

## **Prevalence of Gingivitis among Pregnant and Non-Pregnant Women**

Type of study: Retrospective study

Running title: Prevalence of gingivitis among pregnant and non-pregnant women

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## ABSTRACT

Good oral health is important across a person's lifespan. Pregnancy is a transient physiological state which brings about different hormonal changes in a woman's body, which lead to changes in the oral cavity. These changes have important implications as they have been known to cause adverse pregnancy outcomes. This study aims to evaluate the prevalence of gingivitis among pregnant and non-pregnant women. This retrospective study was done by analysing the case records of 300 patients in a private institution between June 2019- March 2020. Out of 300 patients, 150 were pregnant and 150 were non-pregnant. Data regarding their periodontal status was collected from the case records and analysed. Descriptive statistics and inferential statistics were done using SPSS Software, Version 23. Pregnant women had a higher prevalence of gingivitis (40.3%) and periodontitis (6.0%). Whereas, most of the non-pregnant women had clinically healthy gingiva (30%). The association between periodontal status and the pregnancy status was statistically significant. In age wise assessment, prevalence of clinically healthy gingiva (15.7%), gingivitis (28.7%) and periodontitis (3.3%) were high among the 26-30 year old patients, however the association between different age groups and the periodontal status was statistically not significant. The present study suggested that pregnant women had a higher prevalence of gingivitis and periodontitis and was more common within the age group of 26-30 years.

**Keywords:** Gingivitis; Hormones; Oral health; Pregnancy.

## INTRODUCTION

Effective and adequate care is important in order to maintain good oral health for a lifetime. The importance of maintaining good oral hygiene is not just limited to prevention of dental caries and periodontal problems, but also to improve the overall general health status of an individual [(Hein and Williams, 2017)]. Previous studies have shown that there is a direct correlation between oral health and general systemic health of an individual and it is said to have a positive impact on life [(Azarpazhooh and Leake, 2006)], [(Mealey, Oates and American Academy of Periodontology, 2006)], [(Winning and Linden, 2017)]. However, special care is required when it comes to oral health in women. Oral health care is much more important during pregnancy, breastfeeding, and menopause as these conditions have a tendency to modify the overall health status in women [(Kessler, 2017)]. The importance of oral health in pregnant women is of utmost importance, since not only does it have a direct effect on the pregnant mother but also on the future of the child [(Laine, 2002)].

Pregnancy causes a variety of generalized changes in a woman's body due to the hormonal fluctuations that occur during this period [(Gupta and Acharya, 2016)]. The increased secretion of hormones, namely estrogen and progesterone, may result in different signs and symptoms which can alter the person's overall health and perceptions [(Carrillo-de-Albornoz *et al.*, 2010)]. Various forms of localized effects are also seen within the oral cavity. The effects of these hormones on the hard and soft tissues of the oral cavity during pregnancy

have been reported [(Gupta and Acharya, 2016)],[(Vt *et al.*, 2013)],[(Shamsi *et al.*, 2013)]. The most common are the conditions affecting periodontal health and include gingivitis and periodontitis [(Laine, 2002)].

Estrogen and progesterone could exacerbate the inflammatory response in dental plaque resulting in severe forms of gingivitis [(Gürsoyet *al.*, 2008)],[(Tilakaratneet *al.*, 2000)],[(Morelli *et al.*, 2018)] . Due to increased production of oestrogen and progesterone during pregnancy, there is an increased development of gingivitis and periodontitis. This is attributed to increased vascular permeability and tissue oedema [(Gürsoyet *al.*, 2008)],[(Straka, 2011)]. Pregnancy tumor, which is a reactive growth is commonly seen in the gingiva during pregnancy [(Gondivkar, Gadmail and Chole, 2010)]. The incidence of dental caries also increases due to changes in oral hygiene practices and dietary habits [(Evans and Briggs, 1994)]. A study conducted in Iraq supports this and reported a significant difference in decayed teeth among pregnant women and non pregnant women [(Khamrco and Saleh, 2003)]. Frequent episodes of nausea and vomiting during pregnancy lead to erosions of the teeth [(Laine, 2002)]. Overall, there is an increased incidence of infectious diseases which could have deleterious effects. It should be kept in mind that pregnancy related effects have a negative impact not only on the mother, but also on the infant if it's not handled properly [(Rainchuso, 2013)].

