



Assessment of Community Pharmacists Knowledge on dispensing of Antimicrobial drugs and Prevention of Antimicrobial Resistance in Community practice

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Abstract: The antimicrobial resistance has more impact on the health care division which would increase the mortality and hospital readmission duration. Our objective is to assess the community pharmacist's knowledge on dispensing of antimicrobial drugs and prevention of antimicrobial resistance in community practice. A cross-sectional study was conducted for six months. A sample size of 150 registered community pharmacists participated in the study. We have used simple random techniques to select the community pharmacists. Questionnaire were distributed to the community pharmacists at pre and post visits and the response was analyzed. The collected data was analyzed using graph pad prism software. The mean and standard deviation was calculated and $P < 0.005$ was considered to be statistically significant. For 25-30 years of age, community pharmacists were more 68 (45.33%) as compared to other ages. Pre visit before and after average mean antimicrobial resistance score was found to be 4.87. Proper implementation of antimicrobial resistance prevention programmes would drastically increases the rational use of antimicrobials could and minimizes the health care cost.

Keywords: Community Pharmacists, Antimicrobial Resistance, Hospital Readmission, Health Care Division.

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I. INTRODUCTION

Antimicrobial resistance (AMR) is a serious public health care concern that negatively impacts the healthcare field worldwide.¹⁻⁴ The World Health Organization demonstrated that AMR is a high priority health care issue that is to be resolved by combined work of health care professionals around the world. The world health organization has released a global action plan on AMR in May 2015. More public awareness is needed for understanding of AMR policies helps to minimize the health care issues in the community. The World Health Organization suggested continuous monitoring and educational interventions that aim to rationalize the antibiotics prescription to curb the development of antimicrobial resistance in the community. The more prescribing of over the counter medicines and lack of knowledge on use of antibiotics by the patients creates major problems for healthcare professionals. Recently, the inappropriate prescribing of antibiotics is the most common issue in almost all regions of the world. Antimicrobial resistance has been associated with emergence of resistant strains of several bacteria. The causative factors for misuse of antibiotics are prescribers as well as patient related factors. The ineffective prescribing of prescribers seems to be the leading cause of antimicrobial resistance.⁵⁻⁸ The patient related factors includes unprescribed medication usage and lack of knowledge on appropriate medications usage cause bacterial resistance against antibiotics. This problem can worsen the situation of various infectious diseases such as tuberculosis, acute respiratory tract infections, and malaria. An attempt has been made to create awareness and assess community pharmacist knowledge on antimicrobial resistance prevention in the community. Implementation of antimicrobial resistance programmes is needed in the institutional and community settings to improve the effective drug prescribing pattern.⁹⁻¹² Currently, the community pharmacists are deprived of following such efforts. The important strategies for implementing antimicrobial resistance programmes in community settings includes creating awareness of antibiotic-resistance patterns, and improving knowledge of health care professionals on treatment guidelines, and proper inventory practice of antibiotics in the community. The antimicrobial resistance prevention programmes created among medical professionals, community pharmacists and this type of initiative can be beneficial in improving rational prescribing of antimicrobial drugs. The continuous training, education of prescribers enhances the health outcomes of the patients. Proper prescribing of antimicrobials would reduce the risk of antimicrobial resistance and enhance patient care at the clinical level. The community pharmacists play a major role in the design and execution of antimicrobial practices at the community level. Deploying community pharmacists in this programme and proper implementation of antimicrobial resistance prevention programmes is necessary to understand their perception and practices.¹³ This concept was taken into consideration worldwide and the antimicrobial resistance programmes have been encouraged by the health care providers to hold the responsibility of antimicrobial resistance prevention practices in the community pharmacy settings. Community pharmacist's role in antimicrobial resistance prevention programmes studies were not done anywhere. To the best of our knowledge, this study is the first study in the community settings to evaluate the community pharmacists knowledge on antimicrobial drug

resistance prevention in the community pharmacy setup. The aim of the study was to assess community pharmacists' knowledge on dispensing of antimicrobial drugs and prevention of antimicrobial resistance in community practice. Our objective is to study the socio demographic details of study participants, to evaluate the knowledge of community pharmacists towards antimicrobial resistance prevention and to find out the knowledge score of community pharmacists to prevent antimicrobial resistance.

