

Original Article**A cross-sectional study, to access the awareness regarding antibiotic usage and anti-microbial resistance among general Kashmiri population**

Naser Shaheen Mir, Mehwish Majeed , Zuryat Ashraf, Samina Farhat

Abstract:

Background: Antibiotic resistance has now a days become one of the greatest threats to global health and development. Antibiotic resistance can occur naturally but antibiotic misuse further accelerates the process. Since general public can play a pivotal role in checking inappropriate use of antibiotics, hence it is important to work on their awareness levels.

Aim: to assess the awareness regarding antimicrobial usage and its resistance among general Kashmiri population.

Material and methods: This cross-sectional study was conducted in the Department of Pharmacology, Government Medical College Srinagar from 1st October 2022 to 1st January 2023. A questionnaire based on previous studies was framed and circulated through whats app. 273 responses were obtained. Responses were compiled using Microsoft Excel Sheet and then analyzed. Statistical analysis was done using SPSS version 25.0 software. Demographic characteristics were analyzed using descriptive statistics. Categorical variables were measured as percentages.

Results: In this study (261) 96% participants were of the opinion that antibiotics are used to treat infections. (243) 89% were aware that antibiotics act against bacteria. (147) 53% believed that anti-microbial agents should be brought after proper medical consultation. (267) 98% had idea that antibiotics can cause side effects. (141) 52% left their antibiotics midway during the course and among them (105) 68% believed that symptomatic improvement was the main reason behind it. (258) 96% knew that effectiveness of antibiotics is reduced if antibiotics are left midway. (249) 89% had an idea about antibiotic resistance and the same percentage considered self-medication as its main contributor. Only (90) 32% participants had heard about antibiotic stewardship program.

Conclusion: This study showed that a lot of difference exists between knowledge and actual practice. Although the study population was aware about proper antibiotic usage, but in reality they did not practice it. Intensive awareness campaigns regarding proper antibiotic usage and antibiotic resistance should be carried out focusing health care professionals as well common public, so that misuse of antibiotics can be prevented. Further there should be a strict check on availability of antibiotics as over the counter drugs.

JK-Practitioner 2023;28(3-4):41-49

Introduction:

One of the greatest contributions to therapeutics was with the advent of antibiotics. Antibiotics are substances produced by microorganisms, which selectively suppress the growth of or kill other microorganisms at very low concentrations while Antimicrobial agent (AMA) are synthetic as well as naturally obtained drugs that attenuate microorganisms [1]. Antibiotics, the frequently prescribed drugs are used for the treatment and prevention of infectious diseases [2,3]. Unprofessional use of antibiotics not only hampers their actual role resulting in failure of therapy but also in the development of antibiotic resistance. Antibiotic resistance has now a days become one of the greatest threats to global health and development. Antibiotic resistance can occur naturally but antibiotic misuse further accelerates the process. According to the study published in Lancet Planetary Health by

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EMBASE, SCOPUS, IndMED, ESBCO, Google Scholar besides other national and International Databases

Cite This Article as

Mir NS, Majeed M, Ashraf Z , Farhat S. A cross-sectional study, to access the awareness regarding antibiotic usage and anti-microbial resistance among general Kashmiri population .JK Pract2023; 28(3-4), 41-49

Full length article available at jkpractitioner.com one month after publication

Keywords

Adverse effects, Culture sensitivity, Stewardship.

Global Research on Antimicrobial Resistance (GRAM) Project, antibiotic consumption has increased by 46% in the last two decades (from 2000-2018) [4]. Antimicrobial resistance has given birth to superbugs (resistant pathogens) which do not respond to conventional antimicrobial therapies. In USA it is estimated that about 2.8 million population get infected with antibiotic resistant pathogens and there are 35000 antibiotic related deaths annually [5]. It has also been stated that Asia has the highest rate of antimicrobial resistance and in India 80% E.coli has become resistant to drugs like penicillins, cephalosporins and fluroquinolones [6].

Unprofessional antibiotic use includes self-medication of antibiotics, inadequate education and training in health care professionals, promotion of drug companies, over the counter sales. Among this self-medication seems to be the main culprit. It is commonly practiced in both developed and developing countries. It is more of a concern in developing third world, where health care needs out weight the facilities available. Especially among health care professionals tendency of self-prescription of antibiotics has been reported to be very high [7]. Access to antibiotics is not strictly prescription bound in India as well as in Kashmir [8]. Antimicrobial agents are easily available as over the counter drugs. This free access to antibiotics further escalates the issue of antibiotic resistance which is a serious concern in health care system today.