Similarly, the increased circulating hormonal levels may tend to worsen the pre-existing periodontal conditions. According to previous reports it has been stated that the incidence of pregnant women suffering from periodontal diseases ranged from 30% to 100% [(Gupta and Acharya, 2016)], while some studies have shown that an association between periodontitis and adverse pregnancy outcomes [(Han, 2011)]. Few studies have suggested periodontitis to be a potential risk factor for preterm birth [(Han, 2011)],[(Offenbacheret *al.*, 1996)]. A systematic review has stated that a woman's risk of having a preterm birth is significantly reduced by scaling and root planing during pregnancy [(Dasanayake, 2012)]. Other adverse risks related to periodontitis include miscarriage, stillbirth, pre-eclampsia and intra-uterine growth retardation. A case of perinatal death in relation to periodontitis has been reported in an Australian study [(Shubet *al.*, 2009)].

Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Arigaet *al.*, 2018; Basha, Ganapathy and Venugopalan, 2018; Hannah *et al.*, 2018; Hussainyet *al.*, 2018; Jeevanandan and Govindaraju, 2018; Kannan and Venugopalan, 2018; Kumar and Antony, 2018; Manohar and Sharma, 2018; Menon *et al.*, 2018; Nandakumar and Nasim, 2018; Nandhini, Babu and Mohanraj, 2018; Ravintha and Jayalakshmi, 2018; Seppanet *al.*, 2018; Teja, Ramesh and Priya, 2018; Duraisamyet *al.*, 2019; Gheena and Ezhilarasan, 2019; Hema Shree *et al.*, 2019; Rajakeerthi and Ms, 2019; Rajendran *et al.*, 2019; Sekaret *al.*, 2019; Sharma *et al.*, 2019; Siddique *et al.*, 2019; Janani, Palanivelu and Sandhya, 2020; Johnson *et al.*, 2020; Jose, Ajitha and Subbaiyan, 2020).

Previously our team had conducted numerous clinical studies [(Avinash, Malaippan and Dooraiswamy, 2017)],[(Kavarthapu and Thamaraiselvan, 2018)],[(Khalid *et al.*,

2016)],[(Khalid *et al.*, 2017)],[(Panda *et al.*, 2014)],[(Ramesh, Sheeja S. Varghese, *et al.*, 2016)],[(Ramesh *et al.*, 2019)], [(Ravi *et al.*, 2017)], [(Varghese *et al.*, 2015)], [(Thamaraiselvan *et al.*, 2015)], [(Ramesh, Ravi and Kaarthikeyan, 2017)], [(Sharma *et al.*, 2012)], [(Ramesh, SheejaSaji Varghese, *et al.*, 2016)], [(Ramamurthy and Mg, 2018)] and systematic review [(Moothaet *et al.*, 2016)] over the past 5 years. At present we are focussing on epidemiological studies. In this context, this study aims to evaluate the prevalence of gingivitis among pregnant and non-pregnant women.

## **MATERIALS AND METHODS**

### **Study design and study setting**

This retrospective study was conducted to evaluate the prevalence of gingivitis among pregnant and non-pregnant women in a private institution from June 2019 to March 2020. The study was initiated after approval from the institutional review board-SDC/SIHEC/2020/DIASDATA/0619-0320

### **Study population and sampling**

Inclusion criteria for the study were patients between the age group of 20-35 years. The exclusion criteria was missing or incomplete data. After assessing 86000 case sheets in the university patient data registry, consecutive case records of 300 patients (150 pregnant women, 150 non-pregnant women) were included in the study. Cross verification of data for errors was done with the help of an external examiner.

### **Data collection and tabulation**

Data regarding the patient's periodontal status were collected from the case records and analysed. Based on the clinical parameters like probing pocket depth, clinical attachment level and mobility, patients' periodontal status was categorized into clinically healthy gingiva, gingivitis and periodontitis. A single calibrated examiner evaluated the case records of 300 patients who reported from June 2019 to March 2020.

### **Statistical analysis**

The collected data was tabulated and analysed with Statistical Package for Social Sciences for Windows, Version 20.0 (SPSS Inc., Chicago, IL, USA) and results were obtained. Descriptive statistics was done. Categorical variables were expressed in frequency and percentage; Chi-square test was used to test associations between categorical variables.  $p$  value  $< 0.05$  was considered statistically significant.

## RESULTS

Out of 300 patients, 150 were pregnant and 150 were non-pregnant. Out of 150 pregnant women, 3.7% had clinically healthy gingiva, 40.3% had gingivitis and 6.0% had periodontitis. Out of 150 non-pregnant women, 30.0% had clinically healthy gingiva, 18.3% had gingivitis and 1.7% had periodontitis. Pregnant women had a higher prevalence of gingivitis (40.3%) and periodontitis (6.0%). Whereas, most of the non-pregnant women had clinically healthy gingiva (30%). The association between periodontal status and the pregnancy status was found to be statistically significant with the p value of 0.000 (Figure 1).