2. MATERIALS AND METHODS

A cross-sectional survey study was performed in Mysore district. The survey was conducted from November 2020 to April 2021. The study was done in accordance with the Declaration of Helsinki and institutional standards. The study was approved by the Human ethical committee Approval Number : FCP/IEC/1318/2017. A written informed consent was obtained from the community pharmacists. A sample size of 150 community pharmacists participated in the study. We have designed antibiotic use pictorial images, antimicrobial resistance prevention posters were displayed at every community pharmacy in mysore district region and to create more awareness to the community pharmacists which helps them to prevent antimicrobial resistance problems in community settings.¹⁴ A stratified sampling method was used to communicate with community pharmacists to fill the questionnaire.

2.1 Questionnaires development

A thorough literature was referred to identify potential questions for design of questionnaire used in the study. Based on the literature review, the antimicrobial resistance questionnaire was designed in accordance with local community pharmacy practice. The questionnaire consists of social demographic characteristics, knowledge on antimicrobial resistance and antibiotic usage, course of antibiotics intake and indications of antibiotics usage. The questionnaire was also translated into local language kannada and english for accurate data collection. The accuracy of the translated questionnaire content was checked by twenty community pharmacists having command knowledge of both local languages. A pilot study was done in community pharmacies and response was collected. The questionnaire was subjected for validation and reliability by a team of community pharmacists. The community pharmacists included in the pilot study were excluded from the main study. Before initiation of study, we have explained the purpose, need, and aim of study to the community pharmacists and those who gave written consent were included in the study. We have visited the individual community pharmacies in the mysore district and a questionnaire was given to community pharmacists to collect response filled questionnaires. The response filled questionnaire was physically checked to exclude the incompletely filled questionnaires.

2.2 Reliability and Scoring

The reliability of the questionnaire content was analyzed using cronbach's α test and we got a reliable value of 0.81. The questionnaire has seven questions and scoring includes yes and no response scores. Scoring system was designed to assess the community pharmacists knowledge on antibiotics

and antimicrobial drug resistance prevention in the community. The questionnaire score was calculated by adding the correct responses by the community pharmacists. The community pharmacists knowledge was measured based on their response towards questions. Based on the responses, the community pharmacists were categorized into high, moderate, poor level knowledge. Pre and post mean scores were calculated. Score 1-2 indicates low level knowledge, 3-4 indicates moderate knowledge, 5-7 indicates high level knowledge.

2.3 STATISTICAL ANALYSIS

The collected questionnaire data were statistically analyzed. The mean, standard deviation values were calculated using graph pad prism software 5.0 version. All the questionnaires were manually evaluated and incomplete filled questionnaires were excluded from the final study analysis. The results were summarized by mentioning percentage distribution in various categories. Statistical significance of $p < 0.05$ was found in this study.

3. RESULTS

In our study, 25-30 years old community pharmacists were 68 (45.33%), 31-35 years old community pharmacists were 44 (29.33%), 36-40 years old community pharmacists were 10 (6.66%), and 41-45 years old community pharmacists were 28 (18.66%). In our study, male community pharmacists were 133 (88.66%) and female community pharmacists were 17 (11.33%). In our study D.Pharm education qualification community pharmacists were 102 (68%), B.Pharm education qualification community pharmacists were 45 (30%), and

M.Pharm education qualification of community pharmacists were 3 (2%). In our study, 0-2 work experience community pharmacists were 23 (15.33%), 3-4 work experience community pharmacists were 45 (30%), 5-6 work experience community pharmacists were 66 (44%), 7-8 work experience community pharmacists were 10 (6.66%), 9-10 work experience community pharmacists were 6 (4%). In our study, we found retail Pharmacy shops were 114 (76%), chain pharmacies was 22 (14.66%), and own pharmacy shops was 14 (9.33%). In our , junior pharmacists were 87 (58%), and senior pharmacists were 63 (42%) (Table 1). In our study operating hours of Pharmacy includes 8 hours per day running pharmacies were 94 (62.66%), 12 hours per day running pharmacies were 44 (29.33%), 16 hours per day running pharmacies were 10 (6.66%), and 24 hours per day running pharmacies were 2 (1.33%). In our study 1-3 antimicrobial prescription medications was 56 (37.33%), and 3-4 antimicrobial prescription medications was 79 (52.66%), and 5-6 microbial prescription medications was 15 (10%) (Table 2). Pre visit antimicrobial resistance knowledge among community pharmacists was found to be: 1-2 score patients were 128 (85.33%) have low level knowledge, 3-4 score patients were 12 (8%) have moderate level knowledge, and 5-7 score patients were 10 (6.66%) have high level knowledge. Post visit antimicrobial resistance knowledge among community pharmacists was found to be : 1-2 score patients were 14 (9.33%) have low level knowledge, 3-4 score patients were 39 (26%) moderate level knowledge, and 5-7 score patients were 97 (64.66%) have high level knowledge (Table 3). Pre visit community pharmacists knowledge average mean score was 4.87 and post visit community pharmacists knowledge average mean score was 5.09 (Table 4 and Fig.2).

