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EDUCATIONAL INTERVENTION USING QUICK-RESPONSE CODE (EDIQRC) ON ANTIBIOTICS FOR HEARING-IMPAIRED AND MUTE TEENAGERS IN KORONADAL CITY, SOUTH COTABATO

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ABSTRACT

Introduction: Antimicrobial resistance (AMR) contributed 97 million deaths globally. It is reduced through antimicrobial stewardship. However, insufficient health resources in sign language yielded poorer health outcomes among hearing-impaired and mute individuals. Therefore, the researchers created an educational intervention using a Quick-Response Code (ediQRC) on antibiotics that is beneficial for hearing-impaired and mute teenagers. **Method**: A quantitative approach and quasi-experimental research design were employed with a purposive sampling technique. **Results**: The post-intervention results in the experimental group revealed that ediQRC is beneficial in enhancing respondents' knowledge, attitude, and practice of antibiotics with a mean of 86.0, 3.07, and 3.40, respectively. Statistical analysis confirmed an improvement before and after the ediQRC intervention in the knowledge and attitude ($p<0.05$) excluding practice ($p>0.05$). Additionally, there is substantial change with and without the ediQRC in knowledge and practice ($p<0.05$), except attitude ($p>0.05$). Furthermore, ediQRC's effectiveness can only be evaluated by measuring knowledge. Hence, its mean in the post-intervention was 85.99. **Conclusion**: The level of indicators: knowledge, attitude, and practice were good, high, and very high, respectively. There is a significant difference before and after the ediQRC in the knowledge and attitude but not in practice. Moreover, there is a significant difference with and without ediQRC in knowledge and practice, except attitude. Meanwhile, ediQRC's effectiveness is considered good. Thus, for the study's sustainability, we recommend that the Department of Health (DOH) should coordinate with the Department of Education (DepED) which will be the major facilitator of the execution of the intervention.

INTRODUCTION

The World Health Organization (2021) and Kang et al. (2013) emphasized that antimicrobial resistance (AMR) was a global public health threat as Asia was one of the epicenters worldwide. In South East Asia alone, the Lancet by the Global Research on AntiMicrobial Resistance (GRAM) project, in 2019, accounts for 97,000 deaths in at least 1.27 million deaths worldwide annually (Murray et al., 2022). Furthermore, the authors of Antimicrobial Resistance: Tackling a Crisis for the Health and Wealth of Nations anticipated that by 2050, AMR will be responsible for 10 million deaths globally (O'Neill, 2014).

Consequently, the effects of AMR and medication error on healthcare expenses were devastating (Shrestha et al., 2018; Ahsani-Estahbanati et al., 2021). As stated by the CDC (2013) and Thorpe et. al. (2018), antibiotic resistance potentially added $1,400 to hospital bills in the United States alone for treating patients with bacterial infections. Other researchers expected that by 2050, AMR will cost between $300 billion to $1 trillion per year (Chokshi et al., 2019; World Bank Group, 2017). Whereas, the annual expenditure related to medical errors was approximately $20 billion in the United States, with half of the claims related to outpatient care (Rodziewicz et al., 2019).

Cultural misunderstandings and inadequate regulation and enforcement of antibiotic usage have affected provider and patient attitudes and behavior in the Philippines, a lower-middle-income nation in Southeast Asia (Robredo et al., 2022). One research found that Filipinos had a variety of misconceptions concerning antibiotic indications, guidelines for use, and adverse effects (Mallah, 2021).

