



# Correlation Between Menstrual Cycle Phases and Post-Operative Pain in Female Patients Undergoing Third Molar Extractions - An Observational Study

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## KEYWORDS

Post operative pain perception, menstrual cycle, ovulation, Oral surgery, Discomfort.

## ABSTRACT:

**Aim and Objective:** The objective is to assess the alterations of post operative pain perception in patients undergoing third molar surgery in the menstrual, follicular, ovulation and luteal phase of menstrual cycle.

**Methodology:** 60 female patients, indicated for third molar extraction were grouped based on the phase of menstrual cycle they are in. The post operative pain was evaluated using VAS scale and the results were analysed.

**Results:** The results demonstrated that while the pain declined across time in every group, it was highest in the luteal phase at all time points, followed by menstrual and was the lowest in the ovulatory group.

**Conclusion:** The phase of menstrual cycle has an effect on the post operative pain and discomfort.

## 1. Background

Epidemiological evidence on clinical pain widely suggests that men and women differ in their perception of it, in that females tend to experience greater pain intensity, lower tolerance and lower pain threshold to experimentally induced pain. (1) While these results are ambiguous and subject to controversy (2), it is fair knowledge that the perception of pain depends upon a multitude of confounding factors, one of which has been found to be hormonal. Bergland Et al. conducted an animal study which proved that exogenous administration of lutenising hormone in female rats increased their sensitivity to nociceptive stimuli and diminished the analgesic effects of morphine by desensitising the brain opiate receptor mechanisms (3). In terms of human clinical pain, certain studies have been done to evaluate the same across the menstrual cycle. LeResche Et al. noted that TMD pain in women is highest at times of lowest estrogen, but rapid estrogen change may also be associated with increased pain. (4) Goolkasian Et al. found women with normal menstrual

cycle experienced heightened pain during ovulation. (5) This could be attributed to heightened progesterone (physiological) as well as psychological factors such as increased anxiety as a result of the pre menstrual syndrome. With regard to minor oral surgery, this coherence might hold significance in terms of patient management, treatment planning as well as pharmacotherapy. (2)

This study aims to assess the correspondence between the various phases of menstrual cycle and post operative pain in patients undergoing third molar extractions.

## 2. Objective

The objective is to assess the alterations of post operative pain perception in patients undergoing third molar surgery in the menstrual, follicular, ovulation and luteal phase of menstrual cycle.

## 3. Materials and Methods

Study design: A prospective observational study was conducted at the department of oral and maxillofacial



surgery, Saveetha dental college, Chennai. Ethical clearance was obtained prior to the initiation of the study.

**Participants:** The participants included 60 female patients aged 18-35 years with regular menstrual cycles. Patients excluded from the study were those with:

- irregular menstrual cycles
- use of hormonal contraceptives or hormonal therapy
- Systemic illnesses, bleeding disorders or chronic pain conditions
- Current use of analgesics or psychiatry medications.

Standardisation was done as follows:

- All the surgical extractions were performed by a single oral surgeon.
- Difficulty level of the extractions were harmonised by using the wharfe scale- only cases with score of 10-16 were included.

The patients were further classified into 4 groups based on their menstrual phase I.e. menstrual, follicular, ovulation and luteal which was obtained by the history given by the patients and calculated from the last date of commencement of menstruation.

Phases of menstrual cycle:

1. Menstrual phase: Days 1-5
2. Follicular phase: Days 6-12
3. Ovulatory phase: Days 13-15
4. Luteal phase: Days 16-28

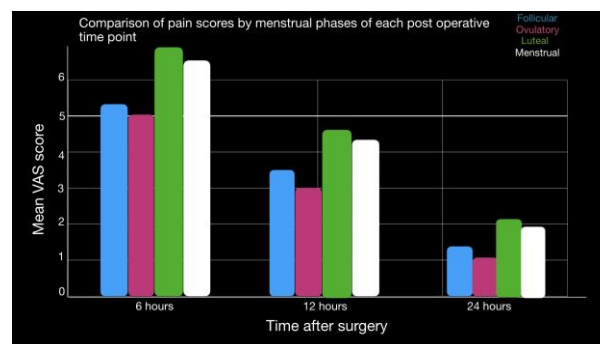
Standard scrubbing and draping was done and the surgical, extraction was performed by a standardised procedure.

The post operative pain was assessed at 6, 24 and 72 hours after the surgery using the Visual Analogue Scale which is a simple, one-dimensional scale where patients visually represent their pain intensity. The VAS line is anchored with descriptive words at each end and the score is determined by measuring the distance in millimetres from the "no pain" end to the patient's mark. Higher scores indicate greater pain intensity.

**Statistical analysis:** Data was analysed using SPSS v25. According to the normality test results, Mann-Whitney U test was used for comparisons between two groups.

Kruskal-Wallis H test was used for comparisons between three or more groups and significance value was kept at  $P < 0.05$ .

#### 4. Results



**Figure 1**

The results demonstrated that while the pain declined across time in every group, it was highest in the luteal phase at all time points, followed by menstrual and was the lowest in the ovulatory group. (Figure 1) These results were statistically significant ( $P < 0.05$ ) for all.

#### 5. Discussion

Most women begin menstruating around the age of 12, which marks the start of regular hormonal cycles. These cycles bring about monthly biological and physiological changes, mainly due to the rise and fall of estrogen and progesterone. Apart from regulating ovulation and menstruation, these hormones also affect pain sensitivity, stress levels, and inflammatory responses. (11)

As of today, there's a severe paucity of studies investigating the differences in pain perception and stress levels due to oral surgery between genders and between women in different phases of the menstrual cycle. Silveira *et al.* (10) reported that women have significantly higher levels of sudden and constant anxiety than men, which could lead to significantly different pain perception levels. Besides this, sex hormones have also said to alter vascular permeability and sensitivity of inflammatory mediators. (8)

Iacovides *et al.* (9) stated that only a few studies investigated the relationship between the menstrual cycle and pain perception. They argued that the physiological effects of the hormonal cycle occur mostly depending on progesterone and estrogen levels.



This study demonstrated that the level of pain perception was significantly different in patients going through various stages of menstrual cycle. The luteal phase concurred with the highest level of pain. This can be correlated to the increased progesterone levels during this phase, which activate the inflammatory and pain response. (9) Furthermore, patients appeared the most comfortable during the ovulatory phase of the menstrual cycle, which may be because of the increasing estrogen levels in this phase. Our results are concurrent with recent studies done by Geçkil Et al (1) which demonstrated least pain and anxiety levels in the luteal phase post operatively. Furthermore, Benediktsdóttir Et al. (11) found significantly higher levels of pain and edema in female patients as compared to their male counterparts.

Studying this is essential to anticipate post operative pain and discomfort, and to devise a custom treatment plan. This could potentially reduce the complications caused by increased stress levels, significantly lower the blood pressure and thereby improve the overall experience of the patient. However, the study also has some limitations. Firstly, the inclusion criterion of regular menstruation extended the study period to reach a sufficient number of patients. The second major limitation is the estimation of the menstrual cycle phase based on patient reports without gynaecological examination. The subjectiveness of the study is attributed to the use of VAS scale as an indicator of pain perception. The study can be advanced further by the use of hormonal assays to objectively correlate hormone levels and pain perception in female patients. Regardless, it paves way for further research in sex based treatment planning and sheds light on an important factor affecting patient care.

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