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**ORAL HEALTH KNOWLEDGE CHANGE AFTER INSTAGRAM
 DIGITAL POSTERS**

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ABSTRACT

Background: Oral health knowledge supports preventive oral health practices, and Instagram may provide an accessible channel for repeated health education. **Purpose:** This study aimed to describe changes in oral health knowledge before and after exposure to digital posters delivered through Instagram. **Methods:** A pre-experimental one-group pre-test and post-test study was conducted online through the Instagram account @nairansc in April–May 2026. The population comprised 1,422 followers; 323 eligible participants were included through simple random sampling. Knowledge was measured using a 15-item questionnaire. Four digital posters addressed toothbrushing, tongue cleaning, interdental cleaning, and factors associated with dental damage. Each poster was published three times in rotation during a 19-day intervention period, followed by one week of reposting. Pre-test and post-test scores were compared using a paired analysis. N-Gain was described by sex, education, and age. **Results:** The proportion of participants with good knowledge increased from 79.3% (256/323) to 97.2% (314/323). The mean score increased from 12.87 ± 1.71 to 14.56 ± 0.98 , an absolute increase of 1.69 points ($p < 0.001$). N-Gain was high for both males (0.73) and females (0.76), and for junior high school (0.71), senior high school (0.72), and university education (0.79). By age, N-Gain was 0.75, 0.63, 0.70, and 0.86 for the 18–22, 23–27, 28–32, and ≥ 33 -year groups, respectively. **Conclusion:** Oral health knowledge was higher after exposure to the Instagram-based digital posters in this study population. Because the design lacked a control group, the observed change cannot be attributed exclusively to the intervention.

Keywords: Digital poster, Health education, Instagram, Knowledge, Oral health.

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INTRODUCTION

Oral health is an essential component of general health and quality of life. Adequate oral health knowledge helps individuals recognize oral health problems, understand preventive measures, and make appropriate decisions about oral care. Limited knowledge may contribute to suboptimal oral health maintenance and remains an important consideration in oral health promotion.¹

Digital technology has expanded opportunities for health education through social media. Instagram and other social platforms are used to access health information, providing opportunities to reach users rapidly and repeatedly. Social-media-based oral health promotion has been reported as a potential approach for improving oral health awareness and knowledge.^{2,3}

Digital posters provide a concise visual format that combines illustrations, typography, color, and short explanatory statements. Previous studies have reported improvements in oral health knowledge or literacy following social-media, poster-based, and digital educational interventions.^{4–7} Instagram has also been described as a platform through which dental information can be disseminated to users.⁸

Despite this evidence, the present study focused on a defined series of four digital posters repeatedly delivered through one Instagram account and evaluated changes in knowledge among adult followers. The

objective was to describe changes in oral health knowledge before and after exposure to the Instagram-based digital posters and to describe N-Gain values according to sex, education, and age.

MATERIALS AND METHODS

Material

This pre-experimental study used a one-group pre-test and post-test design. The study was conducted online through the Instagram account @nairansc from April to May 2026. The population comprised 1,422 followers of the research account. Eligible participants were Instagram users aged ≥ 18 years who followed the account, had access to the internet and a smartphone or laptop, agreed to complete the pre-test, intervention, and post-test, and provided online informed consent. Participants who did not complete either questionnaire, submitted incomplete responses, unfollowed the research account before the intervention ended, or did not access the educational content were excluded.

Methods

The actual number of participants included was 323. Simple random sampling was used. The Isaac and Michael table with a 5% error level was used as the minimum sample-size reference, giving 283 participants for a population of 1,422. Because this was a paired pre-test–post-test analysis, the use of a population-based table rather than an effect-size/power-based calculation should be considered a limitation of the original sample-size planning. The exact randomization mechanism used to select individuals from the eligible follower list was not documented in the source protocol and should be inserted before submission if available.

