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# Oral and Dental Health Maintenance Behavior and Its Barriers Among Pregnant Women

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***Abstract:***
***Background****: Oral and dental health is an integral part of overall body health. During pregnancy, increased progesterone hormone levels lead to a decrease in plasma bicarbonate levels and a drop in saliva pH, resulting in a more acidic oral environment. This decrease in saliva pH promotes the growth of cariogenic bacteria in the mouth, which triggers enamel demineralization, making pregnant women more susceptible to dental caries. To achieve optimal oral and dental health during pregnancy, regular dental health maintenance is essential.*
***Materials and Methods****: This study used a cross-sectional design aimed at analyzing oral health maintenance behavior and its barriers among pregnant women at the Nurdianum Independent Clinic in the Medan Area. The research was conducted on pregnant women who visited the clinic between March and June 2023. Data collection was carried out using questionnaires to obtain information regarding oral health maintenance behavior and the barriers faced. Data analysis using paired t-test.*
***Results****: Based on the t-test analysis, it was found that there is a significant relationship between knowledge of dental health maintenance and oral health condition (P < 0.005). However, there is no significant relationship between attitude and oral health maintenance with oral health condition (P > 0.005). It was also found that practice of dental health maintenance is significantly associated with oral health condition (P < 0.005).*
***Conclusion:*** *Engaging in proper oral health maintenance behavior during pregnancy is crucial to ensuring optimal dental and oral health.*
***Keyword****: Dental health maintenance behavior, oral health condition, pregnant women*

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## I. Introduction

Health is an important aspect in creating good physical, mental, and social development. Therefore, every person can perform optimally, which ultimately impacts productivity levels. According to the World Health Organization, health is a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity[1]. Besides general body health, oral and dental health also needs to be considered because it can affect overall body health. Maintaining oral and dental health is an integral part that cannot be separated from overall health[2]. Oral health conditions during pregnancy can negatively impact both mother and fetus, highlighting the importance of maintaining dental care.[3,4]

Overall body health, including dental and oral health is important for everyone. Dental and oral health can affect speaking function, swallowing and aesthetics as it includes the physical, psychological, social, and environmental domains that are essential for overall health and well-being. Oral cavity and its surrounding structures that are free from any disease indicates good oral health. It doesn't just make a person looks and feels good, this is also relevant in maintaining oral hygiene function.[5,6,2]

Pregnant women are one of the groups vulnerable to oral and dental diseases. To achieve optimal oral health during pregnancy, regular dental care and maintenance are essential.[7,8]. Dental health maintenance can begin with paying attention to diet, removing plaque and food debris through regular and proper tooth brushing, scaling (removal of tartar), filling cavities, and extracting teeth that can no longer be preserved. Oral health in pregnant women greatly affects the condition of the baby in the womb. In early pregnancy, women often experience fatigue, nausea, and sometimes vomiting, which leads to an increase in acidity in the mouth.[9]

An increase in plaque due to a lack of awareness in maintaining hygiene can accelerate tooth decay. Generally, pregnant women experience oral health problems during pregnancy. Common issues include excessive saliva, tooth decay, and bleeding gums.[9] The sign of dental caries is the demineralization of the hard tooth tissue, which is then followed by the destruction of the organic material. The consequences of dental caries include bacterial invasion of the pulp and the spread of infection in the tissues, which can cause pain in the mouth.[10]

Some risk factors for dental caries include local factors such as a history of caries, dental plaque, tooth alignment, habits of consuming cariogenic or sugary foods, improper tooth brushing practices, as well as other

factors like age, gender, race and culture, smoking, economic status, and education level. Caries can occur when causative factors interact and support each other, including the host (saliva and teeth), microorganisms, substrate, and time. Bacteria involved in caries are able to break down sugars in the form of carbohydrates, producing acids that lower the pH in the oral cavity. Repeated decreases in pH over time can gradually cause demineralization of the tooth surface. If left untreated, this can lead to the expansion of carious lesions.[10]