The American Society of Health-System Pharmacists (2019) acknowledged that pharmacists take prominent roles in antimicrobial stewardship programs, such as promoting the optimal use of antimicrobial agents, reducing infection transmission, and educating health professionals, patients, and the general public. Secondly, McCoy et al. (2011) stated that, pharmacists were responsible for educating patient-customers on the safe use of antibiotics, and preventing antibiotic resistance. However, poor communication was considered one of the prevalent issues among deaf people (Emond et al., 2015; Kuenburg et al., 2016). They had experienced difficulty understanding medication information provided by pharmacists due to communication barriers, with over 5% of people worldwide having a "disabling" hearing loss (WHO, 2021; Hyoguchi et al., 2016). These figures might seem to represent a small portion of the entire population, but 430 million people—both adults and children— were affected. Besides, low- and middle-income countries were home to approximately 80% of persons with debilitating hearing loss (WHO, 2021).

In the Philippines, a study using a national representative sampling to gauge the prevalence of hearing loss and their data showed that the prevalence rate in children <18 years, people between the ages of 18 and 65 years, and persons who were >65 years are 7.5%, 14.7%, and 49.1%, respectively (Dawes et al., 2020). Because a limited number of health resources were available for sign language, hard-of-hearing individuals cannot obtain current health information offered to the general population (Mha, 2022). Ineffective communication, lack of education, and limited access to deaf-tailored health information all contributed to their poor health (Berry & Stewart, 2006). Due to these barriers to proper access to health care information, the level of health literacy in the deaf community became lower. Therefore, people yielded poorer health outcomes, and effortlessly for them to make significant mistakes in their medication (Mha, 2022).

The lack of literature on deaf, hard-of-hearing, and mute for antibiotics led the researchers to create an educational intervention using a Quick-Response Code (ediQRC) on antibiotics which became beneficial for hearing-impaired and mute teenagers.

METHODS

Study Design

The researcher used a quasi-experimental research design in performing this study. It concentrated on the impacts of ediQRC on teenagers, particularly the hearing-impaired and mute ones. This approach aided the researchers in a better insight that produced objective data, identified with the utilization of statistics and numbers. The statistical treatment analyzed the collected information from the accumulated responses. It was tallied and processed. Consequently, the Educational Intervention using Quick-Response Code (ediQRC) on Antibiotics for Hearing-impaired and Mute Teenagers in Koronadal City, South Cotabato, was the main subject of the research survey.

Population and Sampling Technique

The researchers used purposive sampling in selecting the respondents. Additionally, the researchers chose the respondents from their sample frame based on aspects of the researchers' preferences in accordance with the inclusion and exclusion criteria (Nikolopoulou, 2022).The population of the study wasthirty (30) hearing-impaired and mute teenagers within Koronadal City, South Cotabato, were examined in this quasi-experimental study (Cohen et al., 2007). Cohen also stated that experimental methodologies required at least 15 respondents. Furthermore, Gall et al. (1996) agreed with Cohen's assertion, emphasizing the importance of at least 15 people in the control and experimental groups. Respondents followed the inclusion and exclusion criteria.

In the eligibility of the inclusion of the study, the respondents were either or all of the following: for the inclusion criteria of the respondents, they were either hearing-impaired (deaf or has a hard-of-hearing) or mute; 13 to 18 years old; have been using the Filipino Sign Language; were capable of answering the survey questionnaire provided by the researchers. Furthermore, the exclusion criteria included the following: not interested in participating; have no hearing impairments or being mute; were below 13 and above 18 years old; have not been utilizing Filipino Sign Language; and they were incapable of answering the provided questionnaire**.**

Research Instruments

In data gathering, the questionnaire was adopted to the study of Karuniawati et al. (2021). Some questions were modified to fulfill the objectives of the researchers. The questionnaire included ten (10) questions relating to knowledge, seven (7) questions about attitudes, and sixteen (16) about practices.

Each correct answer to a statement in the knowledge section got one (1) point score, whereas incorrect or "do not know" responses got a zero score. The maximum score in the knowledge domain is 10. Then, a four-point Likert scale ranging from 1 to 4 were utilized for scoring the attitude and practice questions. The least appropriate answer got a one-point score, and the most appropriate response got four. Some of the questions were unfavorable questions, and the scores were inverted. The minimum and maximum possible scores for the attitude section were 7 and 28, respectively. The lowest possible score was 8, and the highest possible score was 32 for the practice section.

