

The Mediation Effect of Attitude on Knowledge and Oral Health Practices Among Allied Health Students

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ABSTRACT

This study investigated the mediating effect of attitude on the relationship of knowledge and oral health practices among 314 conveniently sampled allied health students in one of the sectarian higher educational institutions in the Philippines. The research used quantitative, descriptive-correlation, and mediation design. Findings showed that the respondents had very good knowledge about oral health practices, a positive attitude toward oral health, and very good oral health practices. Correlation results showed that knowledge and attitude were significantly related to oral health practices and that knowledge was not significantly related to attitude. The predictors of oral health practices were knowledge and attitude. Attitude was not a significant mediator of knowledge and oral health practices.

Keywords: *Knowledge, attitude, oral health practices, toothbrushing, mouthwash.*

INTRODUCTION

Oral health is an essential component of individuals' general health and overall well-being, which is related to individuals' oral health knowledge and healthy oral hygiene habits. It affects an individual's oral functions and social interactions and is closely linked to overall health and quality of life. One should be free from oral cancer and infection, periodontal diseases, tooth decay, tooth loss, and any facial disorders that impair a person's ability to bite and chew (Mbele-Kokela et al., 2021) to stay orally healthy.

This state of oral health might be related to the rapid development of oral diseases following lifestyle changes such as consumption of a sugar-rich diet, lack of water fluoridation, and other socio-environmental factors. Oral health is a critical public health concern due to the high incidence and prevalence of oral illnesses worldwide. According to the World Health Organization oral health problems are still not well controlled globally despite the considerable improvements in oral health measures among populations. Meanwhile, in most industrialized nations, oral disease treatments are considered the fourth most expensive disease treatments (Farsi et al., 2020).

Furthermore, oral health is strongly linked to oral health practices and knowledge. Oral health education contributes to excellent oral health, but nothing will be achieved unless

attitudes and behaviors are created and implemented. Even if the individuals are educated, it is vital to examine their oral health knowledge, attitudes, and habits to instill good lifestyle patterns that will last a lifetime (Reddy et al., 2014).

Individuals who maintain positive oral health ideas throughout time have better dental health than those who do not. However, abstract knowledge about oral health practices does not guarantee a later change in individuals' behaviors and attitudes which are often gained after conceptualizing oral health practices. Neglecting one's dental health, on the other hand, can cause pain and suffering, lowering one's quality of life and impeding productivity at work. Although allied health students are expected to be future health professionals, it is inevitable that among all of them, some do not have optimal oral health conditions (Farsi et al., 2020).

As the saying goes, “Prevention is better than cure”, many of these oral diseases are preventable through education about risk factors. Oral hygiene is a critical factor in maintaining good oral health and subsequently is related to overall health and quality of life. The most effective method for preventing dental caries or periodontitis is the removal of dental plaque by regular and proper mechanical cleaning of the teeth, a key step in maintaining oral health. Despite this, oral hygiene practices will inevitably vary for each individual. Factors such as a person's knowledge about oral health and proper hygiene techniques or their overall attitude and outlook on their ideas may affect the person's actions. (Tadin et al., 2022).

The study aimed to determine the mediating effect of attitude toward the relationship of knowledge and practices of allied health students on oral health.

LITERATURE REVIEW

Knowledge

In a study by Beyene et al., (2021), titled "Oral Hygiene Practices and Associated Factors among Patients Visiting Private Dental Clinics at Hawassa City, Southern Ethiopia, 2018," the researchers investigated oral hygiene practices among patients in private dental clinics. More than a third of the patients had a poor oral hygiene routine. Being a male, residing in a rural region, and having low oral hygiene knowledge were all found to be substantially and independently linked with poor oral hygiene practice. Participants with low oral hygiene awareness were approximately twice as likely as those with strong knowledge to have poor oral hygiene practice, according to the current study. This might be explained by the fact that patients/clients who have a better understanding of oral hygiene are also more likely to practice proper oral hygiene.

Beyene et al., (2021) explain in their study that the majority of the respondents clean their teeth once a day and are from private dental clinics, and the findings might have a big impact on the community's oral health. Males, rural inhabitants, and individuals with limited understanding were also linked to poor oral hygiene practices in this study. For patients who attend dental clinics, it is suggested that health information on oral hygiene be provided in partnership with relevant stakeholders. The messaging should emphasize tooth brushing frequency, timing, and procedures, with a special emphasis on patients from remote locations.