Table 1: Demographic, Education, Work experience, Pharmacy type, designation details of community pharmacists			
S.No	Age	Total (N=150)	Percentage (%)
1.	25-30	68	45.33
2.	31-35	44	29.33
3.	36-40	10	6.66
4.	41-45	28	18.66
S.No	Gender	Total (N=150)	Percentage (%)
1.	Male	133	88.66
2.	Female	17	11.33
S.No	Education	Total (N=150)	Percentage (%)
1.	D.Pharm	102	68
2.	B.Pharm	45	30
3.	M.Pharm	3	2
S.No	Work experience (years)	Total (N=150)	Percentage (%)
1.	0-2	23	15.33
2.	3-4	45	30
3.	5-6	66	44
4.	7-8	10	6.66
5.	9-10	6	4
S.No	Pharmacy type	Total (N=150)	Percentage (%)
1.	Retail Pharmacy	114	76
2.	Chain Pharmacy	22	14.66
3.	Own Pharmacy	14	9.33
S.No	Designation	Total (N=150)	Percentage (%)
1.	Junior Pharmacist	87	58
2.	Senior Pharmacist	63	42

Table 2: Operating hours of Pharmacy			
S.No	Operating hours of Pharmacy	Total (N=150)	Percentage (%)
	8 hours per day	94	62.66
	12 hours per day	44	29.33
	16 hours per day	10	6.66
	24 hours per day	2	1.33
S.No	Antimicrobial medications	Total (N=150)	Percentage (%)
	1-2	56	37.33
	3-4	79	52.66
	5-6	15	10

Table 3: Pre visit Antimicrobial resistance knowledge among community pharmacists:					
Pre visitAntimicrobial resistance knowledge among community pharmacists					
S.No	Questionnaire Score	No of patients (N=150)	Percentage (%)	Level of Antimicrobial resistance knowledge	Mean $\pm$ SD
	0-2	128	85.33	Low	0.83 $\pm$ 0.72 P<0.0001
	3-4	12	8	Moderate	3.25 $\pm$ 0.45 P - 0.0015
	5-7	10	6.66	High	5.70 $\pm$ 0.78 P - 0.0053
Post visit Antimicrobial resistance knowledge among community pharmacists					
S.No	Questionnaire Score	No of patients (N=150)	Percentage (%)	Level of Antimicrobial resistance knowledge	Mean $\pm$ SD
	0-2	14	9.33	Low	1.28 $\pm$ 0.46 P-0.0006
	3-4	39	26	Moderate	3.82 $\pm$ 0.38 P<0.0001
	5-7	97	64.66	High	6.37 $\pm$ 0.76 P<0.0001

Table 4: Comparison of pre-visit and post visit average mean values among community pharmacists	
Comparison of pre-visit before and after average mean values	Comparison of post visit before and after average mean values
4.87	5.09

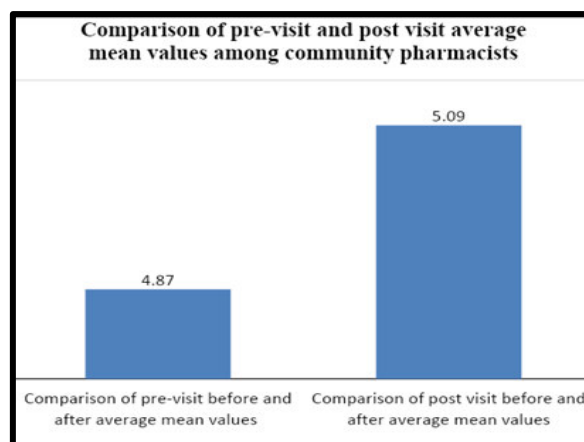


Fig1: Comparison of pre-visit and post visit average mean values among community pharmacists

