ORIGINAL RESEARCH

# Detection and Comparison of the Parathyroid Hormone Level with Periodontal Status of Pregnant Women

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## Abstract

**Background:** This study aims to detect and compare the parathyroid hormone levels with the periodontal status of pregnant women longitudinally throughout their pregnancies.

**Methods:** A longitudinal study evaluated 20 pregnant respondents that reported to the Gynaecology Department of SGT Medical College, Hospital & Research Institute, Gurugram, Haryana, India were evaluated throughout the entire duration of their pregnancy. The respondents were surveyed for oral health awareness, oral hygiene practices, and oral health knowledge using a self-administered questionnaire in both Hindi and English. The pregnant respondents were evaluated for their oral health status with the help of the community periodontal index for treatment needs. (CPITN). Further, for the detection of the parathyroid hormone levels, the blood sample was withdrawn from the pregnant respondents when they reported for their routine check-ups. We drew 2 mL of venous blood in a plain vial, and the serum was assayed for parathyroid hormone (PTH) level by the using chemiluminescent microparticle immuneassay (CMIA) method. The PTH levels were then compared with the periodontal status of the pregnant respondents and checked for their association.

**Results:** The pregnant respondents evaluated for their oral health awareness exhibited unawareness regarding their oral hygiene, the pregnant respondents didn't comply with the required oral hygiene practices, and the oral hygiene knowledge was found to be severely diminished in the pregnant respondents. *Post hoc* comparison using Mann Whitney *U* test showed a significant difference only when community periodontal index (CPI) score two was compared with CPI score three rest of all the pairs failed to reach the level of statistical significance. Parathyroid hormone levels were found to be significantly more among subjects having CPI3 as compared to CPI2 readings.

**Conclusion:** Through this study, it was concluded that there is an increased need for gynecologists and dentists to work in coalition regarding the all-around health of pregnant women. The importance of the parathyroid hormone being evaluated during the pregnancy was that the PTH levels of the pregnant women were correlated to their periodontal findings as they progressed in their pregnancies.

**Keywords:** Parathyroid hormone, Periodontal Status, Pregnancy.

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## Introduction

Research indicates that gum disease in pregnancy can lead to adverse outcomes such as low birth weight and premature births. Maintaining oral health during pregnancy has been recognized as an important public health issue worldwide.[1,2]

The first trimester (conception to 14 weeks) marks the most important pregnancy period characterized by rapid cell division and proliferation.[3,4] The fetus at this point in time is at the highest risk from teratogens and infections.[5] The major point of focus in dental care for pregnant mothers should be proper oral hygiene maintenance.[6] The dental treatments are limited to oral prophylaxis. The use of radiographs should be limited unless it's an emergency as shown in Figure 1.[7,8]

The second trimester is between the 14th and 28th weeks. During this time the organogenesis is completed, and the fetus is at a lower risk. The elective and emergency dental procedures are performed during this trimester. It is of outmost importance to maintain oral hygiene. It is important to prevent the spread of an active infection. The dental radiographs used for evaluation are limited in use and are used at the time of emergency as represented in Figure 2.[9,10]

The third trimester is marked by the 29th week of childbirth. This period poses a great deal of discomfort for the mother. It is important to consider shorter dental appointments for the mother. The correct chair position is very important to prevent episodes of supine hypotension. The maintenance of oral hygiene is extremely important whereas the use of dental radiographs should be limited as much as possible. It should be kept in mind the treatment is being rendered to two people that is the mother and the fetus. The dentist should be in constant contact with the gynecologist. Drugs which could have adverse effects on the fetus such as tetracycline should be avoided at all costs as shown in Figure 3.[11,12]

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**Fig. 1:** CPI index measurement in first trimester

**Fig. 2:** CPI index measurement in second trimester

**Fig. 3:** CPI index measurement in third trimester

During pregnancy, a female faces several physiological as well as hormonal changes. The rising levels of estrogen and progesterone are the cause of these hormonal changes. The plasma levels are elevated by 30 times due to estradiol. The changing levels of the hormones have an impact on the permeability of the microvasculature as well as collagen production. Lowered rate of saliva production in coalition with hormonal changes could lead to an increased occurrence of periodontal disease.[13–16]

