Knowledge, Attitude and Practice Towards Antimicrobial Resistance and Antimicrobial Adherence among Female Community Health Volunteers Before and After an Educational Intervention

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ABSTRACT

Background

Antimicrobial resistance is a serious problem in Nepal. Knowledge, attitude, practice and adherence of female community healthcare volunteers of an intervention area about antimicrobials before and immediately after a workshop conducted on 24th February 2024 was measured.

Objective

To compare the knowledge, attitude and practice towards antimicrobial resistance and antimicrobial adherence among female community health volunteers.

Method

A questionnaire containing four sections related to various themes of antimicrobials was developed. Knowledge, Attitude and Practice questions were analyzed using two sample proportion tests. Feedback regarding the educational intervention was also obtained using a 7-item tool and open responses.

Result

All Female Community Health care Volunteers from Mahalaxmi municipality participated. Most participants were aged between 41-50 years [19 (42.2%)] and [25 (55.6%)] had working experience greater than 10 years. The scores for statements antimicrobial resistance are a serious problem worldwide, [84.4% vs 60% (p=0.004)] and antibiotics are used to inhibit the growth of bacteria improved post- intervention [100% vs 77.8% ($p \leq 0.001$)]. Scores for attitude statements like, taking antibiotics without consulting a physician [91.1% vs 60% ($p \leq 0.001$)], missing a dose or two of antibiotic treatment contribution to antibiotic resistance, [75.5% vs 46.6% ($p = 0.002$)] among others improved. The scores for certain practice statements also improved post-intervention. The median scores for attitude scale, [31 vs 26 ($p \leq 0.001$)] and practice scale, [31 vs 34 ($p = 0.011$)] were different before and after the workshop. Participant feedback on the workshop was positive.

Conclusion

The session was effective in increasing participants' practice scores and may lead to more rational use of antimicrobials. The attitude, practice and total scores were different before and after the workshop.

KEY WORDS

Antimicrobial resistance, Educational intervention, Feedback, Female community healthcare volunteers

INTRODUCTION

Female Community Health Volunteers (FCHVs) play an important role in Nepal's health care system.[1,2] They conduct various programs related to maternal and child health. Each FCHV has a mothers' group which include a group of women within a particular area who are involved in the health activities of their community. FCHVs conduct mothers' group meetings where common health issues of the community are discussed, and different health items are distributed.

The current study was undertaken to educate FCHV regarding antimicrobial resistance (AMR) as part of a quasi-experimental study. This can play an important role in the reduction of AMR in the intervention area as FCHVs will discuss AMR in their respective mother's group meetings. The objective of the study was to compare the knowledge, attitude and practice towards antimicrobial resistance and antimicrobial adherence among female community health volunteers of Mahalaxmi Municipality, Lalitpur, Nepal before and after an educational intervention.

METHODS

This was a pre-post study conducted amongst the FCHVs who participated in an educational intervention workshop held on 24th February 2024 at Imadol, Lalitpur, Nepal. Forty-five FCHVs from Mahalaxmi Municipality participated in this program. All participants were given the pretest questionnaire at the time of registration. Scores were again measured using the same questionnaire at the conclusion of the workshop. A feedback questionnaire was provided to obtain the participant's opinion about the workshop.

There are 10 wards in this municipality. The number of FCHVs are different in different wards. Altogether, there are 45 FCHVs in the municipality. All FCHVs of the Mahalaxmi Municipality were selected for the intervention program. Permission was obtained from the mayor and chief administrative officer of the municipality. Permission was also taken from the health coordinator and team to conduct this educational intervention.

The resource persons (facilitators) were selected based on their expertise. One resource person was from the Department of Pharmacology, KIST Medical College and Teaching Hospital. The other three resource persons were from Patan Academy of Health Sciences (from the Department of Pharmacology and Department of Community Health Sciences and School of Public Health).

The questionnaire for collecting data was prepared after consulting various literature. The validation of the questionnaire was done after discussing with the experts for the contents.

There were three sections in the questionnaire for KAP, each having a set of 10 questions and one for the demographic information. The section containing information about the demographics contained questions related to age, ward number and work experience.

For knowledge related questions, there were ten items with the options Yes, No, and Don't know. For attitude items, a 5-point Likert scale was used to obtain the degree of agreement with the 10 statements. Similarly, for the practice items, a 5-point Likert scale was used to obtain the pattern of their practice.