WHO in 2015 in collaboration with 12 countries conducted a survey to observe public awareness and knowledge of antibiotic use and its resistance and revealed that education and financial status were the main culprits behind antibiotic resistance [9-11]. In spite of regular reminders from WHO, low public knowledge about antimicrobial use and its resistance still remain as the major challenge.

Since general public can play a pivotal role in checking inappropriate use of antibiotics, hence it is important to work on their awareness levels. Keeping this thing in mind we framed our current study to assess awareness regarding antimicrobial usage and its resistance among general Kashmiri population.

A collection of coordinated efforts that encourages the prudent use of antibiotics is known as antimicrobial stewardship (AMS). This concept was introduced to describe acts that affect the environment, animal health, and human health on a local, national, and international scale. Among other things, antimicrobial stewardship programs optimize the use of antibiotics, enhance patient outcomes, lower AMR and healthcare-associated infections (HAIs), and save healthcare expenditures.

Unprofessional use of antibiotics has become one of the greatest worry for health care system today. Researchers have shown that numerous health conditions caused by multi drug resistant pathogens have come into existence [12,13]. There have been limited studies assessing the knowledge of antibiotic

usage among general public [14,15]. Common people form a significant portion of the society and as such it's important to gauge their understanding regarding antibiotic usage and antibiotic resistance. Hence, we conducted the current study to assess awareness regarding antimicrobial usage and its resistance among general Kashmiri population.

Methodology

Our study was conducted in the Department of Pharmacology, Government Medical College Srinagar from 1st October 2022 to 1st January 2023, after getting approval from Institutional Ethics Committee. An electronic questionnaire to assess the awareness regarding antibiotic usage and its resistance was prepared using Google forms and circulated through social media platform (whatsapp). Identity of the respondents was kept highly confidential. The questionnaire was prepared based on previous studies. The questionnaire had 26 questions divided into four sections and was prepared in English language. The first section consisted of basic demographic profile of respondents like age, sex etc. The second section inspected the use of antimicrobial agents by the participants in the last three months, the reasons for consuming the drug and the source from which the drug was obtained. The third section dealt with the awareness regarding antibiotic usage and section four contained information regarding knowledge of participants about antibiotic resistance. Options of questions in section four were framed on 3-point Likert scale.

We received responses from 279 participants which were then included in the study. Responses were compiled using Microsoft Excel Sheet and then analysed. Statistical analysis was done using SPSS version 25.0 software. Demographic characteristics were analyzed using descriptive statistics. Categorical variables were measured as percentages.

Results

Table 1 shows the Demographic profile of study population. Table 2 lists the Participants awareness regarding antibiotic usage. Figure 1 describes the Conditions for which antibiotics were consumed by the respondents. Figure2 shows the knowledge of respondents regarding antibiotic resistance. Table 3 depicts the Education of the study participants where they obtain antibiotics from. Table 4 depicts the Education with respect to the idea about Antibiotic Stewardship program.

Table 5 shows the participants know self medication of antibiotics may lead to antibiotic resistance. Table 6 shows whom the participants consult in case their symptoms don't improve and if they want to change their antibiotic.

Table 1: Demographic profile of study population.

Parameter	Number
AGE	
18 – 28	63(23%)
29-38	144(52%)
39-48	45(17%)
49 and above	21(8%)
GENDER	
Male	108(40%)
Female	165(60%)
MARITAL STATUS	
Single	72(26%)
Married	198(73%)
Divorced	3(1%)
RESIDENCE	
Urban	201(74%)
Rural	72(26%)
EDUCATION	
High school	24(9%)
Graduate	57(21%)
Post graduate	189(70%)

Table2: Participants awareness regarding antibiotic usage.

