

## Menstruation and its Effect on Periodontium: A Myth or Reality

Nagappa Guttiganur<sup>1</sup>, Prerana Mahapatra<sup>2</sup>, Shivanand Aspalli<sup>3</sup>,  
S Gomathi Sai Krishna<sup>4</sup>, Monisha V R<sup>5</sup>

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### Abstract

Females are more susceptible to periodontal diseases because of the influence of sex hormones in the body. These sex hormones are believed to be risk factors for periodontitis because of their ability to proliferate specific periodontal micro-organisms and affect the host immunologic response. The aim of the study was to compare the gingival status of female patients at menstrual age and pre-menopausal age. *Materials and Methods* - The study sample comprised of 50 female patients divided into 2 groups. Group A consisted of 25 subjects aged 20-25 years and Group B consisted of 25 subjects aged 45-50 years. The clinical parameters like GI, PI and BI were recorded for all the patients. Results were obtained, and 2 groups were compared based on collection and the statistical analysis of the data. Statistical analysis of data were carried out using mean  $\pm$  standard deviation (SD), p-value, t-test between two groups; For GI, PI and BI there was a highly significant difference between both the groups. It was concluded that premenopausal women had a greater chance of having gingivitis as compared with the menstrual age group.

**Keywords:** Menstruation; Gingivitis; Estrogen; Sex hormones; Progesterone.

### INTRODUCTION

The endocrine system releases hormones that are important regulatory molecules having potential outcomes on mouth including the periodontium. Periodontitis is a multifaceted disease with microbial dental plaque as the

pioneer of periodontal disease. However, the disease progression and manifestation are influenced by a broad diversity of factors and determinants. The inter relationship between systemic and periodontal disease is the strongest type of causal relation. Women's life cycle changes present unique challenges to the oral health care profession. Hormonal influences associated with reproductive process alter periodontal and oral tissue responses to local elements. The life span of a female consists of different stages like puberty, menstruation, pregnancy and menopause and the hormonal influences associated with these stages alter periodontal and oral tissue responses to local elements.<sup>1</sup>

Increase in the inflammation of gingiva, bleeding gums, GCF from the crevice and the existence of oral ulcers are outlined during the menstrual cycle.<sup>2</sup>

**Author's Affiliation:** <sup>1</sup>Professor, <sup>2,4,5</sup>PG, <sup>3</sup>HOD, Department of Periodontics and Oral Implantology, AME's Dental College, Bijangera Road, Raichur, Karnataka 584103, India.

**Corresponding Author:** Prerana Mahapatra, P.G., Department of Periodontics and Oral Implantology, AME's Dental College, Bijangera Road, Raichur, Karnataka 584103, India.

**E-mail:** mahapatraprerana3@gmail.com

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Muhlemann gave the terminology gingivitis inter menstrualis and was the first person to describe changes in the gingiva during the menstrual cycle, like a condition of bright and haemorrhagic lesions in the interdental papilla.<sup>1</sup>

