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The Basic Periodontal Examination to Screening the Periodontal Health Status in Pregnant Women in Pasuruan Indonesia

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Abstract

The interaction between periodontal pathogenic bacteria and the host immune system result the periodontal disease. The periodontal health has a strong relationship with systemic condition and plays a critical role in maternal well-being. During pregnancy the changes in hormone system increase susceptibility to periodontal diseases. This study reported the periodontal health status in pregnant women in Pasuruan Indonesia by using the Basic Periodontal Examination (BPE) index. Data were collected through validated BPE codes from pregnant patients. The WHO probe was employing to assessed the probing depth. The depth of the pocket, bleeding on probing, presence of calculus, plaque retention and furcation involvement were determined for codes in BPE. Descriptive statistics was applied to examine performance outcomes. BPE data indicated that the majority of pregnant women presented with early to moderate periodontal conditions, with code 2 (47.0%) and code 3 (35.9%) being most prevalent. These findings highlight the need for integrated clinical treatment and maternal oral healthcare outcomes.

Keywords: Basic Periodontal Examination; Pregnancy; Periodontal disease; Maternal; Periodontal treatment

1. Introduction

Periodontal disease results from the interaction between periodontal pathogenic bacteria and the immune mechanism in the human body, characterized by inflammation and tooth supporting tissue destruction, i.e, gingiva, ligament periodontal, cementum, and alveolar bone [1]. The clinical manifestation of periodontal disease, gingivitis or periodontitis, is bleeding on probing (BOP), deepening of probing depth, tooth mobility, gingival enlargement, and, in the advanced condition, it might be followed by tooth loss [2]. The health of periodontal tissue has a strong correlation with systemic health, especially in women, including the period of menstruation, pregnancy, and menopause. Previous studies showed comprehensive data about periodontal disease and pregnancy outcome, preterm birth condition, pre-eclampsia, and babies with low birth weight [3], [4], [5]. Periodontal health plays a pivotal role in overall maternal well-being, particularly during pregnancy, when hormonal changes can heighten susceptibility to periodontal diseases [6]. Since there was a significant correlation between periodontal condition and pregnancy, mastering the periodontal examination will be required to screen pregnant women.

The Basic Periodontal Examination (BPE) was introduced by BSP - the British Society of Periodontology in 1986. The BPE method is simple and rapid, helping dentists with periodontal disease screening. The modification of BPE was

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introduced in 2011, to address the limitation of the previous BPE [7]. Some indicators were used in BPE, such as bleeding on probing, probing depth, plaque retention, pocket development, and the presence of furcation involvement [8]. Early identification using BPE in antenatal care settings may enable timely referral, targeted intervention, and monitoring of maternal oral health risk factors. Furthermore, the high prevalence of periodontal inflammation, marked with bleeding on probing in more than 67 % of the pregnant population, underlined the need for simple screening methods within prenatal programs [9].

The code in BPE presents some indicators of periodontal condition. Based on the particular indicators in each code, it might guide the dental practitioners to decide the adequate treatment. Not only in pregnant women, but the BPE can be used in a variety of populations, such as children and adult patients. The objective of this study is to report the periodontal health condition in pregnant women by employing the BPE index. Incorporating the BPE into routine prenatal dental examinations holds promise for reducing periodontal burden and potentially mitigating its systemic impact on pregnancy outcomes.

2. Material and methods

2.1. Location, population and ethical clearance.

This BPE method was performed to screen the periodontal health on pregnant women in Pasuruan city, East Java, Indonesia. The study population is 32 pregnant patients presenting for routine periodontal examinations. Ethical clearance conduct will be rigorously maintained, with prior approval obtained from Universitas Airlangga, Faculty of Dental Medicine, Health Research Ethical Clearance Commission (Ethical Clearance Certificate Number 0077/HRECC.FODM/I/2025). Informed consent was secured from all participants before screening enrolment.