Data Collection

Data gathering proceeded as the researchers received their clearance, validation, and authorization from the respondents and authorities. It was through the planned survey questionnaires. First, the researchers began by requesting for permission in performing the study from the City Mayor of Koronadal City, South Cotabato, mentioned community pharmacist, and the Pharmacy Department of St. Alexius College. The researchers then sent a consent letter to the Koronadal National Comprehensive High School Administration Office. After which, the researchers coordinated with the Program Head as they chose the respondents who fulfilled the inclusion and exclusion criteria. After selection, the researchers sent the informed consent form to the thirty (30) selected individuals, requesting their permission in participating in the study. Also, in stating that the study has no intention of compromising their identity or disability. Following the objectives of the study, the researchers discussed the purpose of the study. The researcher divided the willing individuals into experimental and control groups, and their pre-assessment took place concurrently but in different rooms. However, the experimental group were given their ediQRC after taking the pre-test. After viewing the video embedded in the QRC, they proceeded to their post-assessment. The control group took their post-assessment in the next 10 minutes. After collecting the data, the researchers encoded the responses in Microsoft Excel and sent them to the statistician for the results.

Data Analysis

In this study, both descriptive and inferential statistics were utilized in determining the level of indicators of ediQRC on antibiotics toward hearing-impaired and mute teenagers in terms of knowledge, attitude, and practice. The computation using frequency, percentage distribution, mean, and standard deviation determined the level of indicators of ediQRC on antibiotics toward hearing-impaired and mute. Meanwhile, One-Way ANOVA was utilized in determining the significant difference in the level of indicators among hearing-impaired and mute teenagers on antibiotics before and after the following indicators of ediQRC in terms of knowledge, attitude, and practice. In addition, independent t-test was used in computing for significant differences among hearing-impaired and mute teenagers on antibiotics with and without the ediQRC.

RESULTS AND DISCUSSION

Level of Knowledge

As depicted in Table 1A, results indicated that ediQRC on antibiotic drugs helped the hearing-impaired and mute teenagers in terms of their level of knowledge on Antibiotic drugs. The post-intervention of ediQRC revealed an overall mean value of 86.0% which is substantially higher in a correct response compared to the pre-intervention (34.0%) and control group (pretest = 24.7%; posttest = 48.0%).

Table 1A. Level of Indicators of ediQRC on Antibiotic Drugs towards Hearing-impaired and Mute Teenagers in term of Knowledge

Items	Expected Ideal Response	Respondent's Correct Answer (%)							
		Control Group				Experimental Group			
		Pretest	Remarks*	Posttest	Remarks*	Pretest	Remarks*	Posttest	Remarks*
Inappropriate use of antibiotics will cause antibiotic resistance.	Yes	26.7	Poor	33.3	Poor	13.3	Poor	100.0	Good

Antibiotics can be purchased at a pharmacy without a doctor's prescription	No	20.0	Poor	53.3	Poor	46.7	Poor	100.0	Good
Antibiotics can be purchased at the sari-sari store.	No	26.7	Poor	53.3	Poor	46.7	Poor	100.0	Good
Amoxicillin is an antibiotic.	Yes	53.3	Poor	53.3	Poor	53.3	Poor	100.0	Good
Antibiotics can kill good bacteria in the intestines.	Yes	40.0	Poor	46.7	Poor	66.7	Moderate	100.0	Good
Paracetamol is an antibiotics	No	33.3	Poor	53.3	Poor	0.0	Poor	93.3	Good
Antibiotic leftovers can be used again if sick.	No	20.0	Poor	46.7	Poor	26.7	Poor	93.3	Good
Antibiotics can be used to treat infections due to viruses.	No	20.0	Poor	46.7	Poor	66.7	Moderate	86.7	Good
Antibiotics need to be stored in case of illness in the future.	No	0.0	Poor	46.7	Poor	20.0	Poor	73.3	Moderate
Antibiotics can be stopped if the illness improves.	No	6.7	Poor	46.7	Poor	0.0	Poor	13.3	Poor
Overall Mean		**24.7**	Poor	**48.0**	Poor	**34.0**	Poor	**86.0**	**Good**