The menstrual cycle is basically divided into 4 phases that is (1) menstrual phase, (2) follicular phase (3) Ovulation phase (4) Luteal phase. The menstrual phase lasts for 3-7 days and there is rise of progesterone and estrogen levels. The follicular phase lasts for 16 days and reports a release of follicle stimulating hormone. The ovulation phase lasts for 3 days reporting a rise in the lutenizing hormone causing an impact on the estrogen levels. The last phase is luteal phase which lasts for 11-17 days and reports a rise in the progesterone levels in the female's body and a mild rise in the estrogen levels as well.<sup>3</sup> In the course of days before the onset of menstruation there is again a drop of the progesterone hormonal level. The transition of menopause, is stated as the years as well as the months during the last menstrual period, and is brought about by decrease in the follicular count and ova, inability to respond to pituitary GnRH, FSH and LH and a consequent decrease in the levels of oestrogen level.<sup>1</sup> The time period just before the menopause is called as the pre-menopausal period and it occurs during the age of 45-50 year in a lifespan of a female. Studies done by Varghese et al state that there is an elevation in the assembly of progesterone hormones at the post-menopausal period.<sup>1</sup> The increase in the progesterone hormone levels affects the periodontal and gingival tissues in various ways such as there is inhibition of synthesis of collagen in the fibroblasts of periodontal ligament, inhibition of rapid growth of fibroblast of the human gingiva, it affects the dilatation of the capillaries and blood vessels, thus upregulating its permeability, there is increase in the regulation of PGE<sub>2</sub>. It also expands the folate breakdown which is essential for repair and maintenance of tissues. Estradiol, a sex steroid hormone produces estrogen which causes alterations in vasculature of tissues which are targeted in females reviving the blood flow in endometrium causing rise of estrogen in plasma during the follicular phase. The levels of estrogen consequently decline during luteal phase thereby rising the levels of progesterone and

causing changes at the cellular level of gingiva.<sup>5</sup>

This clinical study aims to assess and compare the gingival status of females among the menstrual and the pre menopausal age group.

## MATERIALS AND METHODS

Fifty female patients were categorized as two groups. Group A comprised of twenty-five subjects in the age span of 18-25 years and were designated as Menstrual Age. Group B comprised of twenty-five subjects of 45 -50 years age and were designated as pre-menopausal age. The selection of subjects was done randomly from the Periodontics Department, A.M. E's Dental College & Hospital, Raichur, after receiving consent were registered, based on inclusion and exclusion criteria.

### Inclusion Criteria

- Systemically healthy females.
- All the natural teeth present
- Patients on menstrual cycle which is regular.

### Exclusion Criteria

- Females who have attained their menopause.
- Pregnant or lactating females.
- Patients who are on medications.
- Patients who have received periodontal therapy during preceding 6 months.

An UNC-15 probe was used for recording the different clinical parameters which included plaque index, gingival index modified sulcular bleeding index. A single examiner made all the measurements to reduce errors. After the recording clinical parameters in the two groups, the overall gingival status was calculated and the results were obtained.

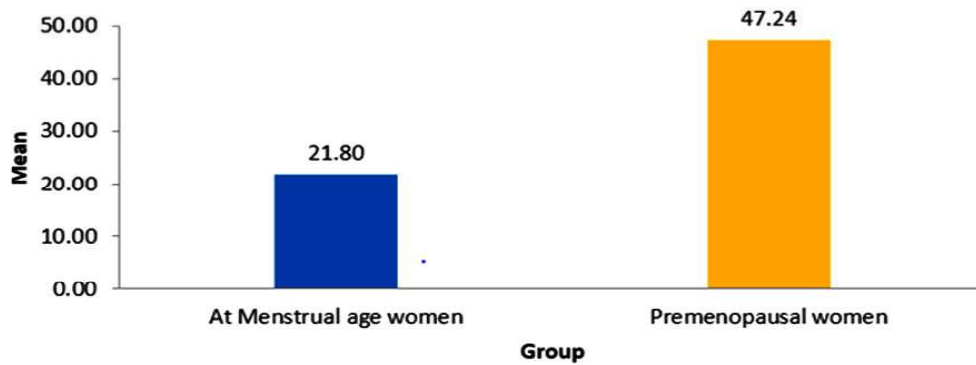
**Statistics** – The data was assembled and statistical analysis was obtained using unpaired t test.

## RESULTS

The mean age of menstrual females was 21.80 years where as for the pre-menopausal age group the mean value was recorded as 47.24 years (Table 1).