A five-point Likert scale was used to obtain the degree of agreement with the 7 statements for the feedback of the workshop. The statements were related to the objectives of the sessions, clarity of the presentations, and relevance of the examples presented, the facilitator/s, and the importance of the sessions for their future practice. There was also a statement about creating a friendly environment and effective group dynamics for their group work. Lastly, they had to rate the workshop from 1 to 10 (1 was least and 10 the maximum score).

The resource persons described the importance of and explained the phenomenon of antimicrobial resistance. They also described AMR using suitable examples.

The participants were divided into six small groups for the group work. They were given different case scenarios about antimicrobials. For example, "A patient is taking antibiotics for common cold and cough. How to proceed? How would you describe this to a group of mothers?" Likewise, for the other group, "You have learned that someone is taking over-the-counter antibiotics. How will you react and move forward? How would you describe it to a group of mothers?" Another scenario was about "A mother has been using Metronidazole for diarrhea in her 2-year-old child for the past 2 days. How to proceed? How would you describe it to a group of mothers?". Likewise, "What are the consequences of indiscriminate antibiotic use? How would you describe it to a group of mothers?" Similarly, another group was given a scenario "What are the roles and responsibilities of FCHVs to prevent AMR? How would you describe it to a group of mothers." and "A patient was recovering after taking a small dose of antibiotics for tuberculosis."

The participants worked in their small groups and presented in the larger group their suggestions and feedback. The facilitators also provided appropriate comments and suggestions.

The study was approved ethically by the Ethical Review Board (ERB) of Nepal Health Research Council (NHRC) on 29th August 2023 with reference number 296 and protocol registration number 535/2023.

The data obtained by the participants were coded for pre and posttest and were entered into SPSS Version 25 software. Likewise, the data for feedback were also coded, entered and analyzed using SPSS Version 25 (SPSS

Inc., Chicago, IL, USA). The statements were recoded into meaningful categories where required and compared using two-sample (pre and post) proportion tests in R software Version 4.0.3. The total knowledge, attitude and practice scales were computed and overall KAP scale was also calculated. The normality distribution of the different scales was assessed using Shapiro-Wilk test. The mean score and standard deviation were used for variables following a normal distribution while median and interquartile range were used for variables that were not normally distributed. Scale values were compared using median test for non-normal data and paired t-test for normal data. The free-text responses were summarized using content analysis.

RESULTS

Table 1 describes the demographic parameters of the study participants. All FCHVs from Mahalaxmi Municipality participated. The maximum number of participants was 19 (42.2%) from the age group 41-50. The majority of the participants, 25 (55.6%), had more than 10 years of working experience.

Table 1. Demographic characteristics of FCHV respondents (n =45)

Age (in years)	Number (percentage)
30-40	9 (20%)
41-50	19 (42.2%)
51-60	16 (45.6%)
Above 60	1 (2.2%)
Working Experience	
Less than 5 years	10 (22.2%)
5-10 years	10 (22.2%)
More than 10 years	25 (55.6%)

Table 2 shows the individual knowledge scores pre and post-intervention. The scores for the statements like antimicrobial resistance is a serious problem worldwide and antibiotics are used to inhibit the growth of bacteria were statistically significant after the intervention. Similar results were obtained for the statements like antibiotic misuse can lead to antimicrobial resistance and antibiotics can treat acute bacterial diarrhea.

Table 3 shows the scores for the individual attitude statements before and after the educational intervention. Scores for statements like, patients should be asked not to take antibiotics without consulting a physician, missing a dose or two of antibiotic treatment does not contribute to antibiotic resistance and overprescribing may be a cause of antimicrobial resistance were found to be statistically different after the intervention.

Table 4 below shows the individual practice scores pre- and workshop. The scores were statistically different for the statements like participants practice for teaching someone