	Number
Have you consumed antibiotics in the last three months	
Yes	204(75%)
No	69(25%)
Don't know	0
If yes, then how long	
3 days	81 (40%)
5 days	93 (46%)
10 days	15 (7%)
>10 days	15 (7%)
What are antibiotics used for	
To decrease fever	9 (3%)
To relieve pain	3 (1%)
To overcome fatigue and malaise	0 (0%)
To treat infections	261 (96%)
No idea	0 (0%)

Where do you obtain antibiotics from	
From pharmacy with prescription	147 (53%)
From pharmacy without prescription	111 (41%)
Left over medicine at home	15 (6%)
Obtained from some friend	0 (0%)
Do you have idea against which organisms antibiotics act	
Bacteria	243 (89%)
Virus	0 (0%)
Fungi	24 (9%)
No idea	6 (2%)
Do you know antibiotics cause side effects	
Yes	267 (98%)
No	6 (2%)
Don't know	0 (0%)
Should antibiotics always be purchased after a valid prescription	
Yes	252 (92%)
No	15 (6%)
Don't know	6. (2%)
Have you ever left antibiotics midway	
Yes	141 (52%)
No	132 (48%)
Don't know	0 (0%)
If yes, what was the reason	
Symptomatic improvement	105 (74%)
Medicine got finished	5 (4%)
Cost issue	3 (2%)
Busy schedule	25 (18%)
Misguidance	0 (0%)
Experienced adverse effects	3 (2%)
What do you do with the medicines left after your course is completed	
Save the remaining drugs for future use	205 (75%)
Discard the left over medicines	49 (18%)
Give it to some friend when they become sick	11 (4%)
No idea	8 (3%)
Do you have idea that effectiveness of antibiotics is reduced if full course is not completed	
Yes	262 (96%)
No	8 (3%)
Don't know	3 (1%)

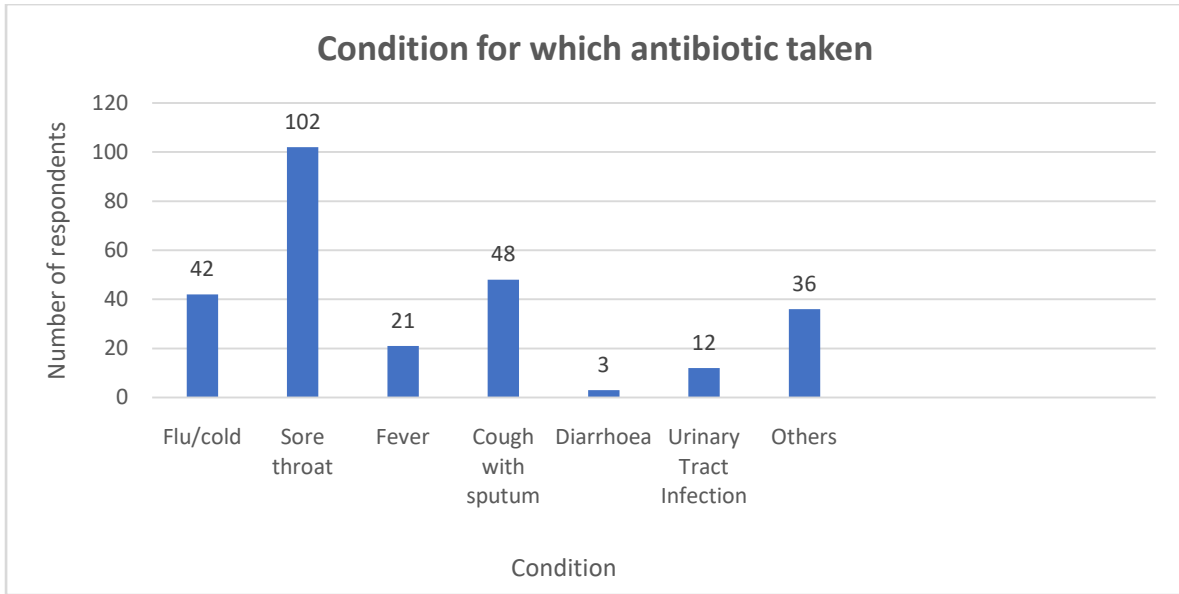


Figure 1: Conditions for which antibiotics were consumed by the respondents.