2.2. Basic Periodontal Examination (BPE)

The BPE is a relatively simple technique to screen for periodontal conditions. Since it is quick, simple, and acceptable, this method is effective in identifying periodontal conditions and gives more benefits for more detailed examination in daily practice. The codes are easy to categorize, applicable to be use in epidemiology studies, and allow the detection of periodontal disease in both reversible and irreversible conditions. Although the BPE technique is appropriate for general patients, it still has limitations. BPE is not recommended for patients who are uncooperative or have anxiety when uncomfortable procedures are performed during treatment.

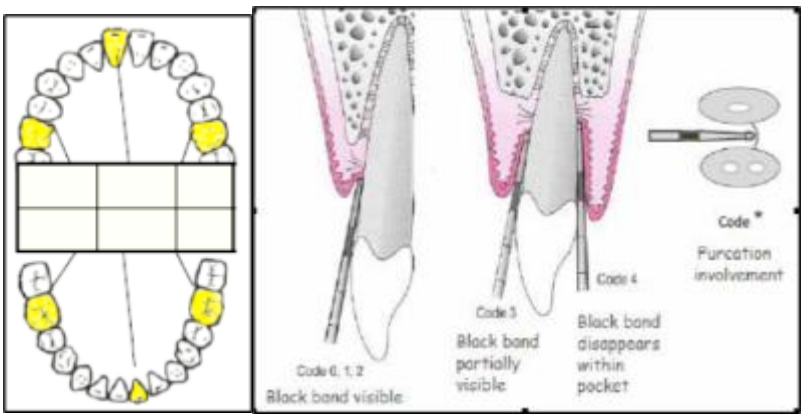

Figure 1 The oral cavity was divided into six areas. The modified BPE assessed the index teeth (the yellow color) UR6, UR1, UL6, LL6, LL1, and LR6 (A). The WHO probe was employed to assess the probing depth [8]

The technique was assessed on six indexed teeth: Upper Right tooth number 1 (UR1), Upper Right tooth number 6 (UR6), Upper Left tooth number 6 (UL6), Lower Left tooth number 6 (LL6), Lower Left tooth number 1 (LL1), and Lower Right tooth number 6 (LR6) (Figure 1A.). WHO 621 probe, which has 0.5 mm grid sphere on its tip and a black band between 3.5 and 5.5mm, was employed to measure probing depth with a light probing force of between 20 and 25 grams. The pocket depth was measured by inserting the WHO probe into the sulcus and calculating the length between the marginal gingiva and junctional epithelium at the base line of the sulcus (Figure 1B). The depth of the healthy sulcus is less than 3.5 mm, while a pathological condition of sulcus, named periodontal pocket, is 3.5 mm or greater. Besides the probing depth, the bleeding on probing (BOP) and the presence of plaque and calculus should be considered to complete the BPE code (Table 1) [8]

Code 0	Healthy condition
Code 1	• Bleeding on probing • No plaque retention factors or pockets greater than 3.5 mm
Code 2	• Presence of calculus or plaque retention factor • No pockets greater than 3.5 mm
Code 3	Pockets of 3.5 to 5.5 mm
Code 4	Pockets greater than 5.5 mm
*	Furcation involvement

Table 1 The BPE Code describes the condition of periodontal tissue. Besides probing depth, bleeding on probing, plaque retention, the presence of calculus, and furcation involvement should be considered to determine the BPE codes. [8]

2.3. Statistical analysis

This study presents the descriptive data to explain the results of the assessment. Data analysis included descriptive statistics to characterize the periodontal health condition in pregnant women.

3. Results and discussion

The present study provides an overview of periodontal health status among pregnant women in Pasuruan, East Java, using the Basic Periodontal Examination (BPE) as a screening tool. The variety of periodontal conditions shows that although some respondents approached ideal periodontal health, there were also groups with symptoms indicating early to advanced stages of periodontal disease. The study demonstrates that the majority of respondents exhibited early to moderate periodontal disease, with BPE Code 2 (47.0%) and Code 3 (35.9%) being the most prevalent. Since the etiology of periodontal disease is plaque retention, these findings indicate that periodontal inflammation and plaque-related conditions are common during pregnancy in this population. Only a small proportion of participants presented with periodontal health (Code 0) (Figure 2).

