleeding.

Statistical analysis:

- Data was entered in Microsoft excel spreadsheet and analysed using IBM SPSS software version 20.O(Armonk, NY: IBM. Corp).
- Numerical data were presented as mean and standard deviation values. For the test, a p value of <0.05 is to be considered statistically significant.
- Shapiro Wilks test used to test the normality of the data set.
- Gingival index scores were continuous variables. Hence, it was presented as mean and standard deviation values
- Independent T test was used to find the difference between the different age groups and gender with respect to the mean Gingival index score

RESULTS AND DISCUSSION

The study population was split into two age groups 19 to 20 years (49.09%) and 21 to 22 years (50.91%) and included 165 patients among which 33.94% were females and 66.06% were males. These are also depicted in the figure 1 and figure 2 respectively. Table 1 and 2 depicts the Shapiro Wilks test used to test the normality of the data set between the age group and gender with the Mean Gingival Index score respectively. The tests were found to be statistically not significant which signifies that the data follows the Normal distribution (Bell curve).
Table 3 and Figure 3 depicts the comparison of age with mean gingival index score. The mean for the age group of 19 to 20 years was 1.13, and the deviation was 0.94. For 21 to 22 years the mean value was 1.36 and the standard deviation was found to be 0.19. The P value was found to be 0.52 -statistically insignificant and Independent t test value was 0.64.
Table 4 and Figure 4 depicts the comparison of gender with mean gingival index score. The mean gingival index score for females was 1.16 and the standard deviation was 1.06. For males the mean was found to be 1.29 and standard deviation was 1.02 . The P value was 0.73 . Independent t test value was 0.33.
Gingivitis is a reversible type of periodontal disease in which inflammation is limited to the gingiva without further destruction of the tooth-supporting components .(Li et al., 2010) It is regarded as the second main and commonly occurring oral malady following dental caries, disturbing more than 75% of the populace global wise.(Califano and Research, Science and Therapy Committee American Academy of Periodontology, 2003; Rebelo et al., 2009; Angst et al., 2013) The incidence of gingival inflammation varies in the conducted studies among the different countries as a consequence of diversity in the studied populations, the age of the included subjects, and the methods of recognising and diagnosing this condition.
Epidemiological studies discovered that plaque-induced gingivitis starts early in children, and becomes more common and aggressive with age and widely spreads among all ages.(Jain et al., 2009, 2012; Gopinath, 2010; Ababneh, Abu Hwaij and Khader, 2012; Chrysanthakopoulos, 2016) It is caused by the increased accumulation of plaque biofilm near the gingival margins. The clinical features characteristic of this gingival inflammation are the erythematous and spongiotic texture of the gingiva; contour alterations; provoked bleeding; and occurrence of calculus, or plaque with no loss of clinical attachment, or radiographic substantiation of crestal bone resorption . (Jordan et al., 2011; Oswal, 2013) Dental professionals advocated efficient oral hygiene measures to maintain optimal oral health aiming at controlling dental plaque and managing the inflammatory products liberated during the interactions between pathogenic microbiota and host response.(Poyato-Ferrera, Segura-Egea and Bullon-Fernandez, 2003; Marsh, 2012; Mizutani et al., 2012)
Clinically, the sternness and signs of the inflamed gingiva can be assessed by Gingival index (GI) of Loe and Silness .(Loe and Silness, 1963; Löe, 1967) In regards to this index, inflamed gingiva can be categorised as mild, moderate, or severe. The occurrence of these symbols of inflammation is regarded as the early phase of the more severe and irreparable form of periodontal destruction as in periodontitis cases. A subject's vulnerability to extend this form of the disease also is greatly inconsistent and is dependent on the host retort towards perio-

pathogens (Lang, Schätzle and Löe, 2009; Broadbent et al., 2011; Pari et al., 2014), which might be controlled by both acquired and genetic factors that can alter the vulnerability to infectivity (Antunes et al., 2008; Marsh, 2012). Avoidance of dental biofilm is amassing and untimely treatment of gingival inflammation diminishes the dangers aligned with the advancement of other serious and ruinous appearance of periodontitis . (Baehni and Takeuchi, 2003; Oswal, 2013) It is reported that gingivitis occurs past 10 - 21 days of biofilm amassing, (Jain, 2013) requiring a regular endeavour to counteract plaque accumulation. A few mulls over found a noteworthy relationship between diminishing the frequency of gingivitis and normal biofilm control procedures.