The results of the study of Janaki et al., (2019) highlight the importance of dental health among medical students. The goal of the questionnaire method was to evaluate the techniques for cleaning the mouth, knowledge of bad breath, oral caries, the frequency of bleeding gums,

and the level of the medical students' mouths. They discovered a history of tooth decay, bleeding gums, mouth dryness, among medical students, and a significant rate of foul breath.

This tangential demonstrates the ineffectiveness of initial preventive efforts, which include the promotion of health and particular defense. As of now maintaining oral hygiene is crucial at this stage to stop further development. This emphasizes the need to raise awareness of the importance of educating on oral health and practicing good dental hygiene and, the risks they could present (Janaki et al., 2019).

Oral Health Practices

A study by Raval and Shaikh (2021) proves that oral health is critical for overall mental and physical health. The link between knowledge and improved oral health has been well documented. The purpose of this study was to evaluate, assess, and compare knowledge, attitude, and practice of oral and periodontal health in medical and nursing professionals. The survey was conducted among students at the Faculty of Medicine, Medical College Vadodara.

A simple random sampling method was used to select 300 students, and each student was given a self-constructed 15-item questionnaire about oral and periodontal health awareness. To compare overall oral and periodontal health awareness and knowledge among students, descriptive statistics such as mean, one-way analysis of variance, and post hoc tests were used. It was discovered that even among health experts, there was a significant lack of oral hygiene awareness and expertise (Raval & Shaikh, 2021).

The researchers concluded that there is an urgent need for extensive educational programs that promote oral health and offer numerous learning opportunities for health professionals as well. It was noted that oral hygiene practice is significantly low compared to oral hygiene awareness among professional students, such as medical and nursing students. As dentists, it is our responsibility to encourage good oral hygiene habits, emphasize the value of flossing, and raise public awareness of the need for routine dental exams. The attempts to spread awareness of oral hygiene must extend beyond professional students to the general public at the elementary school level, including students at various colleges and healthcare professionals (Raval & Shaikh, 2021).

A study by Damle et al., (2014) evaluated that oral hygiene could be maintained in a variety of ways, the most prevalent of which is toothbrushing. It's a great approach to getting rid of plaque, avoiding gingivitis, and managing dental cavities. The value of unregulated toothbrushing in the prevention of dental cavities, on the other hand, has long been questioned. Plaque eradication is dependent not just on the toothbrush used, but also on good brushing techniques. A person's hand competence and drive are essential in maintaining oral hygiene.

The usage of dental floss with chlorhexidine and interdental brushes with chlorhexidine and cetylpyridinium chloride showed that cleaning devices with active substances showed an increase in their antiplaque and antigingivitic efficacies, compared to those without active substances. Despite these results, they have concluded that the evidence to prove the additional clinical efficacy of interdental cleaning devices with active substances was inadequate. Also, they have stated that these interdental devices may have added clinical efficacy when compared to the lack of interproximal hygiene (Langa et al., 2022).

According to the American Dental Association (ADA, 2021), Mouth rinses are divided into two categories: aesthetic and medicinal. Plaque, gingivitis, bad breath, and tooth decay

will all be reduced or managed using therapeutic mouth rinses. Children under the age of six should not be treated unless a dentist advises otherwise. Whether you rinse pre- or post-brushing may be a matter of personal taste. Some fluoride-containing components (such as calcium hydroxide) can build a compound with fluoride ions, reducing mouth rinse efficacy.

According to the Journal of the International Clinical Dental Research Organization (2015), In the development and prevention of oral diseases, a combination of professional and self-care activities and people's attitudes and behavior plays an important role. Personal dental hygiene and professional treatment continue to be the best ways to avoid periodontal diseases. Brushing and flossing should be done properly at least once a day, according to the American Dental Association (ADA), with brushing lasting no more than 3 minutes. Furthermore, the ADA recommends that dental appointments be conducted regularly.

Attitude

Vandana et al., (2016) suggests that cognitive, emotive, and behavioral components define a person's attitudes. The cognitive component reflects the person's beliefs and knowledge, the emotional component indicates the strength of their beliefs, and the behavioral component represents the person's behavior. The behavioral component is their willingness to respond in response to a certain circumstance. As a result, attitudes toward dental care could be characterized, for example, by self-assessment of one's oral health (cognitive), as well as a proclivity to attend to a regular oral diagnosis (behavioral).

McLeod (2018) stated that the power with which one holds an attitude is generally a strong indicator of one's actions. The more powerful the attitude, the more likely it is to influence behavior. As a result, a person's attitude will have a significant impact on their behavior. An attitude, on the other hand, will be unimportant to an individual if it has no significance in their lives.

