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The Effect of Social Media on Oral Hygiene among Pregnant Women (Second Trimester) in Karbala City, Iraq

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ABSTRACT:

Background: There is limited evidence available related to the impact of social media-based oral health education on objective clinical periodontal outcomes among pregnant women. **Objectives:** To assess the effectiveness of a oral health education intervention utilizing social media in terms of plaque control and gingival health in pregnant women compared to the traditional printed oral health education intervention in Karbala, Iraq. **Methods:** The number of pregnant women in the study was 132, consisting of 66 in the control group and 66 in the experimental group, with a randomized baseline–post-test design. The control group received 24 printed educational brochures, while the experimental group was provided with a social media-based oral health education program that lasted for two months. Plaque Index (PI) and Gingival Index (GI) were determined baseline and post-intervention. **Results:** Baseline PI and GI did not differ significantly between groups. After the intervention, the experimental group had significantly lower mean PI (1.177 ± 0.196 vs. 1.885 ± 0.183 ; $P < 0.001$) and GI (0.978 ± 0.174 vs. 1.623 ± 0.194 ; $P < 0.001$) than the control group. **Conclusion:** social media-based oral health education was associated with greater improvements in plaque control and gingival health than conventional printed education among pregnant women in Karbala, Iraq.

INTRODUCTION

Pregnancy is a physiologically active period characterized by hormonal, behavioral, and lifestyle adjustments that may raise the risk of oral health concerns, especially dental caries and gingival inflammation 2,3. During pregnancy, oral hygiene is crucial for the mother's health and may have an impact on future oral health habits for both the mother and the child. Nevertheless, awareness, preventive behaviors, and routine dental attendance often remain suboptimal among pregnant women 3,4,5. Knowledge gaps and unfavorable beliefs are important barriers to dental care during pregnancy. Some pregnant women avoid dental visits because they believe that dental procedures, radiographs, or medications may harm the fetus, while dissatisfaction with oral health instruction during antenatal care has also been reported 3,5. Pregnancy therefore represents an important opportunity for preventive oral health interventions aimed at improving maternal knowledge and health behaviors.^{6,7}

The second trimester represents an important period for maintaining and reinforcing preventive oral health during pregnancy. Pregnancy-related hormonal and physiological changes may increase susceptibility to gingival inflammation and other oral manifestations, highlighting the importance of continued oral hygiene and professional dental care during pregnancy. Current evidence indicates that preventive, diagnostic, and necessary dental care can be safely provided throughout pregnancy when clinically indicated.^{2,3}

Social media has emerged as an accessible and potentially low-cost channel for health communication and oral health promotion, including among pregnant women.^{8,9} Platforms such as WhatsApp, Telegram, YouTube, Instagram, Snapchat, TikTok, and X have been used to provide educational content, counseling, and audiovisual messages.^{10,11} Systematic reviews suggest that social media interventions may improve oral health knowledge and some preventive behaviors, while individual intervention studies have also reported benefits from audiovisual educational approaches.^{8,13}

In pregnancy-specific research, digital education appears particularly useful for improving knowledge, although effects on behavior and clinical outcomes have been less consistent. A randomized trial evaluating social-media-based oral health education among pregnant women reported significant short-term improvements in oral health knowledge.¹ A web-based Health Belief Model intervention also improved knowledge and beliefs, although between-group differences in preventive behavior were not statistically significant after three months.

⁴ Similarly, a field trial reported smaller changes in dental caries and oral health behaviors in a social-network-only group than in more comprehensive educational approaches.¹² Current evidence therefore supports social media as a promising adjunct to, rather than a complete replacement for, conventional oral health education. Systematic and umbrella reviews report favorable effects on knowledge, attitudes, behaviors, and selected clinical indices, but also highlight heterogeneity, short follow-up periods, low or very low certainty of evidence, and risk of bias in many studies.^{8,10} Additionally, social media can facilitate the rapid dissemination of health misinformation, potentially discouraging appropriate preventive care.

^{14,15} This is particularly important for oral health during pregnancy. Some reported misconceptions about dental treatment during pregnancy include the belief that treatment should be avoided during pregnancy and that pregnancy causes calcium loss from the teeth.¹⁶ Social media accounts operated by dental professionals have been associated with lower levels of misinformation, whereas greater confidence in social media as a source of health information has been associated with increased exposure to misinformation.¹⁶ These findings underscore the importance of evidence-based and professionally developed digital oral health education. Based on this evidence, the present study evaluates a oral health education intervention delivered through social media among pregnant women, with particular emphasis on objective clinical outcomes. The study addresses an evidence gap because many previous digital interventions have primarily focused on knowledge and self-reported behaviors, while existing reviews have called for more comprehensive and context-specific intervention research.⁷

While prior studies have focused on the effects of digital health education on oral health knowledge and behaviors, evidence on objective clinical periodontal outcomes among pregnant women, particularly in Iraq, remains limited. Therefore, the aim of this study was to evaluate the effectiveness of a social media-based oral health education program on plaque control and gingival health among pregnant women in Karbala, Iraq.