## II. Material and Methods

**Study Design**

The population in this study consists of all pregnant women who visited the Nurdianum Independent Clinic during the period from January to May 2023. he sample consists of pregnant women who came to the Nurdianum Independent Clinic in Medan Area district. The sample size was calculated using Slovin's formula:

$n = N / (1 + Ne^2)$

Based on Slovin's formula with a 10% margin of error, the sample size obtained is approximately 33.3. To account for potential dropouts, an additional 10% was added, resulting in a final sample size of 37.

The data in this study were analyzed using the Chi-Square test to examine the relationship between oral health maintenance behavior and barriers to such behavior with the dental and oral health condition of pregnant women. The Chi-Square test was used because the variables analyzed were categorical and aimed to determine the association between two variables.

**Data collection**

- Collection of pregnant women's characteristics data
- Assessment of behavior through questionnaires
  A structured questionnaire was distributed to pregnant women to assess their oral health maintenance behaviors.
- Examination of dental caries status (DMF-T) and oral hygiene (OHI-S)
  Dental and oral examinations were conducted using standardized examination forms to evaluate the Decayed, Missing, and Filled Teeth (DMF-T) index and the Oral Hygiene Index Simplified (OHI-S).

**Data analysis**

The collected data are analyzed using univariate analysis to determine the frequency distribution of knowledge frequency. The data in this study were analyzed using the Anova test to examine the relationship between oral health maintenance behavior and barriers to such behavior with the dental and oral health condition of pregnant women.

## III. Result

Respondent Characteristics

The distribution of respondent who visited the Nurdianum Independent Clinic in Medan Ares is presented in the table below now:

**Table 1**. Respondent Characteristics by Age and Education

| Characteristic | Number | Percentage (%) |
|---|---|---|
| Age | | |
| < 20 years | 4 | 11 |
| 20–25 years | 18 | 49 |
| 26–30 years | 8 | 21 |
| 31–35 years | 7 | 19 |
| Education | | |
| Senior High School or equivalent | 28 | 76 |
| College/University | 9 | 24 |

Based on the data above, the majority of respondents were aged 20–25 years (49%) and had completed senior high school or an equivalent level of education (76%).

**Table 2.** Frequency Distribution of Oral Hygiene (OHIS) Status

| OHIS Criteria | Frequency | Percentage (%) |
|---|---|---|
| Good | 6 | 16 |
| Fair | 24 | 65 |
| Poor | 7 | 19 |
| Total | 37 | 100 |

Based on Table 2, the majority of mothers had oral hygiene status in the "Fair" category, accounting for 24 individuals (65%).

**Table 3.** Frequency Distribution of the Relationship Between Mothers' Knowledge and Oral Hygiene Status

| Mothers' Knowledge Toward Oral Hygiene | OHI-S | | | | | | Total | % | α | df | P |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Good | | Fair | | Poor | | | | | | |
| | f | % | f | % | f | % | | | | | |
| Good ≥ 50% | 4 | 14 | 20 | 72 | 4 | 14 | 28 | 100 | | | |
| Poor < 50% | 1 | 11 | 3 | 33 | 5 | 56 | 9 | 100 | 0,005 | 2 | 0,015 |
| Total | 5 | 14 | 23 | 62 | 9 | 24 | 37 | 100 | | | |

Based on Table 3, out of 37 mothers, the majority of those with fair knowledge had oral hygiene status in the good category (72%). Meanwhile, among mothers with poor knowledge, 56% had oral hygiene status in the poor category.
Statistical analysis showed a significant relationship between mothers' knowledge and oral hygiene status (P = 0.005).