4. DISCUSSION

The continuous use of antimicrobial medications can increase the risk of antimicrobial resistance. About 50% of selected community pharmacists do not have proper knowledge on antimicrobial resistance prevention at the community pharmacy level. The health care professionals and community pharmacists are encouraged to take the responsibility of antimicrobial medications prescribing and prevention in clinical practice. Our study showed positive results of community pharmacists' knowledge on prevention of occurrence of antimicrobial resistance. The community pharmacist owners have an essential role to ensure proper antibiotics prescribing and safe disposal of medications.¹⁵⁻¹⁸ A qualified community pharmacist was not present in most of the shops in Indian pharmacy setup. A non-qualified pharmacy staff was managing the prescriptions from physicians and patients in the community practice level. The lack of antibiotics policies in health care settings has a negative impact on antimicrobial resistance threat as stated by WHO. The antimicrobial drug resistance has more impact on the healthcare systems that results in higher morbidity and prolong hospitalization. Antimicrobial drug resistance aims to promote the rational use of antimicrobial medications to escalate the patient's health outcomes and reduce the drug cost, side effects of medications associated with antimicrobial drugs usage.¹⁹ The community pharmacists are the healthcare providers that have an essential role in antimicrobial resistance prevention programmes and dispensing of antimicrobials. The community pharmacists should improve comprehensive knowledge on pharmacokinetic, pharmacodynamics, cost of antimicrobial therapy that eventually enhances the individual patients health outcomes. The results of the present study revealed positive perceptions towards antimicrobial resistance prevention in the community. Our study findings will strengthen the potential role of community pharmacists in reducing the inappropriate prescribing of drugs. The proper education and training practices may be required to improve the patient care at clinical level. Our study results support the similar study conducted by M. U. Khan et al., and M.O. Cotta et al.,^{20,21} In our study 25-30 years of age of participants were 68 (45.33%) as compared to other age groups. The male participants were 133 (88.66%) as compared to female participants 17(11.33%). Present study D.Pharm education qualification participants were 102 (68%) as compared to other education qualification of study of the participants. In our study, we found retail Pharmacy shops were more 114 (76%) as compared to other pharmacies. In our study, junior pharmacists were 87 (58%) compared to senior pharmacists 63 (42%) (Table 1). In our study 8 hours per day operating hours of pharmacies were 94(62.66%) as compared to other pharmacies. In our study, 3-4 antimicrobial drugs prescribing medications were 79 (52.66%) as compared to other antimicrobial medications (Table 2). Lack of education, awareness on antibiotics, and antimicrobial resistance among community pharmacists was very poor. At initial visits to

community pharmacies, the pharmacists knowledge was very poor. Pre visit before and after average mean of antimicrobial resistance knowledge was found to be 4.87. Post visit before and after average mean antimicrobial resistance knowledge was found to be 5.09 (Table 3),(Figure1) and (Table 4). Pre visit antimicrobial resistance low level knowledge score 1-2 patients were 128 (85.33%) as compared to other knowledge levels. After continuous education services to community pharmacists, the knowledge score was drastically improved. In Post visit, the same questionnaire was given to the community pharmacist and their knowledge towards antibiotics and antimicrobial resistance prevention was significantly improved (Mean and SD 6.23± 0.76, P<0.0001). Our study results have correlation with a similar study done by M.O. Cotta et ., which demonstrated that knowledge of dispensing of prescription antimicrobial drugs reduces the appearance of antimicrobial resistance.²¹⁻²⁹ Our study recommends, that regular monitoring of antibiotics dispensing can control the occurrence of antibiotic resistance.

5. CONCLUSION

Our study results indicated that pre-visit community pharmacists have lack of knowledge towards antimicrobial medications dispensing and most of the prescriptions were found to be irrational and it is the main reason for developing antimicrobial resistance. The community pharmacists were educated by displaying antibiotic utilization pictorial images, antimicrobial resistance occurrence posters at every community pharmacies in mysore district region. Therefore post visit community pharmacist's knowledge on antibiotics and antimicrobial resistance was improved. It showed that proper health care interventions are required for improving community pharmacists practice on effective prescribing of antibiotics and helpful for prevention of antimicrobial resistance in the community practice. The present study results suggested that there is a need for multidisciplinary health care team work in community settings to prevent the development of antimicrobial resistance. The proper implementation of health care policies and antibiotic protocol in health care practice areas can reduce the burden of antimicrobial resistance.

6. AUTHORS CONTRIBUTION STATEMENT

Nisar Ahmed designed the work, drafted, collected data, analyzed and interpreted the data. Mohanta GP analyzed, edited Mohanta GP analyzed, edited and interpreted the data. Bhagat MP revised and approved the manuscript. All the authors read and approved the final version of the manuscript.

7. CONFLICT OF INTEREST

Conflict of interest declared none.

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