The study subjects were divided based on their age as follows: 20-25 years, 26-30 years and 31-35 years. Among 20-25 years, 6.3% had clinically healthy gingiva, 12.0% had gingivitis and 1.3% had periodontitis. Among 26-30 years, 15.7% had clinically healthy gingiva, 28.7% had gingivitis and 3.3% had periodontitis. Among 31-35 years, 11.7% had clinically healthy gingiva, 18.0% had gingivitis and 3.0% had periodontitis. The prevalence of clinically healthy gingiva (15.7%), gingivitis (28.7%) and periodontitis (3.3%) were high among the age group of 26-30 years. The association between different age groups and periodontal status was found to be not statistically significant with the p value of 0.918 (Figure 2).

## DISCUSSION

Our study results show that pregnant women had higher prevalence of gingivitis and periodontitis than non-pregnant women. This is similar to the study done by Patil et al. [(Patil *et al.*, 2018)] which was conducted to evaluate the occurrence of dental caries and gingivitis among pregnant women and non-pregnant women, in which 303 pregnant and 238 non-pregnant women were recruited. Gingivitis was reported in 71.9% of pregnant women and 60% of the non pregnant women. A significant difference ( $p=0.0007$ ) was found between pregnant women and nonpregnant women in relation to gingivitis. It was stated that pregnant women were 1.94 times more likely to suffer from gingivitis compared to nonpregnant women. Similarly, Kashetty et al. [(Kashetty *et al.*, 2018)] reported that the mean gingival index score of the pregnant group (1.25) was found to be significantly higher ( $p = 0.005$ ) than that of the nonpregnant group (0.82). Moreover, el-Ashiry et al. [(el-Ashiry *et al.*, 1971)] and Samant et al. [(Samant *et al.*, 1976)] stated that the majority of nonpregnant women had mild type of gingivitis as 86% and 75%, respectively, and they also found severe type of gingivitis only in pregnant groups with 42% and 6.6%, respectively. The increased severity of gingivitis during pregnancy has been also reported by Emmatty et al. [(Emmatty, Mathew and Kuruvilla, 2013)] However, it has been stated that healthy gingiva is unaffected by pregnancy, and complications are only a reaction caused by increased plaque and gingivitis [(of Pediatric Dentistry and Others, 2011)]

It was also seen in our study that prevalence of gingivitis and periodontitis was high among 26-30 year old patients. Study results of Patil et al. [(Patil *et al.*, 2018)] are in accordance with our study. She stated that the age group above 25 years had a higher prevalence of

gingivitis (57.8%) than those below the age of 25 years (42.2%). Some studies have also stated the prevalence of gingivitis and periodontitis in young adults. Ababneh et al. [(Ababneh, Abu Hwaij and Khader, 2012)] said that gingivitis was most commonly reported among those 20-29 year old patients (76.5%) and Taani and Quteish et al. [(Taani and Quteish, 2004)] reported that bleeding on probing scores was highest in the 20-29 group (19.5%). Moreover, Mugeiren et al. [(Mugeiren, 2018)] showed that the prevalence of gingivitis and periodontitis among 20–34 years (61.4%) was higher than that of other age groups, while Balaji et al. [(Balaji, Lavu and Rao, 2018)] reported an increased prevalence of gingivitis in a younger age group. According to the World Health Organization [(Organization and World Health Organization, 1971)], the age group 35-44 years was considered to be the most affected group because they revealed signs of oral diseases, and different forms of periodontal diseases at this stage.

Alterations in estrogen and progesterone levels have shown to affect the immune system and the rate and pattern of collagen production in the gingiva. Both these conditions reduce the ability of the body to repair and maintain gingival tissues. Hence, women are more likely to develop gingivitis during their period of pregnancy. Increase in the rate of estrogen metabolism and in synthesis of prostaglandins by the gingival tissues was found to contribute to the gingival changes observed during pregnancy [(Mitalet *et al.*, 2013)].

Administration of vitamin C, Ca, P, and Fl are thought to provide beneficial effects [(Morelli *et al.*, 2018)]. Pregnant women who have attachment loss have a higher risk of giving birth to low birth weight babies when compared to those with healthy periodontium[(Teshome and Yitayeh, 2016)]. Periodontal diseases, if left unattended, may lead to many systemic diseases, including gestational complications. Due to the above conditions, preventive procedures for oral hygiene are extremely important [(Vasiliauskiene *et al.*, 2007)].