Objectives

1. To evaluate the effectiveness of social media-based oral health education compared with printed education in improving plaque control and gingival health among pregnant women in Karbala, Iraq.
2. To assess changes in Plaque Index (PI) and Gingival Index (GI) from baseline to post-intervention between the experimental and control groups.

METHODS

Design

The study was conducted among pregnant women in Karbala, Iraq. The study protocol, informed consent form, and educational materials were reviewed and approved by the Research Ethics Committee of the College of Dentistry, Mustansiriyah University, Baghdad, Iraq (REC Reference: REC216; Study Number: MUPRV0023). Written informed consent was obtained from all participants before enrollment.

Setting and Sample

Participants were selected from Al-Taqa Primary Health Care Center, the Teaching Maternity and Obstetrics Hospital, and Imam Al-Hussain Al-Mujtaba Hospital (the Turkish Hospital) in Karbala city, Iraq. A total of 140 pregnant women were initially recruited. Eight participants withdrew from the study, including four from the experimental group and four from the control group. The reported reasons for withdrawal were loss of contact, pregnancy loss (abortion), and relocation to another governorate. The exact number associated with each reason was not recorded. Thus, 132 participants completed the study, with 66 participants in each group.

Eligibility Criteria

Eligible participants were pregnant women in second trimester aged 18–40 years who had access to the internet and social media. Women with acute oral infections requiring immediate treatment, high-risk pregnancies, or medical conditions that could interfere with participation were excluded.

Sample Size

Sample size estimation was performed using G*Power software with a significance level of 0.05 and 80% statistical power.

Allocation

Before the intervention began, participants were assigned to the experimental or control group using a lottery method conducted by the principal investigator.

Intervention and Control

The experimental group received a oral health education program through Instagram, Facebook, and TikTok for two months. Educational content consisted of two videos and one post per week, resulting in 24 publications during the intervention period. The same educational content was posted across the three social media platforms. A reminder was provided every two weeks. The educational materials addressed oral health during pregnancy, proper toothbrushing, interdental cleaning, fluoridated toothpaste, dietary recommendations, and the importance of regular dental visits during pregnancy.

The control group received 24 printed educational brochures containing the same oral health information provided to the experimental group. Thus, the educational information was equivalent between the groups, while the method of delivery differed.

Clinical Examination

Clinical examinations were performed before the intervention and immediately after completion of the two-month intervention. Dental plaque was assessed using the Plaque Index (PI) described by Silness and Løe, and gingival inflammation was assessed using the Gingival Index (GI) described by Løe and Silness. The principal investigator performed the clinical examinations before and after the intervention.

Pilot Study and Examiner Calibration

A pilot study was conducted before the main study to assess the clinical examination procedures. Examiner calibration was performed between the principal investigator and an experienced dentist in Preventive Dentistry to improve consistency in recording PI and GI. Following calibration, the principal investigator performed the clinical examinations in the main study.

Statistical Analysis

After completion of the study, the collected data were reviewed, coded, and prepared for statistical analysis. Normality of the continuous variables was assessed using the Shapiro–Wilk test. Demographic and baseline variables were summarized by study group using frequencies and percentages for categorical variables and means and standard deviations for continuous variables. Categorical variables were compared between the groups using the chi-square test, as appropriate.

Paired-samples t-tests were used to assess changes in PI and GI from baseline to post-intervention within each group. Independent-samples t-tests were used to compare PI and GI between the experimental and control groups. A P value <0.05 was considered statistically significant.

RESULTS

A total of 132 pregnant women completed the study, including 66 participants in the control group and 66 in the experimental group.

Table 1. The baseline characteristics of the participants are presented in Table 1. The age distribution was comparable between the control and experimental groups, with the largest proportion of participants aged 26–33 years in both groups. No statistically significant difference was observed in age distribution between the groups ($\chi^2 = 1.169$, $P = 0.557$). Similarly, educational level did not differ significantly between the control and experimental groups ($\chi^2 = 2.383$, $P = 0.497$). Overall, the absence of significant baseline differences in the assessed sociodemographic characteristics indicates that the two groups were comparable before the intervention.