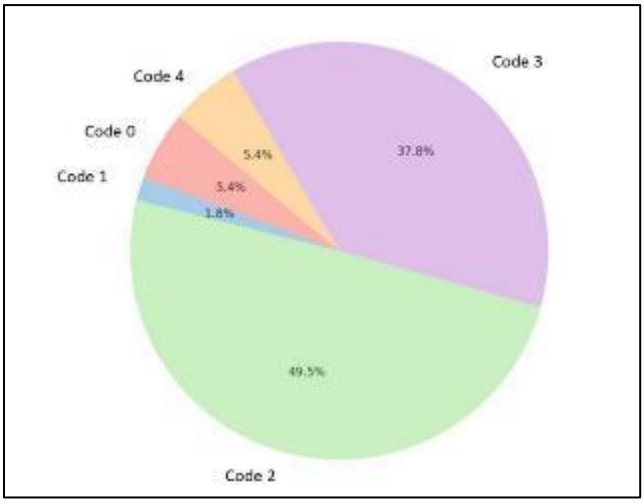

Figure 2 The result of the BPE data in pregnant women in Pasuruan, East Java

The low prevalence of BPE Code 0 (5.4%) suggests that maintaining optimal periodontal health during pregnancy remains challenging. The BPE index uses clinical conditions to determine severity. Meanwhile, the inflammatory process of periodontal tissue can occur microscopically and, in the early stages, does not cause clinical symptoms [10]. The BPE Code 0 describes the clinically healthy condition, no infllam. However, the microscopically inflammatory process might occur in periodontal tissue. This finding is consistent with previous studies reporting a decline in periodontal health status during pregnancy, even among women with acceptable oral hygiene practices. Hormonal fluctuations, particularly elevated estrogen and progesterone levels, are known to increase vascular permeability and gingival inflammatory responses, thereby exacerbating gingival bleeding and periodontal tissue vulnerability without

necessarily increasing plaque levels [3], [6]. This physiological response may explain why clinically healthy periodontal tissues before pregnancy can shift toward inflammatory conditions during gestation.

The minimal proportion of BPE Code 1 (1.8%) indicates that isolated gingival inflammation without plaque-retentive factors was uncommon. Instead, most inflammatory signs were accompanied by calculus accumulation or the pocket formation. This observation suggests that plaque control alone may be insufficient if professional debridement is not performed, emphasizing the importance of regular periodontal evaluation and scaling during antenatal care [11] .

BPE Code 2 was the most dominant finding in this study, reflecting the widespread presence of calculus and plaque-retentive factors without pathological pocketing. This pattern indicates early-stage periodontal disease that is largely preventable and reversible with appropriate oral hygiene instruction and professional prophylaxis. Similar distributions have been reported in pregnant populations in other low- and middle-income settings, where limited access to preventive dental services contributes to the accumulation of calculus during pregnancy [9]. The predominance of Code 2 underscores the opportunity for early intervention strategies to prevent disease progression during this critical period.

Notably, more than one-third of participants (35.9%) presented with BPE Code 3, indicating periodontal pockets of 3.5–5.5 mm. This finding is clinically significant, as it reflects established periodontal breakdown requiring further diagnostic assessment and active periodontal therapy. The presence of moderate periodontal disease during pregnancy has been associated with an increased systemic inflammatory burden, which may contribute to adverse pregnancy outcomes such as preterm birth and pre-eclampsia [4], [5], [6]. Although this study did not assess pregnancy outcomes directly, the high prevalence of Code 3 highlights the importance of periodontal screening as part of comprehensive maternal healthcare.