METHODS

Descriptive-correlational design was used in this study. Descriptive design was used to describe the knowledge level, attitude, and oral health practices of the respondents. A correlational approach was used to assess the relationship between knowledge and oral health practices of allied health students. On the other hand, mediation analysis was used to determine the mediating effect of attitude on the relationship between knowledge and oral health practices of allied health students. Structural equation modeling (SEM) was used to assess the data and select the most appropriate model for the study.

The respondents of the study were 314 allied health students of Adventist University of the Philippines which were selected through convenience sampling procedure. About 133 (42%) of them were male and 181 (58%) were female.

The study used self-constructed questionnaire for data collection, which consisted of four main sections: Part – Demographic Profile, Part 2 – Knowledge Toward Oral Health Practices, Part 3 – Oral Health Practices, and Part 4 – Attitude Toward Oral Health Practices. The demographic profile covered aspects such as degree program, gender, and year level. Oral Health Practices covered toothbrushing, mouthwash, dental flossing and dental visit.

The questionnaire used a five-point Likert scale for attitude with a degree of intensity 5 – strongly agree, 4 agree, 3 – slightly agree, 2 – disagree, and 1 – strongly disagree. For oral

health practices, the degrees of intensity are as follows: 5 – always, 4 often, 3 – sometimes, 2 – rarely, and 1 – never. The computed Cronbach’s Alpha value ranged from 0.47-0.66. According to the study of Raharjanti et al. (2022), ranges from 0.43 – 0.83 is an acceptable Cronbach’s Alpha value.

The collected data were encoded and analyzed using JAMOVI. Mean, standard deviations and frequency were used to measure knowledge level, attitude, and oral health practices of the respondents. Pearson’s correlation was used to assess the relationship between knowledge and attitude, knowledge and oral health practices, and attitude and oral health practices. Regression was used to identify the predictors of attitude and oral health practices. Structural equation modeling was used to quantify the medication effect of attitude on the relationship between knowledge and oral health practices of the respondents.

The respondents were informed that participation was voluntary and that their consent was required, with the assurance that confidentiality and anonymity would be strictly maintained. The researchers personally distributed the questionnaires to the participants.

RESULTS AND DISCUSSION

After gathering enough responses, data were encoded, organized, and analyzed using JAMOVI and SPSS Amos. Results of the different statistical analysis are discussed as follows:

Knowledge level, Attitude, and Oral Health Practices of the Respondents

The knowledge level of the respondents on oral health is shown in Table 1. Result shows that out of 16 questions, the respondents got an average score of 14.538 (90.36%). This means that the knowledge level of the respondents on oral health is very good. Medical education should include oral health as an integral component of their curriculum according to Reddy et al. (2014).

Table 1

Descriptives Statistics for the Knowledge Level of the Respondents on Oral Health

| Variable | Perfect Score | Average Score | % | Verbal Interpretation |
|-----------------|---------------|---------------|-------|-----------------------|
| Knowledge Level | 16 | 14.538 | 90.86 | Very Good |

Legend: 91 – 100% (Excellent), 81 – 90% (Very Good), 71 – 80% (Good), 61-70% (Poor), below 61% (Poor).

The descriptive result of the respondents’ attitude on oral health is shown in Table 2. Result shows that most of the responses (292) of the respondents are affirmative (slightly agree, agree, strongly agree). The percentage of the respondents who affirmed is 93 and it is interpreted as positive. Meaning, that the attitude of the respondents toward oral health is positive which is similar to the study of Okoroafor et al., (2023) and the same as the study of Wahengbam et al., (2016). The attitude scale showed that the majority of the participants had a positive attitude towards oral health as shown in their study.

Table 2

Descriptives Statistics for the Attitude of the Respondents on Oral Health

| Variable | Affirmed | Did not Affirm | % | Verbal Interpretation |
|----------|----------|----------------|----|-----------------------|
| Attitude | 292 | 22 | 93 | Positive |

Legend: 51 – 100% (Positive), 1 – 50% (Negative).

The results of oral health practices of the respondents in terms of toothbrushing, using mouthwash, dental flossing, and dental visits are shown in Table 3. Results in Table 3 indicate that the extent of oral health practices of the respondents is very good. Results of the study support the study of Okoroafor et al. (2023) that their respondents used dental floss, used mouthwash, brush their teeth regularly after eating.