**Table 4.** Frequency Distribution of the Relationship Between Mothers' Attitude and Oral Hygiene Status

| Mothers' Attitude Toward Oral Hygiene | OHI-S | | | | | | Total | % | α | df | P |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Good | | Fair | | Poor | | | | | | |
| | f | % | f | % | f | % | | | | | |
| Good ≥ 50% | 4 | 13 | 23 | 74 | 4 | 13 | 31 | 100 | | | |
| Poor < 50% | 1 | 17 | 2 | 33 | 3 | 50 | 6 | 100 | 0,005 | 2 | 0,015 |
| Total | 5 | 14 | 25 | 67 | 7 | 19 | 37 | 100 | | | |

Based on Table 4, among mothers with good oral hygiene practices, 74% had oral hygiene status in the Fair category. Meanwhile, among those with poor practices, 33% were in the Fair category. Statistical analysis showed a significant relationship between mothers' practices and their oral hygiene status (P = 0.015)

**Table 5.** Frequency Distribution of the Relationship Between Practices and Oral Hygiene Status

| Mothers' Oral Hygiene Practices | OHI-S | | | | | | Total | % | α | df | P |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Good | | Fair | | Poor | | | | | | |
| | f | % | f | % | f | % | f | | | | |
| Good ≥ 50% | 7 | 22 | 22 | 69 | 3 | 10 | 32 | 100 | | | |
| Poor < 50% | 0 | 0 | 2 | 40 | 3 | 60 | 5 | 100 | 0,005 | 2 | 0,004 |
| Total | 7 | 19 | 24 | 65 | 6 | 16 | 37 | 100 | | | |

Based on Table 5, among mothers with good oral hygiene practices, 69% had oral hygiene status in the Fair category. Meanwhile, among those with poor practices, 40% were in the Fair category. Statistical analysis showed a significant relationship between mothers' practices and their oral hygiene status (P = 0.004)

## IV. Discusssion

This study aims to determine oral and dental health maintenance behavior and its barriers among pregnant women at Nurdianum independent clinic, Medan Area. The demographic profile of the respondents in this study provides valuable insight into the patterns of oral and dental health behavior among pregnant women attending the Nurdianum Independent Clinic in the Medan Area. The age distribution reveals that the majority of participants were between 20–25 years old (49%), followed by those aged 26–30 (21%) and 31–35 (19%). Only a small proportion (11%) were younger than 20 years.

This age distribution aligns with findings from George et al. (2018), who noted that the majority of pregnant women accessing antenatal services tend to fall within the 20–30 age range, which corresponds to the most common reproductive age group.[11] The predominance of younger women suggests that oral health interventions targeted at early adulthood may be particularly impactful, as habits formed during this period can influence long-term health behaviors.

In terms of educational attainment, 76% of respondents had completed senior high school or an equivalent level of education, while only 24% had attended college or university. This relatively low proportion of higher education among participants may have implications for health literacy, especially regarding oral and dental care during pregnancy. Similar trends have been observed by Boggess et al. (2010), who reported that pregnant women with lower educational backgrounds were less likely to seek dental care and more likely to exhibit inadequate oral hygiene practices.[12]

Educational level is a well-established determinant of health behavior. According to Thomas et al. (2019), higher educational attainment is positively correlated with greater awareness of the importance of oral health during pregnancy, as well as a greater likelihood of seeking professional dental care.[13,14] Therefore, the dominance of senior high school graduates among respondents may explain some of the barriers identified in this study, such as misconceptions about the safety of dental treatments during pregnancy and limited awareness of the consequences of poor oral health. Overall, the demographic findings of this study underscore the need for targeted oral health education, particularly for pregnant women with lower educational backgrounds and those in younger age groups. By incorporating culturally appropriate and accessible information into antenatal care programs, healthcare providers can bridge knowledge gaps and encourage better oral health practices throughout pregnancy.