Table 2. Knowledge scores pre and post-workshop

Knowledge statements	Pre-Test (p1) N (%)	Post Test (p2) N (%)	Difference p2-p1	p-value (p2>p1)
1. Antibiotics are drugs used to treat any bacterial infection.				
Yes	41 (91.1)	44 (97.8)	3	0.083
No	4 (8.9)	1 (2.2)	-3	
2. Antimicrobial resistance is a serious problem worldwide.				
Yes	27 (60)	38 (84.4)	11	0.004
No	6 (13.3)	7 (15.6)	-1	
3. Antibiotics are used to kill bacteria.				
Yes	41 (91.1)	44 (97.8)	3	0.083
No	4 (8.9)	1 (2.2)	-3	
4. Antibiotics are used to inhibit the growth of bacteria.				
Yes	35 (77.8)	45 (100)	10	<0.001
No	10 (22.2)	0 (0)	-10	
5. Antibiotic misuse can lead to antimicrobial resistance.				
Yes	13 (28.9)	41(91.1)	28	<0.001
No	6 (13.3)	3 (6.7)	-3	
6. Antibiotics can treat acute bacterial diarrhea.				
Yes	25 (55.6)	43 (95.6)	18	<0.001
No	19 (42.2)	2 (4.4)	-17	
7. Patients can stop taking antibiotics when symptoms improve before a full course of antibiotics.				
Yes	5 (11.1)	8 (17.8)	3	0.184
No	36 (80)	37 (82.2)	1	
8. Antibiotics can treat the common cold.				
Yes	3 (6.7)	8 (17.8)	5	0.053
No	39 (86.7)	37 (82.2)	-2	
9. Antibiotics can cause side effects like allergies, diarrhea and vomiting.				
Yes	44 (97.8)	44 (97.8)	0	0.5
No	1 (2.2)	1 (2.2)	0	
10. Amoxicillin is an antibiotic.				
Yes	43 (95.6)	43 (95.6)	0	0.5
No	1 (2.2)	2 (4.4)	1	

Note: Proportions, p1 and p2, are for "Yes" category. They were compared using one-tailed test.

when and how to use antibiotics, using antibiotics to treat minor illness in mothers as an over-the-counter medicine, counselling or informing patients about the possible harms by misusing and abusing antibiotics and their effect on development of antimicrobial resistance before and after the educational intervention.

Table 5 shows the median values of knowledge, attitude, practice scale and total score pre and post intervention along with interquartile range (IQR) and P value. The scores for attitude and practice improved significantly after the educational intervention.

Table 6 highlights the respondent's feedback about the sessions and the mean values with standard deviation for the individual statements.

Table 3. Attitude scores pre and post-workshop

Attitude statements	Pre-Test (p1) N (%)	Post Test (p2) N (%)	Difference p2-p1	p-value (p2>p1)
1. Antibiotics can be dispensed without a prescription.				
Agreed	7 (15.5)	5 (11.1)	-2	0.732
Disagreed	38 (84.4)	40 (88.9)	2	
2. Patients should be asked not to take antibiotics without consulting a physician.				
Agreed	27 (60)	41 (91.1)	14	**< 0.001**
Disagreed	18 (40)	4 (8.9)	-14	
3. Tackling antibiotic resistance is only the physician's responsibility.				
Agreed	21 (46.7)	12 (26.8)	-9	0.975
Disagreed	24 (53.3)	33 (73.3)	9	
4. Antibiotics are safe, so they can be used routinely.				
Agreed	12 (26.6)	8 (40)	-4	0.089
Disagreed	33 (73.3)	27 (60)	-6	
5. Missing a dose or two of antibiotic treatment does not contribute to antibiotic resistance.				
Agreed	21 (46.6)	34 (75.5)	13	**0.002**
Disagreed	34 (53.3)	11 (24.4)	-23	
6. When I have a fever, antibiotics help me recover faster.				
Agreed	27 (60)	28 (62.2)	1	0.414
Disagreed	18 (40)	17 (37.8)	-1	
7. Antimoebic drugs should be given in Diarrhea.				
Agreed	10 (22.2)	32 (71.1)	22	1.67E-06
Disagreed	25 (77.7)	13 (28.9)	-12	
8. Antiretroviral drugs are also antimicrobial.				
Agreed	20 (44.4)	25 (91.1)	5	1.09E-06
Disagreed	41 (55.6)	4 (8.8)	-37	
9. Antimalarial drugs should be used to treat malaria.				
Agreed	43 (95.6)	40 (88.9)	-3	0.8811
Disagreed	2 (4.4)	5 (11.1)	3	
10. Over prescribing may also be a cause of antimicrobial resistance.				
Agreed	22 (48.9)	23 (80)	1	**< 0.001**
Disagreed	23 (51.1)	9 (20)	-14	

Note: Agreed (Strongly agree + agree) and Disagreed (Neutral + disagree + agree); Agreed proportions in pre-test (p1) and post-test (p2) were compared using one-tailed test.

