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Evaluating the Effectiveness of WhatsApp Applications in Enhancing Oral Health Awareness Among Students

Pramila Thapa PhD¹, Dachel Martínez Asanza PhD², Rashmi Chaugai³, Nabin Lamichhane⁴

1 Associate Professor, Founder at Life Skills Education, Nepal,

2 Professor at National School of Public Health, Havana Medical Sciences University, Havana, Cuba.

3 Lecturer at Yeti Health Science Academy, Purbanchal University, Nepal

4 Assistant Professor at Purbanchal University School of Health Sciences, Morang,

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Corresponding Author: Pramila Thapa **E-mail:** pbrt426@gmail.com

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Abstract

Mobile messaging apps like WhatsApp are popular communication tools, especially among youth. Oral health issues are common among young adults, but traditional education methods often fail to engage them effectively. Research on using WhatsApp for oral health education is limited, particularly in Nepal. This study aims to evaluate WhatsApp's effectiveness in improving oral health awareness and practices among students. Employing a quantitative approach with a pretest-posttest design, the study evaluated the effectiveness of a WhatsApp intervention on oral health knowledge and practices. Conducted at Yeti Health Science Academy, 38 students participated, completing pre- and post-tests. Instruments included socio-demographic data and the Digital Education (DE) questionnaire, alongside the Oral Health Awareness and Practice questionnaire. Reliability tests indicated high consistency in the tools. Ethical approval was obtained, and descriptive and paired statistics were applied in the analysis. The mean age was 20.65, with 80% female and 90% Hindu participants. Brahmin and Chhetri were the most common ethnicities. 76.3% practiced oral hygiene, and 26.3% flossed daily. Most consumed sugar snacks (76.3%), with some experiencing dental visit anxiety (37.8%). Mouthwash was popular (89.2%), but no probiotic therapy was reported. Post-test oral health scores significantly improved (88.6579 vs. 76.9737). WhatsApp intervention shows

potential in improving oral health awareness and practices among students. Integrating mobile apps like WhatsApp into oral health education programs can enhance engagement and effectiveness.

Keywords: Health education, Mobile app integration, Oral health awareness, Student engagement, WhatsApp intervention

Introduction

Oral health awareness among students is vital as it directly impacts their overall quality of life, including physical, mental, and social aspects (Lin et al., 2021). Poor oral health can lead to pain, infections, and difficulty in eating or speaking, which in turn affects academic performance and self-esteem (Albino et al., 2012; Lin et al., 2021; Nayak et al., 2018). Educating students about oral health fosters lifelong healthy habits, reducing healthcare costs and improving quality of life (Giansanti & Cosentino, 2021). Various social media platforms have been suggested for disseminating information, with WhatsApp being a reliable source for mass communication (Giansanti & Cosentino, 2021). Regular care and informational support are helpful in improving disease-related health outcomes, making WhatsApp an incredible tool for raising awareness (Krishna et al., 2009). New technologies like WhatsApp can effectively serve as platforms to communicate dental advice, strengthening the connection between health services and technology (Nayak et al., 2018). Social Media applications like WhatsApp have become pervasive tools for communication, particularly among youth. (Jacinto & Arndt, 2018; Ab Mumin et al., 2022). Smartphones have become a necessary part of our everyday life which is used for instant messaging applications (e.g., WhatsApp, Messenger, iMessage, Kik, Viber, GroupMe, Telegram, Send, Line, and Snapchat) and very popular among the users. Despite the prevalence of oral health issues among young adults (Chau et al., 2023; Jain et al., 2024; Murray, 2022), traditional health education approaches often fail to engage this demographic effectively (Albino et al., 2012). There is a notable gap in research evaluating the effectiveness of WhatsApp applications in improving oral health awareness among students (Nayak et al., 2018). Previous studies have demonstrated the efficacy of mobile health applications in promoting behavior change among diverse populations (Aljafari et al., 2022; Koshy et al., 2008; Nagaveni et al., 2022; Raiman et al., 2017). However, in Nepal, few studies have focused on oral health education interventions (Subedi et al., 2021; Lin et al., 2021). In the digital age, social media is gaining popularity due to its cost-effectiveness, reach among large populations, and capability to maintain health data

records. Despite these advantages, such studies remain limited in Nepal. Building upon this existing research, the current study aims to apply similar strategies to oral health education using WhatsApp. By evaluating the impact of WhatsApp interventions through pre- and post-assessments, researchers seek to provide insights into a systematic and interactive approach for enhancing oral health awareness among students

Methodology

The main purpose of the study is to examine the effectiveness of utilizing the WhatsApp social media platform application to enhance oral health awareness and practices among newly admitted allied health science students. Employing a quantitatively approach with a pretest-posttest design, the study intervention duration spans 5days. The research is conducted at Yeti Health Science Academy among a sample of 38 students, both pre and post-test. WhatsApp platform is chosen as the medium for enhancing oral health awareness among students due to its accessibility, user-friendly interface, and widespread adoption, providing a resource-rich platform for innovative student-learning experiences (Raiman et al., 2017; Willemse, 2015). Particularly popular among younger demographics, its ability to facilitate real-time communication and share multimedia content makes it an effective tool for delivering health-related information (Nayak et al., 2018; Raiman et al., 2017). Additionally, WhatsApp's group chat functionality allows for collaborative learning and peer support, which can reinforce positive health behaviors. Researchers have selected this platform to provide an awareness intervention approach and deliver awareness packages.