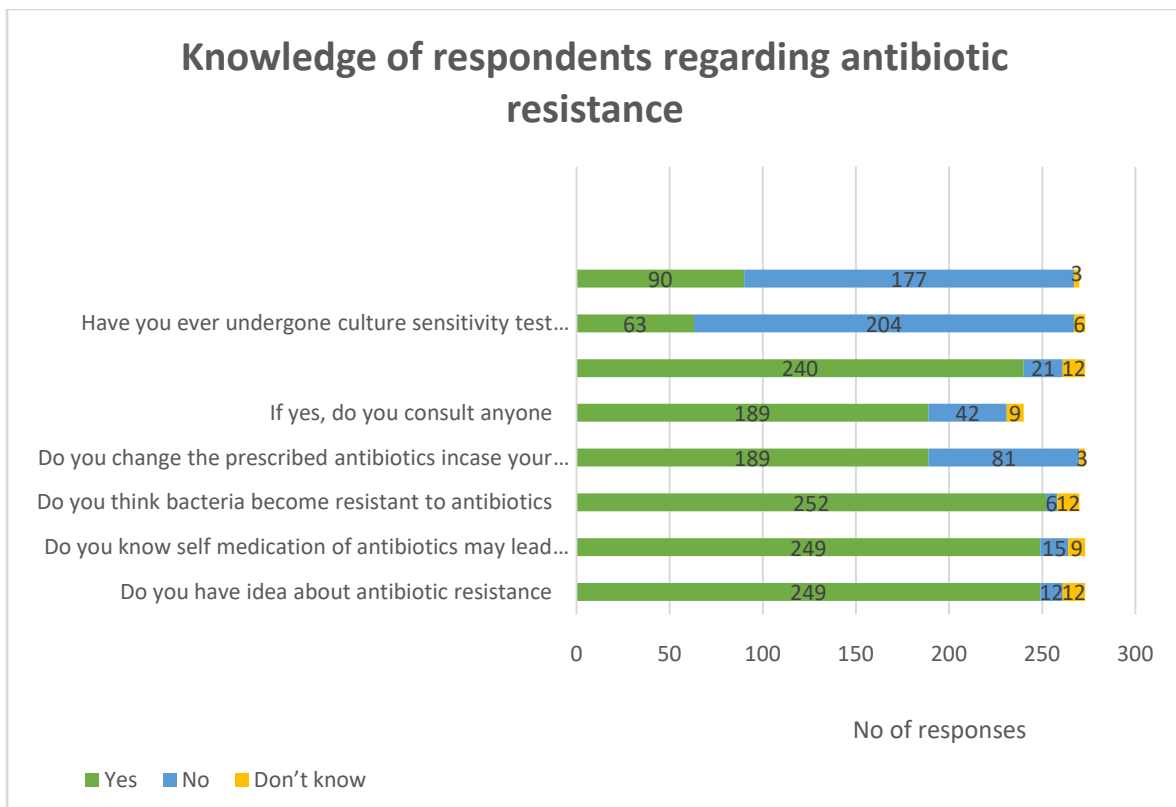


Figure2 : Knowledge of respondents regarding antibiotic resistance.

Table 3:Education- Where do you obtain antibiotics from.

		Where do you obtain antibiotics from			
		From pharmacy with prescription	From Pharmacy without prescription	Left over medicine at home	Total
Residence	Rural	12	8	0	20
		60.0%	40.0%	0.0%	100.0%
% within Education					
Count	Urban	6	0	2	8
		75.0%	0.0%	25.0%	100.0%
% Within Education					
Count		31	29	3	63
		49.2%	46.0%	4.8%	100.0%
% within Education					
Total	Count	49	37	5	91
		53.8%	40.7%	5.5%	100.0%
% within Education					

Chi-Square Test

	Value	Df	Asymptotic Significance(2-sided)	Exact sig.(2-sided)
Pearson Chi-Square	11.459 ^{**}	4	0.022	0.022
Likelihood Ratio	13.125	4	0.011	0.013
Fisher's Exact Test	10.145			0.023
N of Valid Cases	91			

p value= 0.023

Table 4: Education-do you have idea about Antibiotic Stewardship program.

		Do you have any idea about Antibiotic Stewardship program			
		Don't know	No	Yes	Total
Residence	Graduate	0	19	1	20
		0.0%	95.0%	5.0%	100.0%
% within Education					
Count	High school	0	5	3	8
		0.0%	62.5%	37.5%	100.0%
% Within Education					
Count	Postgraduate	1	36	26	63
		1.6%	57.1%	41.3%	100.0%
% Within Education					
Total	Count	1	60	30	91
		1.1%	65.9%	33.0%	100.0%
% within Education					

Chi-Square Test

	Value	Df	Asymptotic Significance(2-sided)	Exact sig.(2-sided)
Pearson Chi-Square	9.872 ^{**}	4	0.043	0.103
Likelihood Ratio	12.457	4	0.014	0.009
Fisher's Exact Test	11.964			0.009
N of Valid Cases	91			

p-value= 0.009

Table 5: Residence-Do you know self medication of antibiotics may lead to antibiotic resistance.