Table 4. Practice scores pre and post-workshop

Practice statements	Pre-Test (p1) N (%)	Post Test (p2) N (%)	Difference p2-p1	p-value (p2>p1)
1. Have you ever taught someone when to use antibiotics?				
Frequent	2 (4.4)	0 (0)	41	0.9237
Infrequent	43 (95.5)	45 (100)	45	
2. Have you ever taught someone how to use antibiotics?				
Frequent	7 (15.8)	38 (84.4)	31	0.013
Infrequent	1 (15.6)	44 (95.6)	43	
3. Have you educated patients about minor side effects of antibiotics?				
Frequent	4 (8.8)	5 (11.1)	37	0.362
Infrequent	41 (91.1)	40 (88.9)	35	
4. Have you educated mothers about minor side effects of antibiotics?				
Frequent	7 (15.6)	3 (6.7)	-4	0.910
Infrequent	38 (84.4)	42 (93.3)	4	
5. Have you used antibiotics to treat minor illnesses in patients without a prescription?				
Frequent	2 (4.4)	5 (11.1)	3	0.118
Infrequent	43 (95.6)	40 (88.9)	-3	
6. Have you used over-the-counter antibiotics to treat minor illnesses in mothers?				
Frequent	0 (0)	1 (2.2)	45	0.157
Infrequent	45 (100)	44 (97.8)	43	
7. Do you counsel or inform patients that antibiotic misuse can lead to antibiotic resistance?				
Frequent	2 (4.4)	8 (17.7)	41	0.022
Infrequent	43 (95.6)	37 (82.1)	36	
8. Do you counsel or inform mothers that antibiotic abuse can lead to antibiotic resistance?				
Frequent	3 (6.6)	12 (26.7)	39	<0.001
Infrequent	42 (93.4)	33 (73.3)	21	
9. Have you ever been advised about proper hygiene as a measure to prevent antimicrobial resistance?				
Frequent	23 (51.1)	24 (53.3)	-1	0.416
Infrequent	2248.9 ()	21 (46.7)	-3	
10. Have you ever given someone advice on hand hygiene?				
Frequent	42 (93.4)	40 (88.9)	-2	0.770
Infrequent	3 (6.6)	5 (11.1)	-35	

Note: Frequent (Always + Often) and Infrequent (Sometimes + rarely + never); Frequent proportions in pre-test (p1) and post-test (p2) were compared using one-tailed test.

The overall feedback of the educational sessions using a 7 item feedback scale were 4.71 and 0.428 respectively.

Participants highlighted the clarity on the topic after doing the group work, use of posters and easy approach learnt to teach mother were listed by the FCHVs. Good knowledge on antibiotics, no rampant use of antibiotics, no sharing of antibiotics was considered as a beneficial part of the educational intervention. Good education, nice sessions, good trainers, clear voice and contents clarity were also listed as the good points.

The other comments were about the nice group work, presenting the group work among the FCHVs, more clarity on the antibiotics and antimicrobials, updated knowledge, and regularity for these types of training were listed as good points. Many of them noted that this was their first experience participating in this type of intervention session.

Similarly, there were some points mentioned as the areas to improve. These were such educational programs should be conducted on holidays, regular conduct of these trainings are needed, less duration for training, more contents in less time, refreshers training is needed, and more frequent trainings are needed.

Table 5. Median knowledge, attitude, practice scales and total pre and post workshop

Characteristic	Median (IQR)	p-value
Knowledge		
Pre test	10 (2)	0.087
Post test	10 (1)	
Attitude		
Pre test	31 (5)	<0.001
Post test	26 (6)	
Practice		
Pre test	31 (4)	0.011
Post test	34 (5)	
Total Score		
Pre test	73 (9.5)	0.004
Post test	71 (9)	

DISCUSSIONS

In the current study the total knowledge scores and the attitude scale decreased, and the practice scale improved following the intervention. The decrease in attitude was concentrated among certain statements. Participants' feedback on the session was positive.

Antimicrobials are an effective remedy for many diseases. Emergence of resistance to antimicrobials is a serious issue worldwide, and especially, in a developing country like Nepal.[3] A study showed that 42% of people did not consult doctors while using antimicrobials, whereas 19% of the participants deferred to the advice of pharmacist for taking antimicrobials.[4] Several studies have indicated that there is an urgent need to limit the availability of antimicrobials in both developing and developed countries.