Instruments of Study

The study comprises two sections. The first section examines socio-demographic variables, while the second section includes the Digital Education (DE) questionnaire. The DE questionnaire employs a 5-point Likert scale, where 1 represents high dissatisfaction and 5 represents high satisfaction. Similarly, the Awareness for Oral Health (AOH) questionnaire utilizes a modified 5-point Likert scale, with 1 representing high dissatisfaction and 5 representing high satisfaction. Additionally, the second section includes a questionnaire on oral health practices, categorized as yes, no, and sometimes.

Reliability and Validity Test:

The reliability test for the digital education of oral health yielded promising results. The Cronbach's alpha coefficients for the Digital Education (DE) questionnaire (8 items),

Awareness for Oral Health (AOH) (14 items), and Oral Health Practice (12 items) indicate high internal consistency, affirming the reliability of the measurement instruments. For the DE questionnaire, the Cronbach's alpha value was .830, while for the AOH questionnaire, it was .848. Similarly, the Oral Health Practice questionnaire demonstrated excellent reliability with a Cronbach's alpha of .956. These findings underscore the robustness and consistency of the questionnaires in evaluating participants' awareness and practices regarding digital oral health education, thereby enhancing the credibility of the study's data collection tools.

Data collection methods:

Included pre-test and post-test oral health knowledge and practice assessments, WhatsApp-based educational intervention, and pre-test and post-test evaluations using the same questionnaire. The study recruited a newly admitted 38 students of who were newly admitted and who didn't have received formal oral health education in secondary school or clinical settings. Participants were randomly assigned to either the intervention group (sending a short WhatsApp educational message). Research utilized WhatsApp, recognized as the simplest, cheapest, and most effective means of communication within the clinical health sector (Mars & Escott, 2016). Similarly, another study revealed WhatsApp's effectiveness as a communication tool among clinicians, highlighting its relevance and applicability in clinical settings (Raiman et al., 2017). The methodology involves gathering data from newly joined allied health sciences students through Google Docs. In the first week of the study, researchers collected pre-test survey questionnaires. In the second week, 5 days an intervention pack was introduced. Consequently, the researchers followed by sending at least 2 to 3 short messages with short videos, text messages, infographics, and information such as the following 5-days calendar for oral health education using digital media through social platforms:

Day 1: Introduction to Oral Health

Post a video introducing the importance of oral health.

Share infographics highlighting key facts about dental hygiene.

Invite followers to share their oral health routines using a dedicated hashtag.

Day 2: Brushing Techniques

Post a tutorial video demonstrating proper brushing techniques.

Share tips for selecting the right toothbrush and toothpaste.

Host a live Q&A session with a dental hygienist to answer questions about brushing.

Day 3: Flossing and Interdental Cleaning

Share a video tutorial on the importance of flossing and interdental cleaning.

Post infographics showing the step-by-step process of flossing.

Encourage followers to share their experiences with flossing and interdental brushes.

Day 4: Nutrition and Oral Health

Share tips for maintaining a tooth-friendly diet.

Post infographics highlighting foods that promote oral health.

Host a poll asking followers about their favorite tooth-friendly snacks.

Day 5: Oral Health Habits for Kids

Share a video with tips for teaching children about oral hygiene.

Post infographics on fun ways to encourage kids to brush and floss.

Host a virtual Storytime session featuring children's books about dental health

Inclusion criteria

Specify enrollment in allied health sciences programs, possession of smartphones with WhatsApp installed, and willingness to participate. Exclusion criteria encompass students with advanced oral health knowledge and those not using WhatsApp platforms. Additionally, participants should not have any oral health-related illnesses and must be willing to take part in the study.

Ethical approval was obtained from the Yeti Health Sciences Academy IRC, recognized by the Nepal Health Research Council, and informed consent from participants was secured.

Data analysis:

Quantitative data were analyzed using SPSS, employing descriptive statistics and paired t-tests to assess the effectiveness of WhatsApp-based interventions on pre- and post-test knowledge and practices about oral health among students.

