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The Impact of the Mom Smile Application on Pregnant Women's Knowledge of Pregnancy Gingivitis

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ABSTRACT The study focuses on determine the impact of Android-based Mom Smile application in enhancing knowledge about pregnancy gingivitis among pregnant women. Adopting a single-group pretest-posttest design with 32 participants, the findings revealed a notable improvement in knowledge levels, rising from 54.68% to 83.28%. These outcomes underscore the efficacy of mobile health education as a tool for raising awareness of oral health issues during pregnancy.

INDEX TERMS Knowledge, Pregnancy Gingivitis, Pregnant.

I. INTRODUCTION

Pregnant women are particularly susceptible to gingivitis due to hormonal changes. Despite the high prevalence of pregnancy gingivitis, many women lack knowledge about its prevention. This study seeks to assess the impact of the Mom Smile application in improving pregnant women's understanding of this condition [1].

Gingivitis is a form of periodontal disease that affects the gingival tissues. It is characterized by redness to bluish-red discoloration, swelling or enlargement of the gingival contour, and a tendency to bleed easily [2]. One of the primary bacterial pathogens responsible for gingivitis is Porphyromonas gingivalis. This bacterium adheres to the surface of the teeth and contributes significantly to plaque formation. Excessive plaque accumulation can trigger inflammation, initially marked by vascular changes such as increased blood flow and capillary dilation [3][4].

According to the 2018 Basic Health Research, approximately 74% of the Indonesian population experiences gingivitis. The overall prevalence of oral and dental health problems reached 57.6%, showing a significant increase compared to 31.7% reported in 2013. One of the contributing factors to the development of pregnancy gingivitis is the level of awareness and knowledge among pregnant women regarding the importance of maintaining oral and dental hygiene [5]. Knowledge, which is acquired through both learning and observation, plays a vital role in sustaining oral health. Pregnant women with limited understanding of oral care are more likely to experience conditions such as gingivitis [6][7].

Pregnancy gingivitis can have serious consequences, including low birth weight and an increased risk of preterm birth [8]. Therefore, it is crucial for pregnant women to develop sufficient awareness and knowledge regarding oral and dental health maintenance [9][10][11]. Achieving optimal oral health during pregnancy necessitates promotive efforts through targeted health education initiatives. Android-based learning media for pregnant women serve as a practical tool to enhance their understanding of oral health. Existing educational resources are primarily in printed form, such as books. However, these are often ineffective due to the lack of motivation or willingness to read among pregnant women [12].

Consequently, there is a need to develop Android-based educational media specifically designed for pregnant women. Such media can deliver health education in a more engaging and accessible manner. One example is the Mom Smile application, an Android-based educational platform featuring motion graphic animations designed to educate pregnant women about pregnancy-related gingivitis.

II. METHODS

The research utilized a quantitative approach through a quasi-experimental method, applying a one-group pretest-posttest design. Participants were evaluated before the intervention (pre-test) and re-evaluated following its completion (post-test) [13].

The knowledge assessment on pregnancy gingivitis in the pretest and posttest included topics such as definitions, symptoms, causes, impacts, and prevention methods. Responses were scored dichotomously, awarding 1 point for correct answers and 0 for incorrect ones. Knowledge levels were categorized as Good (76–100%), Moderate (56–75%), or Poor (<56%). The questionnaire underwent validation and was confirmed to be reliable within the study's context. This quasi-experimental study involved 32 pregnant women from Gayam Health Center, chosen through purposive sampling.

The study sample comprised 32 pregnant women selected through purposive sampling based on specific inclusion criteria: pregnant women in their first, second, or third trimester who visited the Gayam Health Center during the study period

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(January–February 2025), owned a smartphone, experienced pregnancy gingivitis, and consented to participate. This sampling method aimed to represent the accessible population within the research timeframe, considering practical limitations. While purposive sampling restricts generalizability, it offers valuable insights tailored to the study's context [8]. Participants' knowledge of pregnancy gingivitis was assessed before and after the educational intervention using the Mom Smile application. A structured questionnaire was employed to assess participants' knowledge levels, and the resulting dataset subsequently interpreted through the Wilcoxon signed-rank test.