The behavioral characteristics of pregnant women regarding oral and dental health maintenance revealed moderate levels of knowledge, attitude, and practice among the majority of respondents. Specifically, 62% of the participants demonstrated moderate knowledge, while only 24% had high knowledge. Similarly, 65% had a moderate attitude toward oral health, and 57% exhibited moderate practices. However, a concerning 24% of respondents showed poor practice despite relatively better levels of knowledge and attitude.

These findings are consistent with previous studies indicating that while pregnant women may possess a basic understanding of oral health, this knowledge does not always translate into appropriate behavior. Boggess et al. (2010) found that even when women were aware of the importance of dental care during pregnancy, many still did not engage in regular dental visits or proper hygiene practices. This knowledge-behavior gap may be due to external barriers such as fear, cost, or accessibility, as well as internal factors like misconceptions and low perceived need for care during pregnancy.[12]

Furthermore, the study by George et al. (2018) emphasized that behavior is influenced not only by knowledge but also by health beliefs, social support, and the perceived risk of oral diseases. In this study, only 21% of pregnant women had a good attitude, which may indicate a limited understanding of the long-term impact of oral health on both maternal and fetal well-being. This reflects a need for targeted education that not only provides information but also reshapes attitudes.

In terms of practice, the finding that only 19% of women had good oral health maintenance behavior is concerning. Similar results were observed in a study by Thomas et al. (2019), where a majority of pregnant women practiced irregular toothbrushing, rarely visited dental professionals, and consumed cariogenic foods frequently. The poor practices observed in this study highlight a critical gap in preventive oral care behavior during pregnancy, despite the known risks such as periodontal disease and its association with adverse pregnancy outcomes.[3] These results underscore the importance of strengthening oral health promotion as part of routine antenatal care. Healthcare providers, especially midwives and nurses, should be trained to provide simple, clear, and culturally appropriate oral health messages. Interventions should aim to improve not only knowledge but also motivation, confidence, and access to dental services for pregnant women.

The behavioral characteristics of pregnant women regarding oral and dental health maintenance in this study revealed predominantly moderate levels of knowledge, attitude, and practice. Specifically, 62% of respondents demonstrated moderate knowledge, while only 24% had high knowledge. Similarly, 65% exhibited a moderate attitude toward oral health, and 57% reported moderate oral health practices. Notably, 24% of participants reported poor oral health practices, despite relatively better levels of knowledge and attitude—highlighting a gap between awareness and action. These findings are consistent with previous studies, which have

shown that while pregnant women may be aware of the importance of oral health, this awareness does not always translate into proper behavior. Boggess et al. (2010) observed that although many women understood the relevance of dental care during pregnancy, a significant number did not engage in routine dental visits or consistent oral hygiene practices. This disconnect may be attributed to both external barriers—such as cost, fear, and limited access to services—and internal factors such as misconceptions, lack of motivation, and low perceived urgency of dental care during pregnancy[14].

Additionally, George et al. (2018) emphasized that behavior is shaped not only by knowledge but also by underlying beliefs, cultural norms, social support, and perceived health risks. In this study, only 21% of participants demonstrated a good attitude toward oral and dental care, suggesting a limited appreciation of the long-term impact of oral health on maternal and fetal outcomes. This indicates a pressing need for educational efforts that go beyond factual knowledge and instead focus on shifting attitudes and building stronger health convictions.[11]

The finding that only 19% of respondents demonstrated good oral health maintenance practices is particularly concerning. This is in line with the study by Thomas et al. (2019), which reported that many pregnant women engaged in inconsistent oral hygiene habits, infrequent dental visits, and poor dietary practices that increase the risk of oral disease. These behaviors pose risks such as periodontal disease, which has been associated with adverse pregnancy outcomes including preterm birth and low birth weight.[13]

Among the 37 pregnant women surveyed, those with higher knowledge levels (≥50%) predominantly exhibited fair oral hygiene status (72%), while only 14% achieved a good oral hygiene status. In contrast, among those with poor knowledge (<50%), more than half (56%) exhibited poor oral hygiene status. These findings indicate that lower maternal knowledge is associated with poorer oral hygiene outcomes.