Results

Table 1: Socio-Demographic Variables Among Participants

Variables	Frequency	Percentage
Age Group(n=40)		
25 yrs	21	52.5
≥26 yrs	19	47.5
Mean= 20.65; Std. Deviation=4.07337; Minimum=18.00; Maximum=39.00		
Gender(n=40)		
Male	8	20.0
Female	32	80.0
Religion(n=39)		
Hindu	36	90.0
Buddhist	2	5.0
Christian	1	2.5
Ethnicity(n=36)		
Brahman	13	32.5
Chhetri	14	35.0
Newar	2	5.0
Mongolian	7	17.5

Table 1 shows that among the participants, 21 (52.5%) are aged ≤ 25 years and 19 (47.5%) are aged ≥ 26 years, with a mean age of 20.65 (Std Deviation: 4.07; Min: 18; Max: 39). In terms of gender, there are 8 males (20.0%) and 32 females (80.0%). Regarding religion, 36 (90.0%) are Hindu, 2 (5.0%) are Buddhist, and 1 (2.5%) is Christian. The ethnic breakdown includes 13 (32.5%) Brahman, 14 (35.0%) Chhetri, 2 (5.0%) Newar, and 7 (17.5%) Mongolian participants.

Table 2: Pre-test Practice of Oral Health Among Participants

Variables	Frequency	Percentages
Brush twice daily		
No	3	7.9
Sometimes	29	76.3
Yes	6	15.8
Used fluoride toothpaste		
No	3	7.9
Sometimes	27	71.1
Yes	8	21.1

Floss your teeth daily		
No	3	7.9
Sometimes	26	60.5
Yes	8	26.3
Visit dentist twice yearly		
No	3	7.9
Sometimes	23	76.3
Yes	10	15.8
Skills in oral health care		
No	3	7.9
Sometimes	29	76.3
Yes	6	15.8
Taking care Cav-		
ities		
No	2	5.3
Sometimes	25	65.8
Yes	9	23.7

Table 2 shows participants' oral health practices. Results indicate that 76.3% sometimes brush twice daily, use fluoride toothpaste, and visit the dentist twice yearly. Additionally, 26.3% floss daily, while 23.7% actively care for cavities.

Table 3: Pre-test Practice of Oral Health Among Participants

Variables	Frequency	Percentages
Consume excessive sugar, snacks or beverages		
No	3	7.9
Sometimes	29	76.3
Yes	6	15.8
Prevent tooth sensitivity		
No	3	7.9
Sometimes	29	76.3
Yes	6	15.8
Probiotic therapy		
No	38	100
Sometimes	0.00	0.00
Yes	0.00	0.00
Use Mouthwash		
No	1	2.7

Sometimes	3	8.1
Yes	33	89.2
Dental visit anxiety		
No	3	7.9
Sometimes	17	44.7
Yes	18	37.8
Digital Education		
No	3	7.9
Sometimes	25	65.8
Yes	10	26.3

Table 3 reveals participants' oral health practices. Most respondents (76.3%) sometimes consume excessive sugar, snacks. Similarly, 76.3% sometimes take measures to prevent tooth sensitivity. However, no participants reported using probiotic therapy. The majority (89.2%) use mouthwash, while 37.8% experience dental visit anxiety. About digital education, 26.3% reported using it sometimes to learn.

Table 4: Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair	Total_Pre-Test	76.9737	38	10.03100	1.62724
1	Total_Post-Test	88.6579	38	5.93786	.96325

Table 5: Paired Samples Correlations

		N	Correlation	Sig.
Pair	Total_Pre & Total_Post	38	.115	.493
1				

Table 6: Paired Samples Test

Mean		Std. Deviation	Std. Error Mean	Paired Differences			df	Sig. (2-tailed)	
				95% Confidence Interval of the Difference					
				Lower	Upper				
Pair 1	Total_Pre - Total_Post	-11.68421	11.05540	1.79342	-15.31803	-8.05039	-6.515	37	.000

From these statistics, we can observe the mean score on the post-test (88.6579) is higher than the mean score on the pre-test (76.9737). This suggests an improvement or change in the measured variable between the pre-test and post-test. The standard deviation of the scores decreased from pre-test (10.03100) to post-test (5.93786), indicating potentially less variability in scores after the intervention or treatment. The standard error of the mean also decreased from pre-test (1.62724) to post-test (0.96325), suggesting more precision in the mean estimate after the intervention. Based on these findings, it appears that there has been a significant improvement from the pre-test to the post-test. However, to draw more concrete conclusions, further statistical analysis, such as a paired-samples t-test, could be conducted to determine if the observed difference is statistically significant. Additionally, examining the context of the study and any interventions or treatments implemented between the pre-test and post-test would provide valuable insights.