The population of this study encompassed of pregnant women at any different gestational phases trimester who attended the Gayam Public Health Center during the period of January to February 2025. The research investigated the impact of the Android-based Mom Smile application in enhancing knowledge among pregnant women concerning pregnancy-related gingivitis at the Gayam Public Health Center. Located at Jl. Raya Pancor No. 09 in Gayam District, Sumenep Regency, the health center serves residents across 10 villages within the district.

A count of 32 pregnant women participated in this study as the sample. Based on data from Puskesmas Gayam, the age distribution of pregnant women shows that the majority were between 20 and 35 years old, totaling 30 individuals (94%). The highest number of pregnant women visiting Puskesmas Gayam were in the second trimester, with 13 individuals (41%). Additionally, the data indicate that the highest level of education among the pregnant women was tertiary education, with 13 individuals (41%), and the most common occupation was housewife, accounting for 12 individuals (38%).

Knowledge measurement was conducted through interviews or the distribution of questionnaires, wherein questions related to measurable topics were posed to research subjects or respondents. Subsequently, the level of knowledge was evaluated and categorized based on predetermined classifications [14]. In research, scores are often presented in percentage form to simplify the categorization of ranking levels [15].

TABLE 1
Knowledge Assessment Criteria

Scores	Knowledge Categories
76-100%	Baik
56-75%	Cukup
<56%	Kurang

The data analysis procedure involved the stages of data and subsequent processing using SPSS software to evaluate the hypothesis. The analysis employed the Wilcoxon signed-rank test to determine statistical significance [16].

III. RESULT

TABLE 2
Recapitulation of Pregnant Women's Knowledge on Pregnancy Gingivitis Before Receiving Education Using the Mom Smile Application in 2025

Knowledge Criteria	Frequency (N)	Percentage
High	5	16%
Moderate	7	22%
Low	20	62%
Total	32	100%

As indicated by data in **TABLE 1**, the knowledge level of pregnant women at Puskesmas Gayam prior to their education using the Mom Smile application was classified as low for 20 participants (62%) on TABLE 2, while the rest were categorized as having moderate to high knowledge.

TABLE 3
Recapitulation of Pregnant Women's Knowledge on Pregnancy Gingivitis After Receiving Education Using the Mom Smile Application in 2025.

Knowledge Criteria	Frequency (N)	Percentage
High	28	88%
Moderate	4	12%
Low	0	0%
Total	32	100%

As shown in TABLE 3, the knowledge level of pregnant women at Puskesmas Gayam following education through the Mom Smile application was predominantly high, with 28 participants (88%) categorized as having a high level of knowledge and 4 participants (12%) categorized as moderate.

TABLE 4
Recapitulation of Pregnant Women's Knowledge on Pregnancy Gingivitis Before and After Receiving Education Using the Mom Smile Application in 2025

Level of knowledge	Before			After			Difference
	N	%	Mean	N	%	Mean	
High	5	16%	54.68%	28	88%	83.28%	28.60%
Moderate	7	22%		4	12%		
Low	20	62%		0	0%		
Total	32	100%		32	100%		

The table reveals that the average knowledge score of pregnant women regarding pregnancy gingivitis was 54.68% prior to receiving education through the Mom Smile application. Following the educational intervention, this score increased significantly to 83.28%.

TABLE 5
Shapiro-Wilk Normality Test

	Statistics	Frequency (N)	Sig.
Pre Test	0.916	32	0.016
Post Test	0.888	32	0.003

TABLE 4.and TABLE 5 indicates that the data deviate from a normal distribution, as evidenced by a value (p) falling below the predetermined significance level of $\alpha = 0.05$. Consequently, the Wilcoxon test was utilized for data analysis.

TABLE 6
Wilcoxon Test Results

Variable	Knowledge Criteria			*P Value*
	High	Moderate	Low	
Pre Test	5	7	20	0,000
Post Test	28	4	0	

Based on Table 4, Before the intervention, 62% of participants had low knowledge, and only 16% had high knowledge. After the intervention, 88% had high knowledge,

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indicating a significant increase in understanding of pregnancy gingivitis ($p < 0.05$).

IV. DISCUSSION

Studies show that before receiving education via the Mom Smile application, the knowledge of pregnant women at Puskesmas Gayam regarding pregnancy gingivitis was classified as low. This limited level of understanding was associated with a deficiency in recognizing pertaining to the pivotal role of oral health maintenance during pregnancy, which may contribute to an increased risk of developing gingivitis [17] [18]. The majority of pregnant women had not been exposed to structured and consistent education, resulting in a limited understanding of oral health. Insufficient information on oral health during pregnancy significantly impacts their level of knowledge [19]. One of the main contributing factors to this limited understanding is the inadequacy of effective health education. To address this issue, the study from recommended the use of effective educational media, such as technology-based counseling, to comprehensively enhance pregnant women's knowledge [20].