**Table 1:** Mean age comparison between at menstrual age group women and premenopausal age women.

Group	N	Min	Max	Mean	SD	Mean difference	t value	P value
At Menstrual age women	25	20.00	25.00	21.80	1.66	25.44	42.944	<0.001 S
Premenopausal age women	25	40.00	51.00	47.24	2.45			

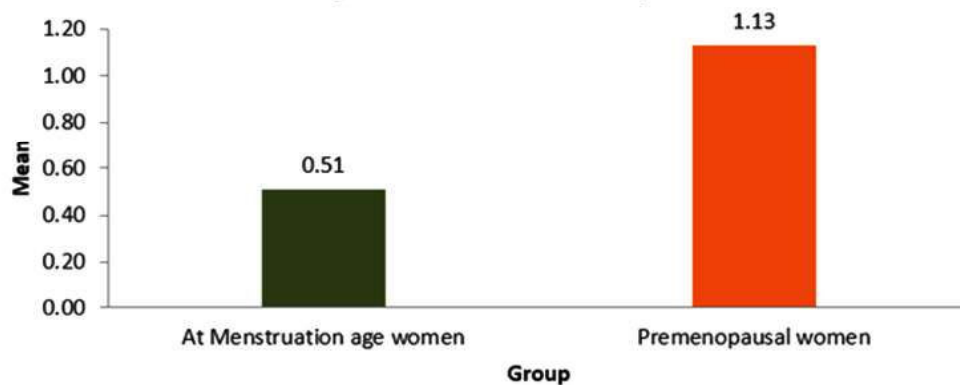


Graph 1: Mean age comparison between at menstrual age group women and premenopausal age women.

On inter-group comparison mean gingival index score showed a difference that was statistically significant among pre-menopausal (1.13) and menstrual age group (0.51) ( $p < 0.001$ ) (Table 2).

**Table 2:** Inter-group comparison of gingival index comparison between at menstrual age group women and premenopausal women.

Group	N	Min	Max	Mean	SD	Mean difference	t value	P value
At Menstrual age women	25	0.00	1.00	0.51	0.28	0.62	7.262	<0.001 S
Premenopausal age women	25	0.60	1.80	1.13	0.32			

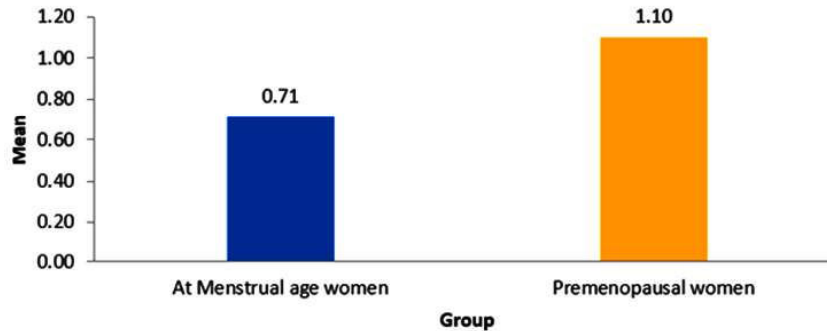


Graph 2: Inter-group comparison of gingival index comparison between at menstrual age group women and premenopausal women

The mean plaque index score for pre-menopausal group as 0.71 which didn't depict a difference that was statistically significant ( $p < 0.001$ ) (Table 3).

**Table 3:** Inter-group comparison of plaque index comparison between at menstrual age women and pre-menopausal women.

Group	N	Min	Max	Mean	SD	Mean difference	t value	P value
At Menstrual age women	25	0.10	2.00	0.71	0.48	0.39	3.331	0.002 S
Pre-menopausal women	25	0.30	1.60	1.10	0.32			



Graph 3: Inter-group comparison of plaque index comparison between at menstrual age women and premenopausal women.