Discussion

The findings of this study highlight significant improvements in pre-test and post-test scores, reflecting positive outcomes from the intervention. The increase in the mean post-test score (88.657) compared to the pre-test score (76.973) suggests the effectiveness of the intervention in enhancing the measured variables. Moreover, a reduction in the standard deviation (pre-test: 10.031; post-test: 5.937) and standard error of the mean (pre-test: 1.627; post-test: 0.963) indicates improved precision following the intervention. These observations align with previous research demonstrating the efficacy of interventions in improving outcomes (Krishna et al., 2009). Subedi et al. (2021) demonstrated the effectiveness of oral health education in enhancing oral hygiene knowledge, attitudes, and practices. Additionally, social media technologies offer versatile methods to promote oral health awareness among students, utilizing various formats such as videos, audio, visuals, and text messages. This study specifically utilized short text messaging due to its simplicity, time-saving nature, and accessibility from any location. Other studies also support the effectiveness of using platforms like Facebook, WhatsApp, and YouTube for similar educational purposes. Mobile phones, particularly SMS services, are emerging as effective tools to reinforce oral health education messages and promote healthier behaviors (Jadhav et al., 2016). For instance, Abdaljawwad (2016) demonstrated that sending text messages directly to patients about oral hygiene significantly improved compliance over a 3-month period. Intervention strategies, such as instant messaging applications (Raiman et al., 2017), play a crucial role in improving communication and enhancing learning

opportunities in healthcare settings. Similarly, another study conducted by Pubalan et al. (2024), regular WhatsApp texting messages and reminders significantly improved oral hygiene. Participants receiving regular reminders via WhatsApp messaging showed a notable improvement in oral hygiene compared to the control group (Pubalan et al., 2024).

The findings suggest that utilizing WhatsApp as an educational tool can significantly enhance oral health awareness among students by leveraging its accessibility and popularity (Giansanti & Cosentino, 2021). In real-world settings, educators can use WhatsApp to disseminate accurate health information, facilitate peer discussions, and encourage positive health behaviors (Ab Mumin et al., 2022; Jadhav et al., 2016; Willemse, 2015). However, attention must be paid to preventing misinformation and ensuring equitable access.

Recommendations

From this study, researchers suggested that enhancing standard care with reminders, oral health awareness, and management through social media, voice, video, and short message services can support improved health outcomes and streamline intervention for both caretakers and healthcare providers.

Social media platforms like WhatsApp are widely accepted and offer valuable opportunities for connection, sharing, learning, and exchanging educational information (Dhungana et al., 2023; Oral et al., 2024; Shrestha et al., 2023). Utilizing WhatsApp to deliver educational content, such as short videos and various materials, is an effective method to reach students, particularly in rural areas (Palladino & Thapa, 2023; Shrestha et al., 2023; Thapa et al., 2023). These approaches are advantageous in regions with limited access to modern technology and infrastructure for oral health care. However, leveraging such technology requires careful consideration of legal aspects and regular updates on dental health practices. This research highlights the need for developing self-awareness, life skills education, and digital literacy to ensure data privacy, security, and effective oral health interventions (Marzo et al., 2024; B. Thapa et al., 2023; P. Thapa et al., 2024).

Limitation

While the study demonstrated the potential of WhatsApp interventions in improving oral health awareness and practice, several limitations should be considered. The study's sample

size was relatively small and limited to a specific demographic, consisting primarily of allied health science students, which may limit the generalizability of the findings to other populations. Additionally, the study's reliance on self-reported data introduced the possibility of response bias and may not accurately reflect participants' actual behaviors. Furthermore, the study's duration was relatively short, which may not capture long-term effects of WhatsApp interventions on oral health outcomes. Future research should address these limitations by including larger and more diverse samples, employing objective measures of oral health behaviors, and conducting longitudinal studies to assess the sustained impact of mobile app-based interventions over time.

Conclusion

The study results highlight the possible of WhatsApp interventions in attractive oral health awareness and practices among students. As evidenced by the socio-demographic data, which discovered a mainly young, female, Hindu population, there occurs a demographic suitable for engagement through digital platforms. In spite of diverse oral health practices among participants, with many rarely observing to suggested activities like brushing and dental visits, the post-intervention improvements direct the efficacy of WhatsApp-based educational initiatives. Integrating mobile apps like WhatsApp into oral health education approach embraces potential for attractive engagement and effectiveness, mainly among youth who are already familiarized to using such platforms for communication. By leveraging the widespread popularity and convenience of mobile messaging apps, oral health education can scope broader audiences and ease behavior change in a more interactive and engaging manner. This research study highlights the importance of pioneering approaches in addressing oral health challenges, particularly in situations where traditional education approaches may fall short. Moving forward, additional study and application of mobile app-based interventions are acceptable to discover their full potential in promoting oral health and cultivating overall well-being among diverse populations.

Finding: None

Conflict of Interest: None

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