		Do you know self medication of antibiotics may lead to antibiotic resistance			
		Don't know	No	Yes	Total
Residence Count	Rural	0	4	20	24
		0.0%	16.7%	83.3%	100.0%
% within residence Count	Urban	3	1	63	67
		4.5%	1.5%	94.0%	100.0%
% Within Residence					
Total Count		3	5	83	91
		3.3%	5.5%	91.2%	100.0%
% within Residence					
Chi-Square Test					
	Value	Df	Asymptotic Significance(2-sided)	Exact sig.(2-sided)	
Pearson Chi-Square	8.701 ^{**}	2	0.013	0.026	
Likelihood Ratio	8.334	2	0.016	0.026	
Fisher's Exact Test	6.955			0.033	
N of Valid Cases	91				

p-value= 0.033

Table 6: Residence- whom do you consult in case your symptoms don't improve and you want to change your antibiotic.

		If yes then whom				
		99	pharmacist	physician	self	Total
Residence Count	Rural	5	3	16	0	24
		20.8%	12.5%	66.7%	0.0%	100.0%
% within residence Count	Urban	11	0	50	6	67
		16.4%	0.0%	74.6%	9.0%	100.0%
% Within Residence						
Total Count		16	3	66	6	91
		17.6%	3.3%	72.5%	6.6%	
% within Residence						
Chi-Square Test						
	Value	Df	Asymptotic Significance(2-sided)	Exact sig.(2-sided)		
Pearson Chi-Square	10.875	3	0.012	0.014		
Likelihood Ratio	12.017	3	0.007	0.011		
Fisher's Exact Test	8.816			0.021		
N of Valid Cases	91					

p-value= 0.021

Discussion

In the study we conducted we found, **that** majority of the respondents (52%) were in the age group of 29-38 years, with female predominance 60%. Most of the participants (73%) were married. 70% participants were post graduates and 74% lived in urban areas.

In the current study when asked about consumption of antibiotics in the last three months, 75% participants responded in the affirmative. Similarly in the study conducted by El Zowalaty ME et al [16],71% subjects had used antibiotics in the last 6 months while 59% had consumed antibiotics in the last 12 months, in the

research conducted by Zajmi D et al [17]. As is evident from figure 1, major portion of the study population (37%) had consumed antibiotics for the treatment of sore throat, followed by cough with sputum, 17%. In the previous similar studies conducted by Mir SA et al [18], sore throat with cough (89%) was the leading cause of antibiotic usage. Another study was conducted by Zajmi D et al [17] where sore throat (20%), was the second most common cause of antibiotic usage. In the research when the respondents were asked about the conditions where antibiotics can be used, 96% correctly responded for the treatment of infections. Yin X et al [19] also reported that majority of the participants (72%), had agreed that antimicrobials can be used to treat infections. Similarly Sharif SI et al [20] conducted the study and reported that 50% participants agreed that antibiotics can be used for the treatment of various infections.

In this research, majority respondents obtained antibiotics from pharmacies after a valid prescription, 53%. Similar results were reported by Sharif SI et al [20] from his study where 41% subjects had purchased antibiotics from medical stores after valid prescriptions. Another study was conducted by Tangcharoensathien V et al [21] where 98% respondents had received their medicines from pharmacies after consultation with health care professionals.

Self medication of drugs is rampant world wide but more so its a problem for third world countries [22]. Especially in case of antibiotics, self medication can result in inappropriate dosage which is one of the major contributors to antibiotic resistance [23]. In this research 47% participants reported that they either bought antibiotics from pharmacies without prescription or used drugs left behind at home. Almost similar results were reported by Sharif SI et al [20] where 40% study subjects practiced self medication of antibiotics. Only 10% respondents had self medicated themselves with antibiotics in the study conducted by Yin X et al [19]. The probable reason for this could be that we are still a third world country where public needs override the available health care facilities. Majority respondents in this study (89%), were aware of the fact that antibiotics act against bacteria. Similarly in the study conducted by André M et al [24], 77% participants had correctly agreed that antibiotics are effective against bacteria. Participants in the study were well aware of the fact that antimicrobial drugs cause side effects, 98%. Likewise 42% subjects had agreed that antibiotics cause side effects as per the study conducted by Javaeed A et al [25]. In this study, 52% subjects had left antibiotics midway and the most common reason for this was symptomatic improvement. Results of our study were comparable with the studies conducted by Sharif SI et al [20] and Mir SA et al [18] respectively. In the study conducted by Sharif SI et al [20], 62% participants had left antibiotics midway during the