Patients suffering from primary hyperparathyroidism show a positive correlation between serum periodontal hormone levels and periodontal ligament space. There is an increased incidence of decreased cortical bone density, presence of tori, and evidence of destructive periodontal diseases.[17] A local inflammatory response can be generated due to the peridontopathogens such as *P.Gingivalis* which are produced by *Lipopolysaccharides* further leading to bone resorption.[18–22]

Socio-economic factors, educational qualification, and financial conditions deter pregnant females from seeking dental treatment among pregnant females. Much prenatal cares providing services have been rendered by developed nations such as the United States of America and the United Kingdom which seems to be lacking in undeveloped nations.[23]

This particular study has been designed in order to detect and compare the levels of parathyroid hormone and the periodontal status observed in pregnant females during the complete duration of their pregnancy. There is a questionnaire designed in order to evaluate oral hygiene awareness, oral hygiene practices, and oral hygiene knowledge. There is no earlier work done in order to compare the parathyroid hormone levels and the periodontal status of pregnant women. There is a lacuna that exists in the literature, and in order to bridge that gap, this particular study has been initiated (Fig. 4).

## Methods

### Source of Data

The source of data for the present study comprised of the respondents reported to the Gynaecology OPD of SGT Medical College Hospital and Research Institute, Gurugram, Haryana, India.

### Study Design

The study was carried out at SGT Medical College Hospital & Research Institute, Gurugram, Haryana, India. A formal approval letter was obtained from the Institution's Ethical Community to carry out the study.

## Discussion

The focus of the present study was to detect and compare the parathyroid hormone levels with the periodontal status of pregnant females. The study evaluated 20 pregnant respondents longitudinally throughout the entire duration of their pregnancy. The age group of the pregnant respondents was 18–40 years of age (Flowchart 1).

The number of pregnant respondents was evaluated in accordance with the study done by Seki et al.[24] wherein serum concentration of calcium-regulating hormones and osteocalcin were evaluated in twenty women throughout their pregnancies.

The age group of the respondents evaluated in the study is in accordance with a study done by Kashetty et al.[17] evaluating a group of pregnant and non-pregnant female respondents in the age groups of 18–40 years of age.

During the course of the study, oral health status, oral health practices, and oral health knowledge were evaluated by the means of a self-administered questionnaire provided in both English and Hindi languages.

The first part of the questionnaire dealt with four questions pertaining to oral health knowledge. The majority of the participants agreed that their oral health knowledge was good but an evaluation of periodontal indices among them showed that most of them had a gingival disease. This showed the unawareness of their present oral health status and a need to intervene and make

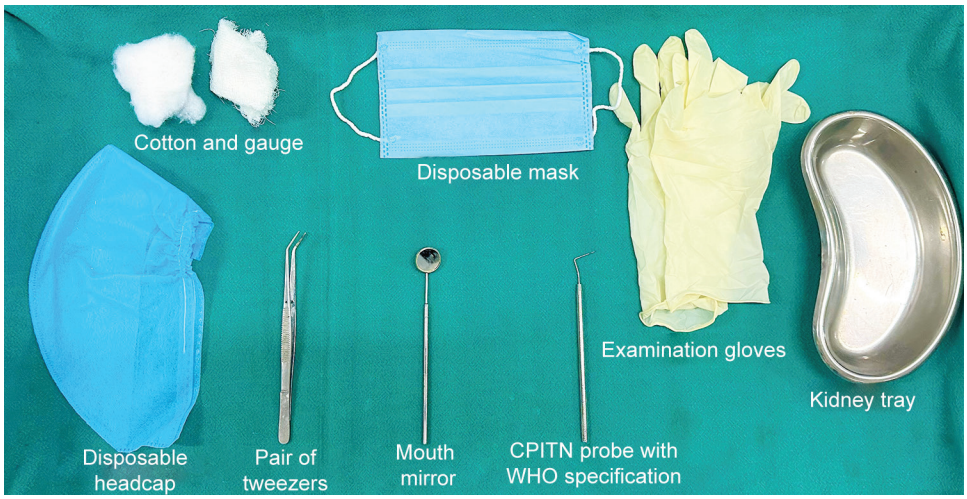


**Fig. 4:** Diagnostic armamentarium

**Flow chart 1:** Study design

**Subject selection**

| Inclusion criteria | Exclusion criteria |
|---|---|
| 1. Patients from the inception of their pregnancy till delivery.<br>2. Patients of 18–40 years of age.<br>3. Patients willing to participate in the study. | 1. Patients suffering from any systemic disease.<br>2. Patients with high-risk pregnancies. |

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20 pregnant respondents were surveyed for oral health awareness, oral hygiene practices, and oral health knowledge using a self-administered questionnaire in Hindi and English.