Characteristic	Category	Control, n (%)	Experimental, n (%)	χ^2	P value
Age (years)	18–25	20 (30.30)	15 (22.73)	1.169	0.557
	26–33	25 (37.88)	30 (45.45)		
	34–40	21 (31.82)	21 (31.82)		
Educational level	Primary	10 (15.15)	12 (18.18)	2.383	0.497
	Secondary	26 (39.39)	18 (27.28)		
	College	15 (22.73)	20 (30.30)		
	Postgraduate	15 (22.73)	16 (24.24)		

Vars. Tests of Normality of PLI and GI among groups using Kolmogorov–Smirnov test

Table 2. The normality of PI and GI scores was assessed using the Kolmogorov–Smirnov test. All P values were greater than 0.05 for PI and GI at baseline and after the intervention in both groups, indicating no statistically significant departure from normality and supporting the use of parametric statistical tests for subsequent analyses.

Vars.	Groups	Statistic	P value	
PI-Baseline	Control	0.978	0.055	
	Exp.	0.975	0.052	
PLI-post	Control	0.973	0.051	
	Exp.	0.977	0.054	
GI-Baseline	Control	0.980	0.057	
	Exp.	0.976	0.053	
GI-post	Control	0.977	0.054	
	Exp.	0.981	0.058	

Descriptive and statistical test of PLI and GI among groups.

Table 3. At baseline, the control and experimental groups demonstrated comparable PI and GI scores. The mean PI was 2.088 ± 0.171 in the control group and 2.115 ± 0.169 in the experimental group, with no statistically significant difference ($t = 0.891$, $P = 0.374$). Likewise, baseline GI values were 1.835 ± 0.196 and 1.893 ± 0.217 , respectively, with no significant between-group difference ($t = 1.605$, $P = 0.111$).

	Control		EXP		T test	P value
	Mean	$\pm$ SD	Mean	$\pm$ SD		
PI-Baseline	2.088	0.171	2.115	0.169	0.891	0.374
PL-post	1.885	0.183	1.177	0.196	21.422	0
GI-Baseline	1.835	0.196	1.893	0.217	1.605	0.111
GI-post	1.623	0.194	0.978	0.174	20.14	0

Following the two-month intervention, both clinical indices showed a marked difference between the groups. The experimental group demonstrated a significantly lower PI than the control group (1.177 ± 0.196 vs. 1.885 ± 0.183 ; $t = 21.422$, $P < 0.001$). A similar pattern was observed for GI, with lower post-intervention scores in the experimental group compared with the control group (0.978 ± 0.174 vs. 1.623 ± 0.194 ; $t = 20.140$, $P < 0.001$). These findings indicate that the experimental group achieved significantly greater improvements in plaque accumulation and gingival inflammation following the intervention.

Statistical test of PLI and GI change by groups.

Paired Samples Test

Table 4. Within-group analysis demonstrated statistically significant reductions in both PI and GI from baseline to post-intervention in both groups. In the control group, PI decreased by 0.204 points ($t = 5.957$, $P < 0.001$), while GI decreased by 0.212 points ($t = 6.981$, $P < 0.001$). The experimental group showed substantially greater reductions, with PI decreasing by 0.937 points ($t = 33.024$, $P < 0.001$) and GI decreasing by 0.915 points ($t = 25.211$, $P < 0.001$).

Groups	Pair	Paired Differences Mean	Paired T test	Sig. (2-tailed)
Control	Pair 1 PI-Baseline–PLIpost	0.20364	5.957	0
Control	Pair 2 GI-Baseline–GIpost	0.21212	6.981	0
EXP	Pair 1 PI-Baseline–PLIpost	0.93712	33.024	0
EXP	Pair 2 GI-Baseline–GIpost	0.9153	25.211	0

Thus, although both groups demonstrated significant improvements following the intervention period, the magnitude of reduction in both plaque accumulation and gingival inflammation was considerably greater in the experimental group.

The experimental group showed greater reductions in both PI and GI than the control group after the intervention.

DISCUSSION

The present study demonstrated that a social media-based oral health education program produced significantly greater improvements in plaque control and gingival health than conventional printed oral health education among pregnant women in Karbala, Iraq. To the best of our knowledge, this is the first study conducted in Iraq to evaluate the effect of a structured social media-based oral health education intervention on objective periodontal outcomes, specifically plaque control and gingival health, among pregnant women. These findings suggest that professionally supervised digital education may enhance preventive oral health practices during pregnancy. The groups showed comparable PI and GI values at baseline, whereas post-intervention PI and GI were significantly lower in the experimental group.