After receiving education via the Mom Smile application, the knowledge of pregnant women improved significantly, reaching a "good" category. This improvement aligns with Notoatmodjo's theory, which posits that knowledge is acquired through learning and experience [21]. Demonstrating that android-based media are practical and efficient tools for disseminating health information, particularly in improving pregnant women's understanding of health during pregnancy [22]. Digital media, such as android-based applications, are more effective than conventional methods like booklets [23]. This finding was further corroborated by [24] who highlighted that animations in educational applications increase pregnant women's interest in learning. The animation features in the Mom Smile application provide an engaging and interactive learning experience.

The study demonstrated a significant increase in pregnant women's knowledge following the educational intervention. These results align with prior research, confirming that digital tools like the Mom Smile application are effective in enhancing health-related knowledge. While some participants still exhibited moderate knowledge levels, this highlights the potential for improving the application's content and user engagement. The persistence of moderate knowledge in certain cases may be attributed to a lack of detailed explanations regarding the causes and effects of pregnancy gingivitis within the application [25]. This aligns with [26], who noted that variations in content comprehension and the lack of guidance could affect the effectiveness of education. This research supports the S-O-R (Stimulus-Organism-Response) theory, where the Mom Smile application serves as a stimulus delivering information to pregnant women (organism) and produces a response in the form of increased knowledge and behavioral changes [27]. Emphasized the importance of tailoring application content to users' characteristics to enhance learning effectiveness.

Animations and attractive designs in educational applications could boost users' motivation to learn [28]. This supports the success of the Mom Smile application in significantly improving pregnant women's knowledge, especially regarding preventive measures for pregnancy gingivitis. Based on the research findings and previous studies, the Mom Smile application is proven effective in increasing pregnant women's knowledge about pregnancy gingivitis. This android-based educational medium serves as a practical solution for delivering health information, thereby encouraging positive behavioral changes in maintaining oral health during pregnancy [29]. Based on the research findings and previous studies, the Mom Smile application is proven effective in increasing pregnant women's knowledge about pregnancy gingivitis. This android-based educational medium serves as a practical solution for delivering health information, thereby encouraging positive behavioral changes in maintaining oral health during pregnancy [30]. The increase in knowledge from "low" to "good" observed in this study highlights the potential for improved oral health practices among pregnant women. Enhanced awareness can lead to positive behavioral changes, such as regular dental visits and better oral hygiene, which are essential for preventing pregnancy gingivitis. a single-arm design involving pre- and post-intervention assessment used in this study lacks a control group, limiting the ability to isolate the application's effects from other external factors. Future research should incorporate a control group to strengthen causal inferences and provide a more comprehensive evaluation of the intervention's impact.

V. CONCLUSION

This research concludes that pregnant women's knowledge about pregnancy gingivitis was initially categorized as low before receiving education through the Mom Smile application. However, after the intervention, their knowledge significantly improved, reaching the "good" category. The study highlights the effectiveness of the Mom Smile application in enhancing awareness about pregnancy gingivitis. These findings can serve as a valuable reference for healthcare providers at Puskesmas Gayam to develop innovative methods for disseminating information pertaining to oral and dental health-related knowledge criterias, particularly concerning pregnancy gingivitis. The integration of accessible digital platforms, such as the Mom Smile application, within comprehensive antenatal care services contributes meaningfully to enhancing maternal awareness pregnant individuals of the critical role of oral health in supporting maternal well-being throughout pregnancy. For pregnant women, utilizing the Mom Smile application offers essential knowledge about pregnancy gingivitis, empowering them to uphold proper oral hygiene throughout pregnancy. Quantitative analysis employing the Wilcoxon signed-rank test demonstrated a marked improvement with high statistical significance, as indicated by a value (p) = 0.000, highlighting the application's potential as an effective educational tool in antenatal care services. Healthcare providers are encouraged to incorporate mobile applications like Mom Smile into antenatal care strategies to enhance educational efforts and improve overall pregnancy outcomes.

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ATTACHMENT

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