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The pregnant respondents were evaluated for their oral health status with the help of the community periodontal index for treatment needs (CPITN). CPITN aims to screen and monitor individual or group periodontal treatment needs. The 'treatment need' is intended as a guide to the level or magnitude of the need for care using accepted periodontal criteria.

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For the detection of the parathyroid hormone levels, the blood sample was withdrawn from the pregnant respondents when they reported for their routine check-ups.

↓

The evaluation of the parathyroid homone levels were done using chemiluminescent microparticle immunoassay (CMIA) method.

↓

The periodontal status and parathyroid hormone levels were evaluated in every trimester of the pregnancy. Follow-up done in the first trimester (between 0 and 13 weeks), second trimester (between 14 and 26 weeks) and third trimester (between 27 and 40 weeks) respectively.

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The comparison of periodontal status of the respondents was done with the parathyroid status longitudinally throughout the pregnancy.

them aware of the urgency to maintain good oral health. The reason for their lack of awareness may be due to their less educational qualification and also fewer awareness programs arranged by the government and the dentists themselves.

Most of the participants in their first trimester had mild periodontal disease, and those in their second and third trimesters had moderate periodontal disease. The findings of the present were in accordance with the findings shown in the studies done by Nattalle et al.[25] and Tilakaratne et al.[15]

In contrast to the findings of the present study, a study was done by Tanni et al.[22] less periodontal involvement as compared to gingival involvement. This might be due to direct hormonal influence during pregnancy only on the gingival tissues which showed more prevalence of gingival diseases.

The second part of the questionnaire dealt with four questions pertaining to oral health practices wherein we found there was low awareness in terms of oral health practices.

This might be due to their low educational qualification and lack of knowledge with regard to maternal and fetal health. The majority of the participants didn't visit a dentist in the last 6 months and didn't brush twice or use any dental hygiene aids.

The majority of the participants didn't visit a dentist in the last 6 months and didn't brush twice or use any dental hygiene aids in the present study. These findings were in accordance with the study done by Gaffield et al.[26]

The questions pertaining to oral health practices in the present study were in accordance with a study was done by Sinha et al.[27] wherein he evaluated pregnant women's perception of oral hygiene and dental care practices.

The third part of the questionnaire dealt with oral health knowledge wherein we found out that, it was seen that the majority of the respondents do not know the importance of oral health knowledge for better maternal and fetal health. While some of the respondents were ignorant of the fact that oral health knowledge enables better health for both mother and child.

Studies done by Natalie J Thomas, Philippa F Middleton, and Caroline A Crowther.[25] showed that lack of knowledge about oral and dental health was strongly linked to women with lower educational achievements and lower socioeconomic backgrounds.[26]

In a study by Sinha et al.[27] in order to evaluate knowledge and awareness regarding the association of periodontitis and adverse pregnancy outcomes among gynecologists practicing in Hubli-Dharwad city, they found that due to a lack of practical knowledge of oral health, gynecologists failed to refer pregnant patients to dentists.

The questionnaire contained questions pertaining to demographic data including the age of the respondent, the residence of the respondents, and education. It was found that most of the respondents were young at the time of conception falling in the age category of 20–30 years of age. The majority of respondents were residents of rural areas. The majority of respondents were less educated and had not completed their intermediate schooling. Only a handful of respondents had completed college education.

The questions in the present study were in accordance with a study done by Machuca et al. [28] wherein he evaluated periodontal status and demographic variables such as education, professional level, and residence.

In another study done by Tanni et al.[22] wherein he evaluated periodontal health with socio-demographic variables, where he found that increased age, lower level of education, and non-employment lead to poor periodontal health.

In this study, we aimed to find the periodontal status of pregnant females using the CPITN index.

We found out that the majority of respondents in their first trimester of pregnancy required TN1, which means the respondents need improvement in their personal oral hygiene whereas a minority of respondents in their first trimester of pregnancy required TN2, which means respondents need scaling and an improvement in their oral hygiene.

The majority of respondents in their second trimester of pregnancy required TN2, which means the respondents needed scaling and an improvement in their oral hygiene, whereas the minority of respondents in their second trimester of pregnancy required TN3, which means the respondents need scaling and an improvement in their oral hygiene.