The improvement in plaque control observed in the present study is clinically plausible because the intervention provided repeated exposure to practical oral hygiene messages, including tooth-brushing, interdental cleaning, fluoridated toothpaste use, dietary advice, and dental attendance. Repeated access may reinforce recommended behaviors more effectively than a single educational encounter. Audiovisual formats may also make procedural information easier to understand and remember. This interpretation is consistent with findings that video-based digital education may improve oral health knowledge among pregnant women¹³ and with reviews suggesting potential advantages of audiovisual content over text-only communication⁸. The significant reduction in GI scores suggests that improvements in oral hygiene were accompanied by better gingival health. This is important because pregnancy-related hormonal changes can increase gingival inflammatory responses to plaque. A sustained reduction in plaque accumulation may therefore contribute to improved gingival status. Previous reviews have reported positive effects of online social network interventions on gingival health, although the overall certainty of the evidence has been described as very low⁽¹⁰⁾.

Not all previous studies have reported equally strong behavioral or clinical effects from digital interventions. In an Iranian field trial, the social-network-only group showed smaller changes in dental caries and oral health behaviors than groups receiving more comprehensive interventions¹². Similarly, a randomized trial comparing WhatsApp education with motivational interviewing found that both approaches were beneficial, while motivational interviewing produced stronger improvements in some oral health outcomes (11). These differences suggest that the effectiveness of digital education may depend on the intensity of reinforcement, personalization, interaction with health professionals, and quality of educational content.

Social media should also be considered a double-edged communication channel. Although it allows rapid dissemination and repeated access to information, misinformation can spread widely and may influence health decisions¹⁵. Pregnancy-related oral health misconceptions, including concerns about dental treatment during pregnancy, remain relevant¹⁶. Therefore, the favorable clinical findings in the present study should not be interpreted as evidence that unmoderated social media use is sufficient. The likely benefit is more appropriately attributed to a structured, professionally guided intervention using consistent oral health messages.

The findings also support integrating digital oral health promotion with routine antenatal care rather than replacing provider-led education. Systematic reviews of pregnancy oral health interventions have emphasized the value of education, screening, referral, and provider involvement (5). Social media may extend the reach of antenatal oral health education by providing reinforcement between clinical encounters, while dental and prenatal professionals remain important sources of accurate information and referral. The study has several limitations. First, the follow-up period was only two months, preventing assessment of whether the observed improvements were sustained.

Third, participant exposure and engagement with content on social media platforms might not have been completely controlled. Fourth, participants were selected from health care facilities in one geographic region, which might not be representative of other populations. Lastly, the sample in the control condition received baseline education in print, while the sample in the experimental condition received repeated digital education, which might have accounted for the effect seen. Yet, the study has practical strengths in that objective clinical indices were used, standardized clinical examination was used, the intervention was defined over a two-month period and compared to a conventional approach to education. More studies with larger and diverse

patient populations, a consistent dose of intervention, objective measures of engagement and longer follow-up time are warranted.

CONCLUSION

This randomized study found that social media–based oral health education improved plaque control and gingival health among pregnant women compared with printed education in Karbala, Iraq.

Practical Implications

The results of this research indicate that the social media (SM) based oral health education can be used as an effective and cost-economical oral health education supplement for conventional antenatal oral health education. Professionally supervised digital educational materials can be routinely integrated into maternal healthcare to enhance oral health outcomes in pregnant women.

Clinical Significance

This study showed that the Plaque Index and Gingival Index (GI) were considerably lower in the experimental group, demonstrating that digital education can help to promote better oral hygiene and decrease gingival inflammation in pregnant women. The results pave the way for increasing the use of digital oral health education in the context of routine antenatal care.

Strengths of the Study

The strengths of this study lay in the use of objective clinical periodontal measurements, the use of conventional printed education as a comparison, the use of a standard pre- and post-intervention assessment, and the evaluation of an objective social media–based educational intervention in a real-world setting within the antenatal healthcare system.

LIMITATIONS

This study has several limitations. Although participants were assigned to the experimental or control group using a lottery method, the randomized design and convenience sampling method limit the generalizability of the findings and warrant cautious interpretation of causal effects. In addition, the length of the follow-up was short, lasting only two months, and thus did not allow for conclusions about the persistence of results. Also, the research took place in selected healthcare facilities in Karbala, Iraq and thus the results of the study may not be generalized to other healthcare facilities. In the future, long-term multicenter randomized controlled trials should be conducted.

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CONFLICT OF INTEREST

The authors have no conflict of interest.

INFORMED CONSENT

All participants in the study gave written informed consent.

AUTHOR CONTRIBUTIONS

Data Collection: A.A., H.H.; Formal Analysis: A.A., H.H.; Writing – Original Draft: A.A.; Writing – Review and Editing: A.A., H.H.; Supervision: H.H.

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