**Based on the study of Hague, M. (2018) Ratings: 80-100 (Good); 60-79 (Moderate/Fair); <60 (Poor)*

The study participants, especially the experimental group, shown high knowledge of antibiotics. Most of them were able to possess a clear basic concept regarding antibiotic activity and the consequences of the unnecessary use of antibiotics. A significant proportion of the experimental group believed that amoxicillin was an antibiotic (100%). Also, they answered correctly on the following statements regarding antibiotic resources, antibiotic leftovers, antibiotic use, and access to antibiotics. A similar result was seen in a study by Radhakrishnan et al. (2022).

However, in Karuniawati et al. (2021) data, seventy-three percent (73%) answered incorrectly, while thirteen percent (13%) of their respondents did not know that antibiotics were not used in treating viral infections. Another noteworthy finding was that the research participants lacked understanding of the statement: "Antibiotics can be stopped if the illness improves." A comparable discovery in a study done in the Philippines by Barber et al. (2017).

Overall, outcomes showed that the ediQRC effectively raised the respondents' knowledge levels. As a result, awareness of antibiotic use and antimicrobial resistance increased in Koronadal City, South Cotabato Province.

Level of Attitude

Results in Table 1.B revealed that the hearing-impaired and mute teenagers had found ediQRC helpful in improving their attitude towards antibiotic drugs (3.07), which was substantial compared to the pre-intervention (2.22) and control group (pretest = 1.97; posttest = 2.58).

Table 1B. Level of Indicators of ediQRC on Antibiotic Drugs towards Hearing-impaired and Mute Teenagers in term of Attitude

Items	Control Group				Experimental Group			
	Pretest	Remarks*	Posttest	Remarks*	Pretest	Remark*	Posttest	Remarks*
I can save money using leftover antibiotics and not seeing a doctor.	2.20	Low	3.40	Very High	2.67	High	4.00	Very High
It is acceptable to purchase antibiotics at a sari-sari store when you're sick.	1.93	Low	3.20	High	3.27	Very high	3.87	Very High
I would be grateful if the pharmacist could provide me with antibiotics at the pharmacy, even though I don't have a doctor's prescription.	2.13	Low	2.67	High	1.93	Low	3.07	High
I will keep leftover antibiotics because they will be useful in the future.	2.07	Low	2.67	High	1.67	Very Low	3.00	High
I will take antibiotics in hope that antibiotics can speed up the healing of my cold.	2.07	Low	2.40	Low	2.13	Low	3.00	High
I will take antibiotics until the regimen runs out even though my sickness has improved.	1.87	Low	2.00	Low	1.73	Very Low	2.27	Low
If I feel better, I will stop taking antibiotics.	1.53	Very Low	1.73	Very Low	2.13	Low	2.27	Low
Overall Mean	**1.97**	Low	**2.58**	High	**2.22**	Low	**3.07**	**High**

**Wibowo & Suyatmi, 2016: 1.00-1.75 (very low), 1.76-2.50 (low), 2.51-3.25 (high), 3.26-4.00 (very high)*

They were able to understand that it was inappropriate to use leftover antibiotics to save money and not consult with a doctor (4.00/4.00), whose moderate response was recorded in the study of H. Karuniawati et al. (2021) in Boyolali, Indonesia. They also understood that keeping antibiotics for future use is incorrect (3.00/4:00), contrasting the result in a study conducted in three Chinese provinces, where 48.1% of antibiotics were kept at home for children, and 63.1% came from previous prescriptions (Sun, 2019). It implied that self-medication with antibiotics was prevalent even in China, a developed country, exposing children to antibiotic misuse and resistance.