The prevalence of gingivitis in adulthood is difficult to be estimated worldwide as a result of differences in study population , genetics and environmental factors. In addition the presence of different clinical methods for defining gingivitis and absence of clear objective cut off points between health and disease adds difficulty. Many previous studies estimated that prevalence of adult gingivitis varies approximately 50-100 % for dentate patients.(Gamonal et al., 2010) In this study the prevalence of gingivitis was found to be greater in 21 to 22 year old people.

Zhang et al reported gingival inflammation to be more in males than females which was similar to our results (Zhang et al., 2010) Li et al reported that the gingival inflammation should be present at three or more sites to be considered as gingivitis.(Li et al., 2010) In contrast , our criterion for defining gingivitis was inflammation in at least one site and this illustrates the higher prevalence of this disease in our study when compared to others.

In the study by Idrees et al,(Idrees et al., 2014) higher prevalence was found to be in males along with bleeding gingiva of about 28.8%. Also a higher prevalence of bleeding gingiva among males was reported in Australian population in 2009. (Australia.* et al., 2008). Our results are consistent with many previous studies that revealed a significant association of the male gender with gingivitis. This may be because males are less likely to visit the dentist and also have a poor attitude towards health due to increased work stress. This study has limitations due to a very narrow age group and also based on a single centre . However the prevalence and other results are consistent with many other articles.

CONCLUSION

In our study, the prevalence of gingivitis was found to be higher in the age group of 21 to 22 years old and is more severe in males than females. Further research is warranted to identify the factors that might contribute to the high prevalence of gingivitis. Community preventive programmes should be assessed and re-implemented on a larger scale for effective learning importance of gingival health and overall oral health among patients.

Author Contributions

We thank all the above mentioned authors for their valuable support and contribution to this study.

Conflicts of Interest

There are no conflicts of interest.

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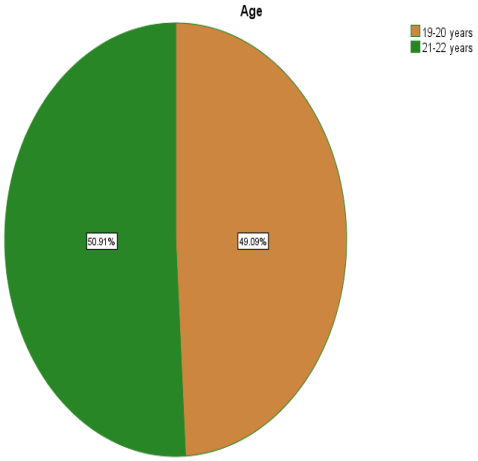

Fig.1: depicts the distribution of study subjects based on Age. 49.09% of the patients are in the age group of 19-20 years (Brown) and 50.91% of the patients are in the age group of 21-22 years (Green).

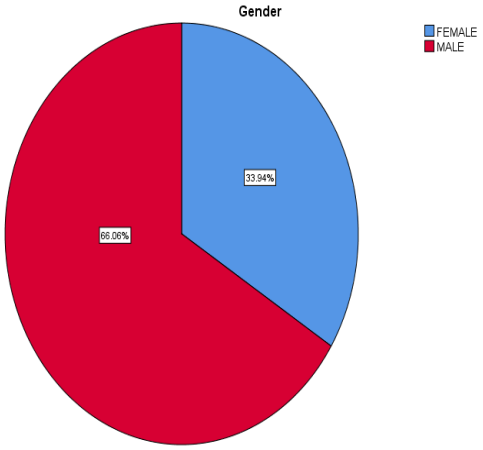

Fig.2: depicts the Pie chart on distribution of study subjects based on Gender , where 33.94% were Females (Blue) and Males were about 66.06% (Red).

Table 1: depicts the Shapiro Wilks test used to test the normality of the data set between the age group and Mean Gingival Index score. The test was found to be statistically not significant which signifies the data follows the Normal distribution (Bell curve).

Tests of Normality	Age	Shapiro-Wilk test	
		Statistic	Sig.
Mean Gingival Index score	19-20 years	0.611	0.06
	21-22 years	0.187	0.09

Table 2: depicts the Shapiro Wilks test used to test the normality of the data set between Gender and Mean Gingival Index score. The test was found to be statistically not significant which signifies the data follows the Normal distribution (Bell curve).