The statistical analysis supports this observation, with a chi-square test yielding a P-value of 0.005 ($\alpha = 0.05$, $df = 2$), demonstrating a significant relationship between mothers' knowledge and oral hygiene status. This suggests that inadequate knowledge of oral health practices may serve as a barrier to maintaining proper oral hygiene during pregnancy. These results align with prior studies indicating that knowledge deficits among pregnant women can contribute to suboptimal oral health behaviors and outcomes. Given the well-established links between maternal oral health and adverse pregnancy outcomes, such as preterm birth and low birth weight, addressing these knowledge gaps becomes essential. This finding emphasizes the urgent need for targeted health education and intervention strategies focused on pregnant women. Healthcare providers, particularly those involved in prenatal care, should incorporate oral health education into routine care, empowering expectant mothers with the information needed to adopt and maintain effective oral hygiene behaviors. [15,16]

Among the 37 pregnant women surveyed, 69% of those with good oral hygiene practices (≥50%) had fair oral hygiene status, and 22% achieved a good oral hygiene status. Conversely, among mothers with poor hygiene practices (<50%), 60% had poor oral hygiene status, and none were categorized as having good oral hygiene. This distribution suggests that poor oral hygiene practices are strongly associated with poorer oral health outcomes.

The statistical analysis confirms this association, with a chi-square test revealing a significant relationship between mothers' oral hygiene practices and oral hygiene status ($P = 0.004$, $\alpha = 0.05$, $df = 2$). This significant result indicates that the level of maternal practice is not independent of oral health status, emphasizing the critical role of daily behaviors in maintaining oral health during pregnancy. Pregnancy often brings about physiological and behavioral changes that can negatively affect oral health, including increased plaque accumulation, changes in diet, and morning sickness that leads to enamel erosion. Therefore, consistent and proper oral hygiene practices become even more essential during this period. The data from this study reinforce that inadequate hygiene practices among pregnant women may serve as a barrier to achieving and maintaining optimal oral health. [17]

These findings are consistent with existing literature, which emphasizes the impact of behavioral practices—such as brushing frequency, flossing, and dental check-ups on oral health. They also underscore the importance of reinforcing oral hygiene practices during prenatal care visits. Educational interventions tailored to pregnant women should focus not only on increasing knowledge but also on motivating and enabling better hygiene practices. [18]

Overall, these results underscore the urgent need to integrate oral health education into routine antenatal care. Healthcare providers, particularly midwives and nurses who have frequent contact with pregnant women, should be equipped to deliver clear, practical, and culturally sensitive oral health messages. Interventions must be designed to enhance not only knowledge but also self-efficacy, motivation, and access to affordable dental services—ultimately empowering pregnant women to adopt healthier oral care behaviors for their well-being and that of their babies.

## V. Conclusion

This study revealed that the majority of pregnant women at Nurdianum Independent Clinic, Medan Area, demonstrated moderate levels of knowledge, attitude, and practice regarding oral and dental health maintenance. While most participants understood the importance of oral hygiene during pregnancy, this knowledge did not always translate into consistent or appropriate behavior. Only a small proportion reported good oral health practices, with significant barriers such as lack of awareness, fear, limited access to dental care, and cultural beliefs contributing to poor oral health behavior.

Demographic data also showed that most respondents were young and had only completed secondary education, which may influence their health literacy and behavioral outcomes. The findings indicate a clear gap in oral health promotion during prenatal care services.

To address these issues, there is a strong need for integrated oral health education in antenatal care programs. Health professionals, especially midwives and nurses, should be empowered to deliver accurate, practical, and culturally appropriate oral health information to pregnant women. Enhancing knowledge, reshaping attitudes, and removing behavioral and systemic barriers are essential steps toward improving maternal oral health and ensuring better pregnancy outcomes.

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