However, the respondents were aware that it was impermissible to procure antibiotics at a sari-sari store (3.87). A contrasting result was recorded in a qualitative study in the Philippines by M. Lota (2022). There were still Filipinos who got their antibiotics through a small community store, demonstrating lenient implementation of no prescription, no dispensing policy by the health regulatory organizations in the Philippines. A similar issue was reported in Saudi Arabia (Alghadeer et al., 2018) and Jordan (Shehadeh et al., 2012).

The intervention tool did not eliminate all misconceptions. They poorly recognized the importance of continuing the antibiotic treatment despite improved signs and symptoms (2.27) and completing the prescribed antibiotic regimen (2.27), Barber et al. (2017) revealed forty-five percent (45%) of Filipinos agreed that it was acceptable to stop taking antibiotics when they felt better even if there were still antibiotics left to take. Shatla et al.'s investigation yielded a similar outcome in Saudi Arabia's Western Region (2022). Furthermore, Lota et al. (2022) reported occurrences in the Philippines when patients ceased their antibiotic treatment after they felt better to save money; which an economic analysis conducted by Alsan et al. (2015) showed that out-of-pocket health expenditures were strongly associated with antimicrobial resistance in low-income and middle-income countries. However, Jaja's result showed that sixty-seven percent (67%) had an appropriate response (2017) in Southwest Alberta with the same question.

Overall, the findings demonstrated that ediQRC was beneficial in enhancing respondents' attitudes.

Level of Practice

As depicted in Table 1.C, results clearly indicated that ediQRC on Antibiotic drugs has helped the hearing-impaired and mute teenagers in terms of their level of practice towards Antibiotic drugs. Post-intervention of ediQRC demonstrated an overall mean value of 3.40 which was substantial compared to the pre-test (2.44) and control group (pretest = 2.23; posttest = 2.39). It indicated that the ediQRC was effective in terms of enhancing the level of practice among respondents.

Table 1C. Level of Indicators of ediQRC on Antibiotic Drugs towards Hearing-impaired and Mute Teenagers in term of Practice

Items	Control Group				Experimental Group			
	Pretest	Remarks*	Posttest	Remarks*	Pretest	Remark*	Posttest	Remarks*
I recommend buying antibiotics when one of my family is sick.	2.33	Low	2.47	Low	1.87	Low	4.00	Very High
I take leftover antibiotics when I feel sick with the same symptoms.	2.07	Low	2.47	Low	2.53	High	3.93	Very High
I bought amoxicillin from a pharmacy without a doctor's prescription.	3.07	High	2.47	Low	3.80	Very High	3.98	Very High
I use antibiotics because of the advice from others.	1.67	Very Low	2.27	Low	2.53	Low	3.87	Very High
I bought antibiotics from a sari-sari store.	2.53	High	2.73	High	2.60	Low	3.87	Very High
I take antibiotics to speed up the healing of my cold.	2.20	Low	1.93	Low	1.33	Very Low	3.73	Very High
I keep taking antibiotics until the course is finished.	2.20	Low	2.60	Low	2.47	Low	2.53	High
I stop taking antibiotics if my condition improves	1.80	Low	2.20	Low	2.40	Low	1.33	Very Low
Overall Mean	**2.23**	Low	**2.39**	Low	**2.44**	Low	**3.40**	**Very High**

**Wibowo & Suyatmi, 2016: 1.00-1.75 (very low), 1.76-2.50 (low), 2.51-3.25 (high), 3.26-4.00 (very high)*

Respondents demonstrated a very high level of practice towards the perception of antibiotic use. More than one-quarter of the respondents believed that an antibiotic did not work against the common cold, in which a similar response was recorded in a study by Thong et. al and Mazinka B et. al (2022). After conducting the educational intervention, the participants during the post-test intervention showed a positive tendency toward the better practice of antibiotic use after showing them the prepared video-based educational tool together with a sign language translation.