## DISCUSSION

During the pre-menstrual period, because of certain hormonal changes despite less concentration of plaque deposition there is prevalence of gingivitis. Increase in the progesterone levels leads to rise in the blood vessels' permeability and in turn affect the pattern of production of collagen at cellular levels.<sup>6</sup> It is unquestionably feasible that the gingival connective tissue reacts in the same way as that of other tissues of the body to alterations in activity of endocrine system. It is accepted that because of changes at physiochemical levels in periodontal ligament cells, this event is reported in subjects with or without periodontal disease.<sup>1</sup> In 1993 Miyagi et al. found that sex hormones significantly enhanced synthesis of prostaglandin E<sub>2</sub> (PGE<sub>2</sub>). PGE<sub>2</sub> plays an essential part in inflammation of the periodontium. They also studied the consequences of estrogen & progesterone hormones on PGE<sub>2</sub> synthesis by peripheral monocytes. The levels of the two hormones resulted in increased PGE<sub>2</sub> production. This elevated progesterone could turn up the inflammatory process in gingiva.<sup>7</sup>

In our study, the females at their pre-menopausal period were more inclined to have gingivitis consequently leading to periodontitis in contrast to the menstrual age group females. This was due to the fact that estradiol which is steroid hormone affects the proliferation and production of the cells thus leading to decrease production of protein in the fibroblasts of gingiva. This proliferation of cells results due to a certain colony of cells within the culture of the parents' tissues that counters to estradiol concentration at physiological levels.

There is a decrease in the levels of estrogen at the luteal phase. On the contrary, progesterone has a minimal effect on the blood vessels of systemic target tissues. In addition, progesterone decreases corpuscular flow rate, allowing for inflammatory

cell accumulation, thereby having an effect on the proliferation and permeability of blood vessels.

In our study on comparing either of the groups the premenopausal women showed to have a higher gingival index score, plaque index score and bleeding index score which indicates that out of the two groups the premenopausal age group are more vulnerable to have gingivitis. This was due to the fact that because of the hormonal changes in females, there is a decrease in the estrogen and multiplication in the progesterone hormone at the premenopausal and perimenopausal phase of a women's life.<sup>8</sup> There has been evidence showing that impact of progesterone affects the accumulation and proliferation of inflammatory cells which leads to the infection and delineation of the cells leading to gingivitis, further if left untreated leading to periodontitis.<sup>9</sup>

This was in comparison to a study done by Varghese and Madhubalain 2016 where they had done a comparative analysis of Periodontal status of Premenopausal women and Postmenopausal women and they had found that postmenopausal women had a great chance of having periodontitis in contrast to premenopausal women.<sup>1</sup>

Later in another study which was conducted in 2019 by Wulandari et al, where they had obtained a valuable information regarding periodontal severity in perimenopausal and post-menopausal women.<sup>6</sup>

Another study conducted by Aspalli et al in 2018 where the authors had evaluated the gingival status of women at their menstrual age and had concluded that ovarian hormones like estrogens & progesterone have a direct impact on the gingiva at inflammatory levels in healthy premenopausal women resulting in an increased bleeding at certain times during the menstrual cycle.<sup>4</sup>

Hence, this is the first of its kind of study where

we evaluated the gingival status of menstrual and pre-menopausal women and compared their gingival status for prevention of diseases affecting periodontium and more of such studies at biochemical and pathological levels have to be done with a larger sample size and longer follow up period.

## CONCLUSION

Within the limitations of the clinical research it was seen that the pre-menopausal females have an increased tendency for getting affected by gingivitis leading to periodontitis if not treated at the correct time. Although there was an aggregation of different local factors in the menstrual age group females but the disease progression rate was mild in contrast to the pre-menopausal age group females. Gingivitis could be exacerbated by the prevalence of hormonal factors involved. Hence, females have to be educated and motivated for maintaining the hygiene of the mouth and proper routine dental visits have to be done before it turns into a destructive periodontal disease. The medical fraternity especially the gynecologists should have proper knowledge to educate and motivate their patients about the significance of maintaining hygiene of the mouth by referring their patients to the periodontists. Awareness should also be created at government and private sectors for maintaining hygiene of patients especially at 45 – 50 years of age as that particular age is more predisposed to have oral diseases.

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