There was a variation seen in the CPITN index in the third trimester, the majority of the respondents required TN4 and need complex treatment such as deep scaling, root planning, and more complex surgical procedure. The second highest treatment need was TN3, requiring scaling and improvement in oral hygiene. A minority of respondents required TN2 in their third trimester.

The findings of the present study were in accordance with a study done by Fahimeh Rashidi Maybodi,[29] in which he conducted a longitudinal study. He found out the relationship between increasing months of pregnancy and more periodontal treatment needs. CPITN increasing during pregnancy shows the importance of periodontal care during this period.

The findings of the present study were in accordance with the study conducted by Said Bashirian et al.[30] where he found that CPITN measurement, pregnant women were not in good health conditions in terms of gingival and periodontal disease, and more than half required oral health education and treatment.

The findings of the present study were in contrast to the findings of a study conducted by Miyazaki et al.[31] where he found that the changes interpreted as the rise in pocket depth during pregnancy were caused by gingival enlargement instead of periodontal destruction. These results show that pregnant women had a healthier periodontal condition when compared with non-pregnant women.

Then we intended to detect the Parathyroid hormone levels during the course of the entire pregnancy. The method used for this particular study for the estimation of parathyroid hormone (PTH) levels was chemiluminescent microparticle immunoassay (CMIA).

The method chosen for the present study was in accordance with the method adopted by Mahmood et al.[32] He evaluated serum vitamin D, PTH, calcium, and ALP using chemiluminescence microparticle immunoassay. The results showed that PTH did not have a correlation with vitamin D.

The PTH levels of the pregnant respondents in the present study were found to be lowered in the first trimester, then slightly elevated as observed in the third trimester.

These findings of the present study were in accordance with Mina Abbassi-Ghanavati, Laura G Greer, and F Gary Cunningham[33] they conducted several electronic databases in order to elucidate PTH levels in pregnant females.

The findings of the present study were in accordance with the study done by Ola Hysaj et al.[34] wherein he assessed parathyroid hormone and 25-hydroxy-vitamin D in pregnant females. He concluded that variations in 25-hydroxy-vitamin D levels were seen due to season, multiparity, and education of the pregnant female. Also, these factors and their effect on PTH appear to be vastly determined by 25-hydroxy-vitamin D levels.

The findings of the present study were in contrast to the study done by Sharma et al.[35] it was found that the serum PTH levels were significantly lower during pregnancy as compared to a non-pregnant state. It was found that there were no changes in serum PTH levels seen in high-risk pregnancies.

The final objective of the present study was to compare the PTH levels with the periodontal status of pregnant respondents, it was found that the higher month of pregnancy, the higher the CPITN index. The treatment needs were higher which correlated with the increase in the PTH levels. It was further found that PTH levels were found to be significantly higher in subjects having CPI3 as compared to CPI2.

**Fig. 5:** Blood sample being taken from the patient during routine check-up measurement of parathyroid hormone level

It is further important to raise awareness in terms of maternal and fetal well-being, wherein dental professionals can play a significant role in educating the females as well as being instrumental in maintaining their oral hygiene (Fig. 5).

## Conclusion

The below listed conclusions were derived from the study:

- Through this study, it was concluded that there is an increased need for gynecologists as well as dentists to work in coalition when it comes to the all-around health of pregnant women. Due to the lack of awareness programs, it is apparent that most pregnant women do not realize the importance of good oral hygiene required for better maternal and fetal health. It is the need of the hour that government awareness programs are increased so as to raise awareness of maternal oral health.
- In this study we evaluated the importance of the parathyroid hormone being evaluated during the course of the pregnancy, it was found that the periodontal status of the pregnant women was correlated to their periodontal findings as they progressed in their pregnancies. It is important to include the evaluation of parathyroid hormone in the antenatal analysis of pregnant females when they report to their gynecologists in their first trimester of pregnancy. As we know "Prevention is better than cure". A lot of post-partum complications can be prevented when we are vigilant from the inception itself.

## Future Perspective

The future direction of this particular study could be the inclusion of the analysis of PTH levels in the ante natalanalysis of pregnant females. In this study, we have evaluated the PTH levels of pregnant females prior to delivery. We could analyze the PTH levels post-partum for the respondents as well as compare it with their periodontal status. There could also be an evaluation for the parity of the pregnant respondents which could further help us in understanding the difference in levels of Parathyroid hormone levels in these respondents.

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