These factors may include limited access to healthcare resources, communication barriers, and a lack of attention given to their specific needs in terms of medication education. As a result, these teenagers may not receive sufficient information or guidance regarding the appropriate use of antibiotics, leading to misconceptions and inadequate practices. To address these challenges, the researchers developed the ediQRC intervention, which utilized video-based educational tools with sign language translation performed by a translator. The intervention aimed to bridge the gap in knowledge and practice by providing tailored educational materials that were accessible to hearing-impaired and mute teenagers, ultimately improving their understanding and adherence to proper antibiotic use (K, Graydon et. al, 2018).

Overall, results showed that the Educational Intervention using Quick Response Code (ediQRC) had proven effective in enhancing antibiotic medication practice among hearing-impaired and mute teenagers. By addressing the socioeconomic barriers and providing accessible educational materials, the intervention successfully improved their understanding and adherence to proper antibiotic use. This intervention demonstrated the potential of incorporating innovative approaches such as ediQRC, to promote better health outcomes for the specific population (Thong, et. al and Mazinka, B et. al, 2022).

Analysis Before and After ediQRC

Statistical analysis confirmed a significant difference ($p<0.05$) in the level of knowledge and attitude before and after the ediQRC intervention in Table 2. Meanwhile, the results for practice revealed no significant difference ($p>0.05$) before and after the ediQRC intervention.

Table 2. Testing the Significant Difference in the Level of Indicators among Hearing-impaired and Mute Teenagers on Antibiotic Drugs Before and After ediQRC Intervention

Test Variables			T value	P value	Remark*
Knowledge	Experimental	Pretest Posttest	6.3517	0.0001	Significant
Attitudes	Experimental	Pretest Posttest	5.0120	0.0024	Significant
Practices	Experimental	Pretest Posttest	2.3253	0.0530	Not Significant

**Calculation was performed at 0.05 level of significance*

Jha et al. (2013) stated that the level of knowledge and attitude of their respondents had greatly improved, similar to the research conducted by Tahool et al. at National Liver Institute, Egypt (2020). A KAP questionnaire includes a section for measuring practice. Many KAP inquiries failed to reveal appropriate attitudes and practices because people did not honestly disclose their ideas, beliefs, and understandings. As a result, it directly influenced their thinking (Good, 1993).

The study group showed a substantial change ($p = 0.0530$) in the practice score. However, it failed to present a significant difference ($p<0.05$). More educational interventions aimed at enhancing the practice can result in improvement in this area. It might be due to the duration of our educational intervention. Another issue was the participants' retention of information from the educational intervention. The instructional intervention was only executed once, without repetition. Possibly, it did not significantly improve the participants' general knowledge, attitude, and practice level. Other research stated respondents with higher levels of education tend to have better knowledge, more appropriate attitudes, and better practices about antibiotic use (Nepal et al., 2019).

However, the analyses on two educational interventions by Radhakrishnan et al. in 2022 revealed that all KAP domains have significantly improved with the video-based showing much improvement compared to pamphlet-based. Nevertheless, table 1.A, table 1.B, and table 1.C showed that the ediQRC was an effective intervention to enhance the knowledge, attitude, and practice of the respondents.

Analysis With and Without ediQRC

Statistical analysis confirmed that there was an existing significant difference ($p<0.05$) on the level of knowledge and practices among respondents that did not undergo (without intervention) and those that underwent (with intervention) of the ediQRC in Table 3. This meant that ediQRC effectively enhanced the level of knowledge and practices among respondents.