Table 3

Descriptives Statistics for the Oral Health Practices of the Respondents

| <i>Oral Health Practices</i> | <i>Mean</i> | <i>Std. Deviation</i> | <i>Scaled Response</i> | <i>Verbal Interpretation</i> |
|---|-------------|-----------------------|------------------------|------------------------------|
| <i>Toothbrushing</i> | <i>3.96</i> | <i>.470</i> | <i>Often</i> | <i>Very Good</i> |
| <i>Using Mouthwash</i> | <i>3.84</i> | <i>.428</i> | <i>Sometimes</i> | <i>Good</i> |
| <i>Dental Flossing and Dental Visit</i> | <i>3.61</i> | <i>.867</i> | <i>Often</i> | <i>Very Good</i> |
| <i>Oral Health Practices</i> | <i>3.64</i> | <i>.451</i> | <i>Often</i> | <i>Very Good</i> |

Legend: 4.50-5.00 (Excellent), 3.50-4.49 (Very Good), 2.0-3.49 (Good), 1.50-2.49 (Poor), 1.00-1.49 (Very Poor).

The Relationship of Knowledge, Attitude, and Oral Health Practices

The results of the correlation were analyzed and interpreted based on the guidelines created by Cohen (1988) on how to interpret the size or magnitude of the correlation coefficient. These guidelines are shown in Table 4.

Table 4
Cohen’s Guidelines in the Interpretation Correlation Coefficient Size

| Correlation | Negative | Positive |
|-------------|----------------|-------------|
| Small | -0.30 to -0.10 | 0.10 to .29 |
| Medium | -0.50 to -0.30 | 0.30 to .49 |
| Large | -0.10 to -0.50 | 0.50 to 1.0 |

Table 5 shows the correlation results of knowledge and oral health practices. When knowledge was correlated with oral health practices, the correlation coefficient (r) is equal to 0.134 with a p -value of 0.018 which is significant at level 0.05. Using the guidelines created by Cohen (1988) in Table 16, the magnitude or the size of the correlation coefficient is small but still significant. Oller (2023) commented that “even when a correlation is low and accounts for little variation in a particular study, it does not necessarily mean that the two variables are unrelated or only weakly related in reality”. The results of the study confirm the study of Zheng et al., (2021) that there is a significant relationship between knowledge and oral health practices. According to them, these two variables can be effective in changing oral health-related quality of life.

Table 5
Correlation of Knowledge and Oral Health Practices

| Knowledge | Oral Health Practices |
|---------------------|-----------------------|
| Pearson Correlation | 0.134* |
| P-Value | 0.018 |
| N | 314 |
| Interpretation | Significant |

Note. * $p < 0.05$

The correlation results of knowledge and attitude are shown in Table 6. The correlation efficiency (r) of knowledge and attitude is 0.075 with a p -value of 0.188. The p -value of 0.188 indicates that the relationship between knowledge and attitude is not significant.

Table 6
Correlation of Knowledge and Attitude

| Knowledge | Attitude |
|---------------------|-----------------|
| Pearson Correlation | 0.075 |
| P-Value | 0.188 |
| N | 314 |
| Interpretation | Not significant |

Oral health practices has three sub-dimensions: toothbrushing, mouthwash, dental flossing and dental visits. Table 7 shows the correlation results of attitude, oral health practices, and its three (3) sub-dimensions. As shown in Table 7, the *p*-values of the correlations of attitude and oral health practices, attitude and the sub-dimensions of oral health practices were all significant, indicating that the relationship of attitude and oral health practices, and the relationships of attitude and the three sub-dimensions of oral health practices are significant.

Table 7
Correlation of Attitude and Oral Health Practices

| Attitude | Toothbrushing | Mouthwash | Dental Flossing and Dental Visit | Oral Health Practices |
|---------------------|-------------------|------------------|----------------------------------|-----------------------|
| Pearson Correlation | 0.214*** 0.001 | 0.167** 0.003 | 0.143* 0.012 | 0.222*** 0.001 |
| P-Value | 314 | 314 | 314 | 314 |
| N | Significant | Significant | Significant | Significant |
| Interpretation | | | | |

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Results of the study support the study done by Zheng et al., (2021) that unequivocally demonstrates a robust correlation, indicating that an increase in oral health knowledge invariably corresponds to a marked enhancement in individual attitudes towards oral care practices.

Predictors of Oral Health Practices

The regression analysis outputs that were used to determine the predictors of oral health practices are shown in table 8.