Steps of Procedure

Oral health knowledge was measured using a 15-item questionnaire based on Romalee et al.⁹ and modified with reference to Verma.¹⁰ The questionnaire covered toothbrushing, interdental cleaning, tongue cleaning, fluoride, plaque, calculus, dental pain, and factors associated with dental damage. Items used binary or multiple-choice responses. A correct answer received 1 point and an incorrect answer received 0 points, giving a maximum score of 15. Knowledge was categorized as good (12–15), moderate (8–11), and poor (0–7). The source thesis documents the instrument source and scoring criteria but does not report a formal content-validity or reliability coefficient; these should be reported if such testing was performed.

Four digital posters were prepared for Instagram feed delivery. The topics were: (1) toothbrushing technique, (2) tongue cleaning, (3) interdental cleaning, and (4) factors associated with dental damage, including plaque, calculus, and dental caries. Each poster was published three times in rotation during the 19-day intervention period. All four posters were then reposted for one week as reinforcement. Participants completed the same 15-item questionnaire for the post-test after the intervention. The study protocol excluded participants who reported no access to the educational content; however, individual exposure frequency was not objectively verified through Instagram analytics.

Data were processed using Microsoft Excel and SPSS. Descriptive statistics were used to describe participant characteristics and knowledge categories. Data normality was assessed using the Kolmogorov–Smirnov test because the sample size exceeded 50 participants. The pre-test and post-test scores were normally distributed ($p = 0.54$ and $p = 0.61$, respectively). Therefore, differences in knowledge scores before and after the intervention were analyzed using the paired-samples t-test. Statistical significance was set at $p < 0.05$. The mean difference between pre-test and post-test scores was also calculated. N-Gain was calculated to describe the magnitude of improvement across sex, education, and age groups. The classification used was low when $g < 0.30$, moderate when $0.30 \leq g \leq 0.70$, and high when $g > 0.70$.¹¹ Thus, a value of exactly 0.70 is classified as moderate.

The study was conducted after obtaining ethical approval from the Ethics Committee of the Faculty of Dentistry, Universitas Syiah Kuala (05/KE/FGK/2026). Participants provided online informed consent before participating in the study. Participation was voluntary, and participant identities and research data were kept confidential. Ten participants were selected by lottery to receive an electronic-money reward of Rp50,000.

RESULTS

A total of 323 Instagram users completed the study. Most participants were female (223; 69.0%), aged 18–22 years (261; 80.8%), and educated at senior high school level (227; 70.3%). University participants accounted for 94 (29.1%), while 2 (0.6%) had junior high school education is presented in Table 1.

Table 1. Participant characteristics

Characteristic	Category	n (%)
Sex	Female	223 (69.0%)
	Male	100 (31.0%)
Age	18–22 years	261 (80.8%)
	23–27 years	17 (5.3%)
	28–32 years	5 (1.5%)
	≥33 years	40 (12.4%)
Education	Junior high school	2 (0.6%)
	Senior high school	227 (70.3%)
	University	94 (29.1%)

Table 2. Knowledge categories before and after intervention

Before the intervention, 256 participants (79.3%) had good knowledge, 66 (20.4%) had moderate knowledge, and 1 (0.3%) had poor knowledge. After the intervention, 314 (97.2%) had good knowledge and 9 (2.8%) had moderate knowledge; no participant remained in the poor category.

Knowledge category	Pre-test n (%)	Post-test n (%)	Change
Good	256 (79.3%)	314 (97.2%)	+17.9 pp
Moderate	66 (20.4%)	9 (2.8%)	–17.6 pp
Poor	1 (0.3%)	0 (0%)	–0.3 pp

Table 3. Comparison of knowledge scores before and after intervention

Measure	Mean ± SD	Range
Pre-test	12.87 ± 1.71	6–15
Post-test	14.56 ± 0.98	10–15

The mean score increased by 1.69 points, from 12.87 ± 1.71 before the intervention to 14.56 ± 0.98 after the intervention. The post-test mean approached the maximum possible score of 15. The Kolmogorov–Smirnov test showed normal distribution for the pre-test ($p=0.54$) and post-test ($p=0.61$) scores. The Paired Sample T-Test demonstrated a statistically significant difference between pre-test and post-test scores ($p<0.001$).