Tests of Normality	Gender	Shapiro-Wilk test	
		Statistic	Sig.
Mean Gingival Index score	Female	0.55	0.08
	Male	0.56	0.07

Table 3. depicts the Comparison of Age with Mean Gingival index score.The difference was found to be statistically not significant using the Independent t test (t value- 0.64; p>0.05). Even though the test was statistically not significant, it was found that 21-22 years age group was found to have a higher mean Gingival Index score of 1.36±0.19 than 19-20 years (1.13±0.94)

Variable	Age	Mean	Std. Deviation	Independent "t" Test	P value
Mean Gingival Index	19-20 years	1.13	0.94	0.64	0.52
	21-22 years	1.36	0.19		

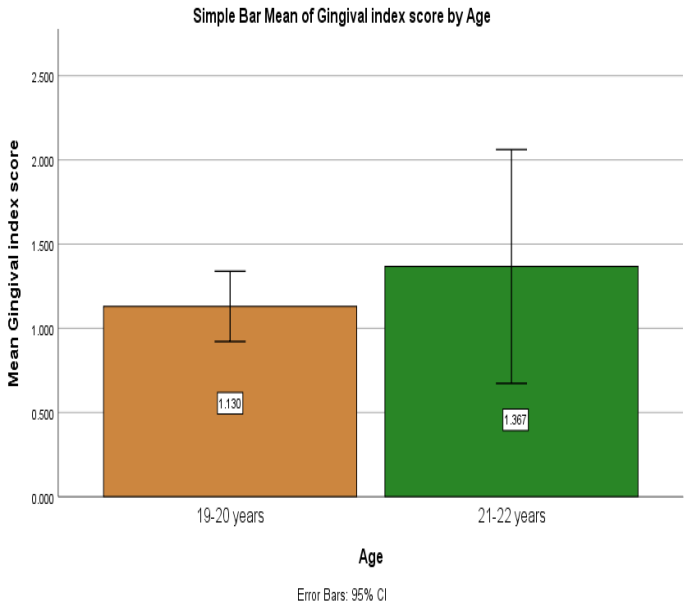

Fig.3: Bar chart depicts the comparison of Age with Mean Gingival index score. X axis represents the Age of the study population ; 19-20 years (Brown) , 20-21 years (Green). Y axis represents the Mean Gingival index score. The difference was found to be statistically not significant using the Independent t test (t value- 0.64; p>0.05). Even though the test was statistically not significant, it was found that the 21-22 years age group was found to have a higher mean Gingival Index score of 1.36±0.19 than 19-20 years (1.13±0.94).

Table 4: depicts the Comparison of Gender with Mean Gingival index score . The difference was found to be statistically not significant using the Independent t test (t value- 0.33; p>0.05). Even though the test was statistically not significant, it was found that Males had a higher mean Gingival Index score of 1.29±1.02 than Females (1.16±1.06)

Variable	Gender	Mean	Std. Deviation	Independent "t" Test	P value
Mean	Female	1.16	1.06		0.73

Gingival Index	**Male**	**1.29**	**1.02**	**0.33**	

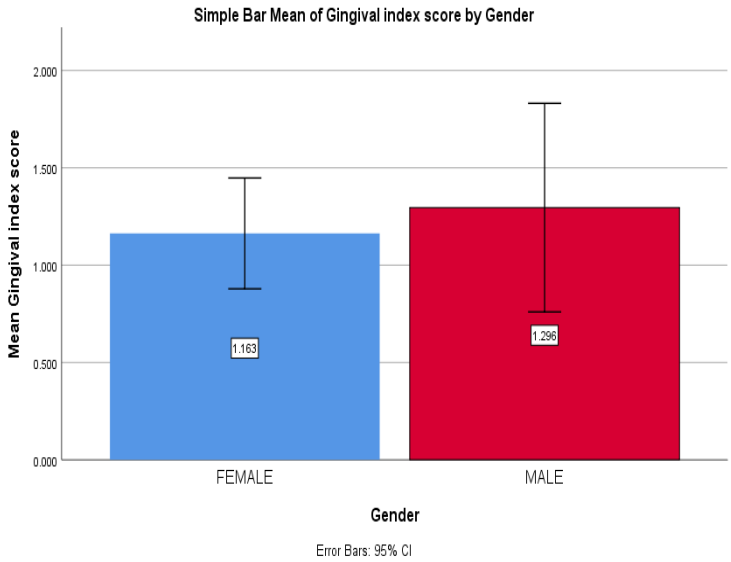

Fig.4: depicts the comparison of Gender with Mean Gingival index score . X axis represents the Gender , Females (Blue) and Males (Red). Y axis represents the Mean Gingival index score. The difference was found to be statistically not significant using the Independent t test (t value- 0.33; p>0.05). Even though the test was statistically not significant, it was found that Males had a higher mean Gingival Index score of 1.29±1.02 than Females (1.16±1.06)