A smaller yet important proportion of participants (5.1%) exhibited BPE Code 4, representing severe periodontal destruction with probing depths exceeding 5.5 mm. These cases require comprehensive periodontal examination and specialist management. Severe periodontitis during pregnancy is of particular concern due to its association with elevated inflammatory mediators and specific periodontal pathogens, such as *Fusobacterium nucleatum*, which has been implicated in placental colonization and adverse obstetric outcomes [11]. The detection of such cases through BPE reinforces its value as a rapid screening tool to identify high-risk individuals for timely referral.

Overall, the findings support the use of BPE as an effective, practical, and acceptable screening method for periodontal health assessment in pregnant women. Its simplicity makes it suitable for integration into routine antenatal dental examinations, particularly in community and primary healthcare settings. Early identification of periodontal disease using BPE may facilitate preventive and therapeutic interventions, potentially reducing the periodontal disease burden and its systemic implications during pregnancy.

However, this study has certain limitations. The relatively small sample size and descriptive study design limit the generalizability of the findings. In addition, the absence of clinical attachment loss measurements and radiographic assessment restricts the ability to fully characterize periodontal disease severity. Future studies with larger populations, longitudinal designs, and correlations with pregnancy outcomes are warranted to further elucidate the role of periodontal screening and intervention during pregnancy.

The concept of the first 1,000 days of life, spanning from conception through the child's second year, has been increasingly recognized as a critical window for establishing foundational health trajectories, including oral and periodontal health. This period represents a unique developmental "window of opportunity" during which exposures to maternal health, nutrition, microbial colonization, and caregiving practices exert profound and lasting effects on both systemic and oral health outcomes throughout life. The oral microbiome and immune system exhibit high plasticity during this interval, and maternal microbial contributions play a central role in shaping offspring oral microbial communities [12] .

Emerging evidence indicates that maternal periodontal and oral microbiota can be transmitted vertically to the neonate, influencing initial microbial colonization patterns in the infant's oral cavity. Maternal oral bacteria constitute one of the earliest sources for the infant's oral microbiome, with perinatal factors such as mode of delivery and feeding practices further modulating microbial establishment [13]. Given that imbalanced or dysbiotic microbial communities are implicated in periodontal disease pathogenesis, early microbiome establishment shaped by maternal periodontal conditions may predispose children to altered immune responses and oral disease susceptibility later in life [12].

The first 1,000 days also encompass key developmental events such as primary tooth eruption, the introduction of complementary foods, and the establishment of oral hygiene behaviors, all of which influence the trajectory of the oral microbiome and subsequent periodontal health [14]. Disruptions in early microbial colonization or persistent exposure to pathogenic bacteria, including those associated with maternal periodontal inflammation, could theoretically increase susceptibility to both periodontal and cariogenic conditions in children. Although most research on this early period has focused on dental caries, a similar foundational framework likely applies to periodontal immune priming and inflammatory regulation, suggesting that maternal periodontal health during pregnancy can have implications beyond birth outcomes and extend into early childhood periodontal risk profiles [15]

Collectively, these insights reinforce the need for integrated maternal–infant oral health strategies that begin in pregnancy and extend through the first 1,000 days of life. By optimizing maternal periodontal health and supporting beneficial microbial colonization in infancy (e.g., through breastfeeding and early hygiene practices), clinicians and public health programs may improve both immediate and long-term oral health trajectories for mothers and their children [16].

4. Conclusion

This study reported the description of periodontal health in pregnancy. The high quality of oral hygiene and periodontal condition may contribute to the quality of human life. The first 1,000 days of life justify the need for integrated education, prevention, and treatment given by dental professionals to pregnant women. Strengthening interdisciplinary collaboration between dental and midwifery services may improve early detection and management of periodontal conditions during pregnancy. Future programs should focus on combining clinical skill development with supportive educational environments to optimize maternal oral health outcomes.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

Ethical clearance conduct will be rigorously maintained, with prior approval obtained from Universitas Airlangga, Faculty of Dental Medicine, Health Research Ethical Clearance Commission (Ethical Clearance Certificate Number 0077/HRECC.FODM/I/2025).

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