Table 4. N-Gain according to participant characteristics

N-Gain was high in both sex groups and all education groups. According to age, N-Gain was high in the 18–22-year and ≥33-year groups and moderate in the 23–27-year and 28–32-year groups. Findings for very small groups, particularly junior high school ($n = 2$) and 28–32 years ($n = 5$), should be interpreted descriptively.

Characteristic	Category	n	Mean N-Gain
Sex	Male	100	0.73
	Female	223	0.76
Education	Junior high school	2	0.71
	Senior high school	227	0.72
	University	94	0.79
Age	18–22 years	261	0.75
	23–27 years	17	0.63
	28–32 years	5	0.70
	≥33 years	40	0.86

DISCUSSION

The study found higher oral health knowledge after exposure to Instagram-based digital posters. The proportion of participants with good knowledge increased from 79.3% to 97.2%, while the mean score increased from 12.87 to 14.56, representing an increase of 1.69 points. These findings are consistent with previous studies

showing that Instagram-based health promotion can improve oral health literacy and that digital posters can increase dental and oral health knowledge.^{6,11,13} In addition, poster-based dental health education has been reported to improve tooth-brushing knowledge, supporting the potential of visual media as an educational approach.⁸

The observed improvement may be related to the characteristics of the intervention. The posters presented concise visual information using illustrations and limited text, which may facilitate the delivery and comprehension of preventive oral health messages. Digital posters also allow health information to be accessed repeatedly through social media. Previous research has described Instagram as an accessible medium for health promotion, while studies of digital posters have reported improvements in knowledge following their use as an educational medium.^{6,11} However, the present study cannot determine whether the visual format itself or the repeated exposure contributed more to the observed improvement.

The intervention also involved repeated exposure to the educational materials. Each of the four posters was circulated three times during the intervention, and all posters were reposted during the final week. Repeated presentation may have provided participants with additional opportunities to review the same preventive messages. This may have supported retention of information, particularly because the intervention addressed several basic oral health practices. Nevertheless, because the study did not compare repeated exposure with single exposure, the independent contribution of repetition cannot be determined.

The descriptive N-Gain findings showed improvement in both sexes, with values of 0.73 in males and 0.76 in females. The difference was small and should not be interpreted as evidence that sex independently influenced the magnitude of improvement because no inferential subgroup analysis was performed. Similarly, the higher descriptive N-Gain observed in the university group (0.79) should be interpreted cautiously. Previous research has reported an association between educational level and oral health knowledge among adults, indicating that educational attainment may be related to differences in oral health knowledge.¹² However, the present study did not statistically test differences in N-Gain between educational groups; therefore, the observed values should be considered descriptive rather than evidence of an education-specific intervention effect.¹³

The age-group findings should also be interpreted cautiously. The highest N-Gain was observed among participants aged ≥ 33 years (0.86), whereas the 23–27-year group had the lowest value (0.63). The age groups were unevenly distributed, particularly the 28–32-year group, which consisted of only five participants. Differences in N-Gain may reflect variations in baseline knowledge, previous experience, exposure to oral health information, or other characteristics that were not measured in this study. Therefore, these descriptive values should not be interpreted as evidence of age-specific intervention effects.

The findings should be interpreted in consideration of several limitations. First, online data collection limited direct control over the conditions under which participants completed the questionnaires. Participants may also have obtained oral health information from sources outside the intervention, which could have contributed to changes in knowledge. Second, the same 15-item questionnaire was administered during the pre-test and post-test; therefore, a testing effect cannot be excluded. Third, the one-group pre-test–post-test design did not include a control group. Consequently, maturation, testing effects, and exposure to external information cannot be separated from the observed change. The sample was also dominated by young adults and participants with senior high school education, which may limit the generalizability of the findings to other populations.

Oral health knowledge was higher after exposure to digital posters delivered through Instagram among the participants in this study. The proportion of participants with good knowledge increased from 79.3% to 97.2%, and the mean knowledge score increased from 12.87 to 14.56. Because the study used a one-group pre-test and post-test design without a control group, the observed improvement should be interpreted as a pre-test–post-test change and not as definitive evidence of a causal effect of Instagram-based digital poster education.

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