course, while when the respondents in the study conducted by Mir SA et al [18] were asked about the reason of leaving the medicine midway, 58% replied that they felt improvement in their symptoms. 96% subjects in the study were well aware of the fact that effectiveness of antibiotics is reduced if full course is not completed. Our results were definitely better than the previous study conducted by Javaeed A et al [25] where only 2% participants were aware that antibiotics effectiveness is reduced if full course is not completed. This suggests better knowledge about antibiotic usage in our study group. Figure 2 consisted of factors to scrutinize the knowledge of participants regarding antimicrobial resistance. 89% subjects in our study had idea about antibiotic resistance. Our findings were almost similar to the findings reported by André M et al [24], where 85% subjects were familiar with antibiotic resistance. Again 89% participants knew that self-medication was one of the main culprits behind it while only 62% participants said so in the previous study conducted by Karandikar YS et al [26]. 67% respondents in our study changed their medication in case their symptoms did not improve after consultation with some health care professional. The results of our study were contrary to the findings reported by Mir SA et al [18], where only 16% subjects had changed their antibiotics when their symptoms had not improved. In our study 86% participants knew about culture sensitivity testing which should ideally be done before prescribing antibiotics, while only 23% had actually undergone such a test and only 32% had heard about antibiotic stewardship program. Fisher exact test was done to find out the association between variables. On statistical analysis between education and where the respondents obtained antibiotics from, it was found that a higher percentage of subjects (75%) with high school education bought antibiotics from pharmacies using a valid prescription, and this was found to be statistically significant with a p-value = 0.023 (table 3). This meant that the post graduates in our study were more adamant that they are in no need of prescriptions to get drugs from medical stores. This attitude of theirs needs to be addressed as people with higher education influence the society more. When relationship between education and idea regarding antibiotic stewardship program was analyzed, it was found that higher percentage of postgraduates (41.3%) were aware about the program and the association was found to be statistically significant with a p-value of 0.009 (table 4). The association between residence and awareness that self medication of antibiotics may lead to antibiotic resistance was analysed and it was found that that urban population was more aware about this fact (94%). This association was found to be statistically significant with a p-value of 0.033 (table 5). When the relationship between residence and the person whom the respondents consulted in case their symptoms did not improve and they wanted to change their antibiotics, higher percentage of urban

population (75%) consulted physicians before doing so. This association was seen to be statistically significant with a p- value of 0.021 (table 6). This is probably due to more exposure of urban people to awareness programs.

Conclusion

The discovery of antimicrobial agents was a major breakthrough in the field of medicine. It proved life saving for a variety of infectious conditions. Then came an era when these magic bullets began to be used indiscriminately resulting in the development of antimicrobial resistance. Various factors contribute to the development of antimicrobial resistance, the first being the level of awareness regarding its proper use. In our study 96% participants were of the opinion that antibiotics are used to treat infections. 89% were aware that antibiotics act against bacteria. 53% believed that anti-microbial agents should be brought after proper medical consultation. 98% had idea that antibiotics can cause side effects. 52% left their antibiotics midway during the course and among them 68% believed that symptomatic improvement was the main reason behind it. 96% knew that effectiveness of antibiotics is reduced if antibiotics are left midway. 89% had an idea about antibiotic resistance and the same percentage considered self-medication as its main contributor. Only 32% participants had heard about antibiotic stewardship program. Our study showed that a lot of difference exists between knowledge and actual practice. Although our study population was aware about proper antibiotic usage, but in reality they did not practice it. Intensive awareness campaigns regarding proper antibiotic usage and antibiotic resistance should be carried out focusing health care professionals as well common public, so that misuse of antibiotics can be prevented. Further there should be a strict check on availability of antibiotics as over the counter drugs.

Conflict of interest:

There is no conflict of interest among the authors.

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