Our institution is passionate about high quality evidence based research and has excelled in various fields ( (Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; VijayashreePriyadharsini, SmilineGirija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; VijayashreePriyadharsini, 2019; Chandrasekar *et al.*, 2020; Mathew *et al.*, 2020; R *et al.*, 2020; Samuel, 2021)

## CONCLUSION

Within the limitations of our study, it can be concluded that prevalence of gingivitis (40.3%) and periodontitis (6.0%) was higher among pregnant women and was most common in the age group of 26-30 years. Also, the association between periodontal status and the pregnancy status was found to be statistically significant.

## ACKNOWLEDGEMENT

The authors of this study would like to express their gratitude towards everyone who facilitated and enabled us to carry out this study successfully.

## AUTHOR'S CONTRIBUTION

First author (Fathima BareeraRezvi) performed the analysis, and interpretation and wrote the manuscript. Second author (Dr.Arvin Rajasekar) contributed to conception, data design analysis, interpretation and critically revised the manuscript. Third author (Dr.Manjary Chaudhary) participated in the study and revised the manuscript. All the authors have discussed the results and contributed to the final manuscript.

## CONFLICT OF INTEREST

Nil

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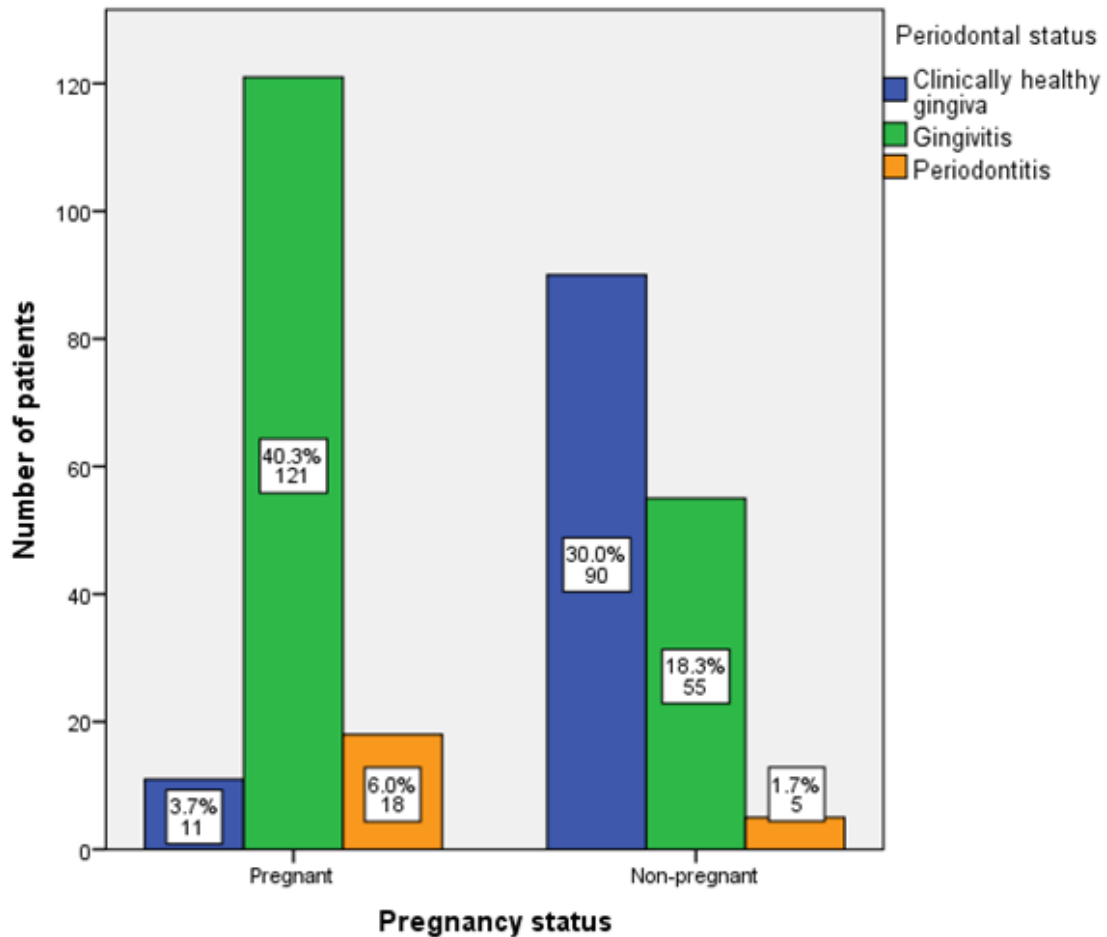