Table 3. Testing the Significant Difference in the Level of Indicators among Hearing-impaired and Mute Teenagers on Antibiotic Drugs With and Without ediQRC Intervention

Test Variables		T value	P value	Remark*
Knowledge	With Without	4.348	<0.001	Significant
Attitudes	With Without	1.418	0.182	Not Significant
Practices	With Without	2.855	0.013	Significant

**Calculation was performed at 0.05 level of significance*

The experimental group manifested remarks equivalent to good in their knowledge on antibiotics while the control group showed poorness in their responses, thus leading to a significant difference. As stated by Curie, Lin, and Zhang (2011) the utilization of tailored education material targeting antibiotic need and use with a main aim of enhancing the public knowledge about antibiotics can be an effective and feasible strategy. This piloted study could be considered as the beginning for a wider scale public educational intervention study and national antibiotic campaign.

In addition, there was a significant difference in the practice for those with ediQRC (very high level) and without the ediQRC (low level). An analogous study of Nepal and Bhatta (2018) supported the significance of educational interventions on antibiotics in preventing short-term therapy, insufficient dose, sharing of medications, and treatment avoidance once disease symptoms have improved. Changing people's perspectives on antibiotic self-medication is essential to prevent these harmful practices.

However, there was no significant difference in the attitude because although there was a change, it was not great enough for it to be considered as significant. It might be caused by a close post-test value in the control and experimental groups which in turn made their remarks almost the same on the statements under the attitude portion.

A similar finding was seen in the study of Formoso et al. (2013) which might be due to the fact that people's attitude may necessitate longer-term exposure and more aggressive campaigns. In contrast, a study concluded that through education, people's attitudes toward the usage of antibiotics and their resistance can be significantly changed. The reduction of misunderstandings and incorrect expectations that lead to inappropriate antibiotic usage may be aided by this improved knowledge (Eng et al, 2003).

Level of Effectiveness of ediQRC

The overall mean value of knowledge before the intervention was 34.01. However, the overall mean value after the intervention was 85.99. Based on the knowledge level in Table 4, the ediQRC was an effective intervention to enhance the level of knowledge among respondents on Quick-Response Code (ediQRC) on Antibiotic Medications for Hearing-impaired and Mute Teenagers in Koronadal City, South Cotabato.

Table 4. Level of Effectiveness of ediQRC Intervention

Test Variables			Mean	Remarks
Knowledge	Experimental	With	34.01	Poor
		Without	85.99	Good

An Iranian dental antibiotic prescription survey found contradictory findings. Mehdizadeh et al. (2022) concluded that their educational intervention was relatively unsuccessful due to a lack of motivation, an absence of useful-effective teaching methods, and a lack of participation in group discussions.

However, a favorable result was proven following an education program in Iran (Khoshgoftar et al., 2021). According to previous research, the level of knowledge of the individuals studied after the educational intervention was much more advanced than before the intervention. These findings agreed with the results of other global studies conducted in the United States (Alder et al., 2010), Jordan (Shehadeh et al., 2016), Egypt (Kandeel et al., 2019), Malta (West et al., 2019), United Arab Emirates (Rabbani et al., 2020), and Nigeria (Ahwinahwi et al., 2022) where various educational interventions proved beneficial advancement related to antibiotic drug awareness.

A KAP survey preferably led to an awareness program or an intervention program, which sought to determine what is known (knowledge), believed (attitude), and done (practiced) in the context of the topic of interest (Andrade et al., 2020). Numerous empirical studies have demonstrated that health education can improve knowledge and change unfavorable attitudes and behaviors, effectively curbing infectious diseases and epidemics (Verelst et al., 2019).

Understanding hearing-impaired and mute teenagers' knowledge, attitudes, and behaviors toward antibiotic drugs can provide a reference for formulating health education plans. Hence, the ediQRC intervention was effective.

Conclusion

The level of indicators: knowledge, attitude, and practice were 86.0=good, 3.07=high, and 3.40=very high, respectively. In addition, there was a significant difference before and after the ediQRC in the knowledge and attitude but not in practice. Moreover, there was a significant difference with and without ediQRC in knowledge and practice, except attitude. Meanwhile, ediQRC's effectiveness can only be evaluated by measuring knowledge. Hence, its mean in the post-intervention was 85.99= good.

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