The overall total score decreased due to the decline in the attitude scale. We are unable to explain the decline in the total attitude scale. Some statements had lower scores following the intervention. For these statements there is a possibility that respondents may have misinterpreted the statements or scored them wrongly. This may need to be explored further. We will also examine the results of the retention study when it is completed. The individual knowledge statements were developed through a thorough literature review and discussions among the investigators. Amoxicillin is a commonly used antibiotic in Nepal. In a study it was noted that amoxicillin had the maximum promotional activities and was among the top selling antibiotic.[5] A narrative review found beta-lactam antibiotics were among the most prescribed according to different drug utilization studies.[6] Statements for attitudes were also developed following a similar process as for knowledge. We will examine knowledge, attitude and practice scores during the retention study.

Table 6. Feedback on the session by the FCHVs

Individual Feedback statements	Mean ± Standard Deviation
1. The objectives of the academic session were clearly presented.	4.68 ± 0.70
2. The examples used were relevant to the objectives of the academic session.	4.57 ± 0.49
3. The case scenarios used were relevant to the objectives of the academic session.	4.73 ± 0.49
4. Facilitators performed their role effectively.	4.73 ± 0.44
5. This academic session will be important for my future practice.	4.75 ± 0.43
6. Facilitators were successful in creating a friendly environment.	4.75 ± 0.43
7. The group dynamics during the academic session was satisfactory.	4.73 ± 0.44
Normalized feedback scale (Total score/7)	4.71 ± 0.43

Note: Strongly disagree=1, disagree=2, Neutral=3, Agree=4 and Strongly ageee=5.

Educational interventions and rational use of antimicrobials

Educational interventions have proven effective for promoting rational use of antimicrobials.[7] Awareness programmes for the public should also be created and implemented.[8] Sessions in our workshop were targeted to enhance knowledge and understanding about rational use of antimicrobials and the role of health care professionals. In Jordan tailored educational material targeted at improving the public's knowledge of antibiotics was successful but the authors mentioned that this improvement may not reflect a change in antibiotic use or if the increased knowledge would be retained.[9]

In a study, respondents had relatively good knowledge about certain aspects of antibiotic use. The concept of antibiotic resistance was imperfectly understood. Half of the respondents (50.9%) were unsure whether skipping doses would contribute to the development of antibiotic resistance, 88.2% indicated they would go to another doctor if not prescribed an antibiotic when they thought one was needed and nearly half (47.7%) believed antibiotics helped them get better more quickly if they had a fever.[10] Interventions have been used in different settings to improve KAP and the use of antibiotics. In Nepal, a community intervention utilizing journalists, schoolteachers, and school children resulted in a significant increase in knowledge of antibiotics and improvement in the administration of antibiotics in households.[11] In Hong Kong, two weekly sessions and a peer network using Facebook resulted in better knowledge about the indications of antibiotics and the importance of continuing the full course of treatment at the original dose.[12] At a family health centre in the United Arab Emirates an educational intervention and a booklet significantly improved mothers' awareness, practice and attitudes regarding antibiotic use.[13]

Most FCHVs are mothers and also have mothers in their group. Training the mothers will help in spreading the awareness of antimicrobials and the problems due to AMR. Mothers are important family members and training them will facilitate the better understanding of the problems and they will also share their knowledge in the family, community, society and the nation. KAP and adherence of antibiotics and AMR among women groups have not been studied previously. This is important as FCHVs are important members of the healthcare system and each FCHV has mothers' groups attached with them. The FCHVs and the groups play an important role in promoting rational antimicrobial use in the community. Studies have shown that women may be more involved in self-medication than men.[14] A study describes how mothers are assigned the role of the family health caretakers who may self-medicate themselves and their children with antibiotics.[15] However, they are also expected to abide to a hierarchical power structure and listen to the advice of 'senior mothers' in the community.

The strength of the study is the authors facilitated an educational intervention among FCHVs in a community setting in Lalitpur. A validated questionnaire was used in the study. The limitation is the study was confined to only one municipality in Lalitpur, Nepal. We are also unable to explain the decline in attitude scores following the intervention.

CONCLUSION

Knowledge scores did not change significantly but the attitude score decreased, and the practice scale improved following the intervention. The overall KAP score also decreased. Participant feedback on the workshop was positive. Similar studies should be conducted in other municipalities in Nepal. Educational intervention about AMR targeted at FCHVs should be conducted at other locations.

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