Figure 1: Bar chart represents the association between periodontal status and the pregnancy status. X axis represents the pregnancy status and Y axis represents the number of patients exhibiting a particular type of periodontal status. Prevalence of gingivitis (40.3%) was high among pregnant women, whereas most of the non-pregnant women had clinically healthy gingiva (30%). The association between periodontal status and the pregnancy status was statistically significant. [Pearson Chi square = 93.890, df = 2, p = 0.000 (p<0.05)]

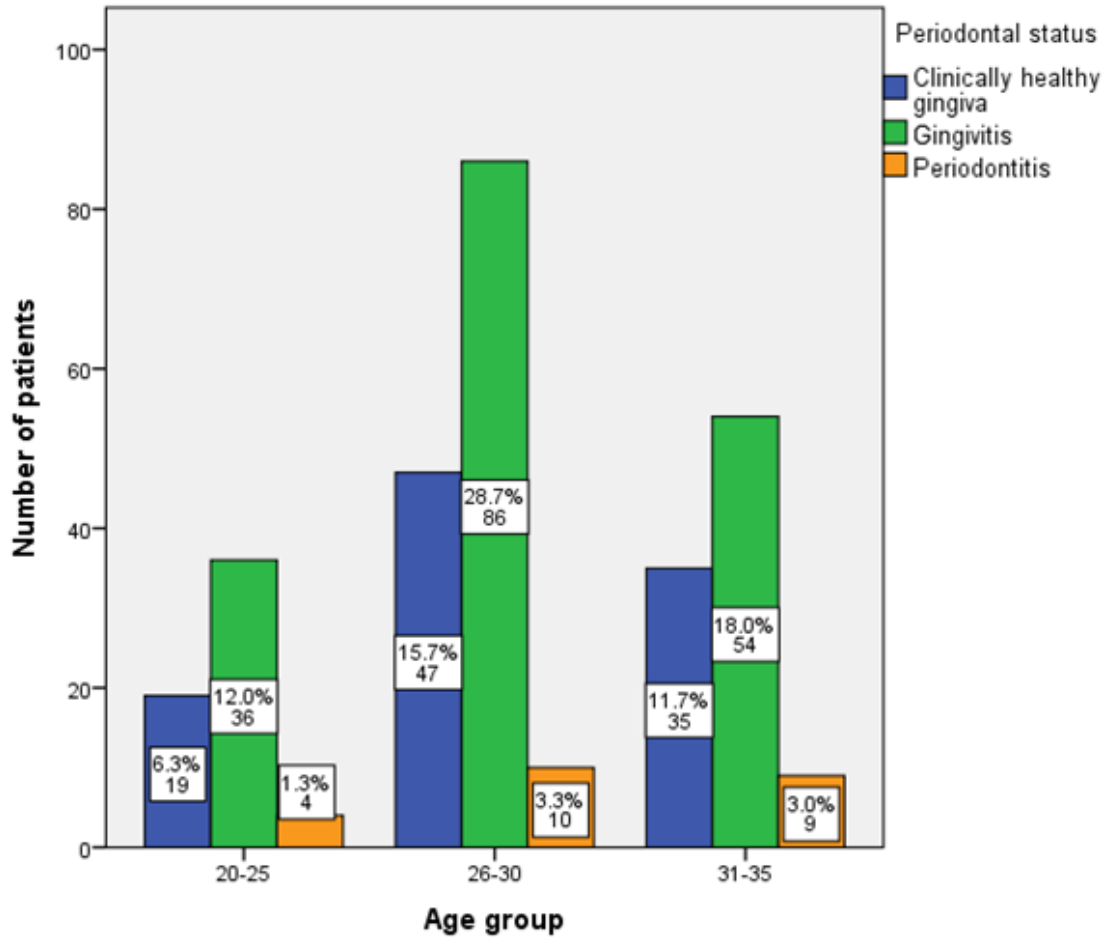


Figure 2: Bar chart represents the association between different age groups and periodontal status. X axis represents the different age groups and Y axis represents the number of patients exhibiting a particular type of periodontal status. Prevalence of clinically healthy gingiva (15.7%), gingivitis (28.7%) and periodontitis (3.3%) were high among the 26-30 year old patients. The association between different age groups and periodontal status was statistically not significant. [Pearson Chi square = 0.947, df = 4, p = 0.918 (p>0.05)]