Table 8
Predictors of Oral Health Practices

| Description | R | R-squared | Adjusted R-squared | F | R-squared Change | Sig. |
|-------------|-------|-----------|--------------------|------|------------------|-------|
| Attitude | 0.222 | 0.0493 | 0.0462 | 15.9 | 0.0493 | 0.001 |
| Knowledge | 0.134 | 0.0180 | 0.0148 | 5.63 | 0.0180 | 0.018 |

As shown in table 8, attitude predicts oral health practices with an R-squared of 0.0493 with a p-value of 0.001. The *R-value* of 0.222 indicates a relationship while *R-squared* (0.0493) indicates the magnitude of variance in oral health that can be explained by attitude. An *R-squared* of 0.0493 means that 4.93% of the variance in the oral health practices of the respondents is explained by attitude. As a predictor, it can predict 4.93% of the variation in oral health practices. The adjusted *R-squared* (0.0462) gives some idea of how well the model can be generalized. The shrinkage means that if the model was derived from the population rather than from a sample it would account for approximately $(0.0493 - 0.462) 0.0031$ or 0.31% less variation in the outcome.

Knowledge predicts oral health practices with an *R-squared* value of (0.0180) and a *p*-value of 0.018. *R* (0.134) indicates a relationship while *R-squared* (0.0180) indicates the magnitude of variance in oral health that can be explained by knowledge. An *R-squared* of 0.0180 means that 1.8% of the variance in the oral health practices of the respondents is explained by knowledge. As a predictor, it can predict 1.8% of the variation in oral health practices. The adjusted *R-squared* (0.0148) gives some idea of how well the model can be generalized. The shrinkage means that if the model was derived from the population rather than from a sample it would account for approximately $(0.0180 - 0.148) 0.0038$ or 0.38% less variation in the outcome.

According to the study of Gangwar et al. (2015), healthcare workers who are knowledgeable about the development of dental caries are more aware of the importance of oral health care. The results also support the study of Wang et. Al (2023) stating that people with more positive attitude and higher level of dental knowledge have better tooth brushing practice.

The Mediating Effect of Attitude

The research used Structural Equation Modeling to determine the mediating effect of attitude on the relationship between knowledge and oral health practices. Based on the model generated by Structural Equation Modeling in Figure 1, the line that connects knowledge to oral health practices has a p-value of 0.065 and the line that connects knowledge to attitude has a p-value of 0.204. Both p-values of the two lines are greater than 0.05 indicating that the mediating effect of attitude on the relationship of knowledge and oral health practices is not significant.

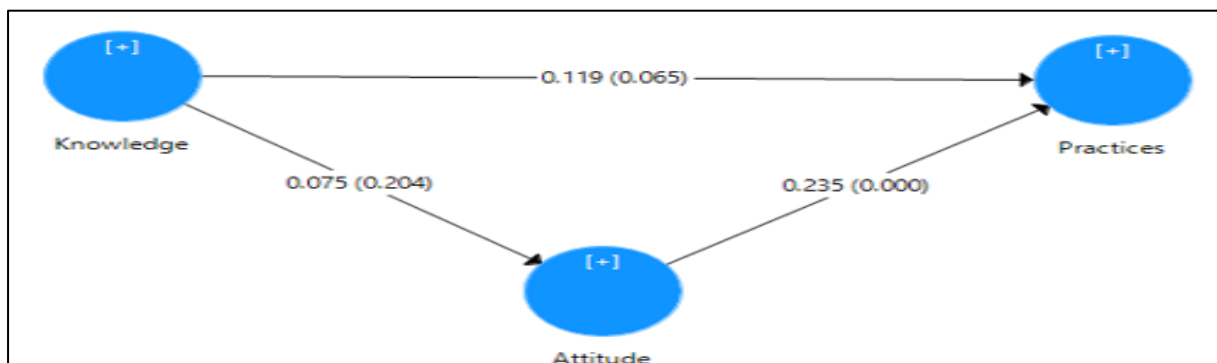


Figure 1. Model Generated by Structural Equation Modeling

CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

The study concludes that the knowledge level of the respondents on oral health is very good and their attitude toward oral health is positive. Their oral health practices as a whole is very good. Knowledge and attitude are significant related to and predictors of oral health practices but attitude does not have a mediation effect on the relationship between knowledge and oral health practices.

Although the study revealed that the knowledge of the respondents on oral health was very good and their attitude is positive, the items in which the respondents got low scores, and low positive affirmations are areas that need improvements. Online oral health education programs or mass awareness campaigns among young and old, less, and highly educated can be done to potentially improve their knowledge attitude on oral health practices.

This study adds to the relatively limited body of knowledge and attitude on oral health and oral practices, especially on the influence of knowledge and attitude on oral health practices as a predictor.

For future research, the study could also be replicated considering different respondents aside from respondents coming from the allied health programs.

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