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Research Article

**KNOWLEDGE, AWARENESS & ADHERENCE TOWARD
THE ANTIBIOTIC USE AND ANTIMICROBIAL
RESISTANCE AMONG THE PEOPLE OF NORTHERN
BORDER REGION OF SAUDI ARABIA****Mohd. Imran*¹, Raji Rubyyi Al-Shammari², Emad Obaid³, Jawad Mumtaz Sodhar³,
Sibghatullah Muhammad Ali Sangi³**¹Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Northern Border University, Rafha - 91911, P.O. BOX 840, Kingdom of Saudi Arabia.²Faculty of Pharmacy, Northern Border University, Rafha - 91911, P.O. BOX 840, Kingdom of Saudi Arabia.³Department of Clinical Pharmacy, Faculty of Pharmacy, Northern Border University, Rafha - 91911, P.O. BOX 840, Kingdom of Saudi Arabia.**Abstract:**

Antimicrobial resistance has become a global concern, including in the Kingdom of Saudi Arabia, for the human health. The objective of this study was to evaluate the knowledge, awareness, and adherence to the antibiotic use and the antimicrobial resistance among the people of the Northern Border Region of the Kingdom of Saudi Arabia. This cross-sectional epidemiological study was done by using a pretested and structured questionnaire from November 2015 to March 2016 among the Northern Border Region population (764 participants) of the Kingdom of Saudi Arabia. The data obtained was analyzed by using the Statistical Package for Social Sciences (SPSS) version 19. This study has provided a very significant insight about the level of knowledge, awareness & adherence toward the antibiotic use and antimicrobial resistance among the people of the Northern Border Region of the Kingdom of Saudi Arabia. It was found that about 70.7% of the people were not aware about the antibiotic resistance and the majority of the people used antibiotics irrationally without the consultation of the doctor. Most of the people were also able to get an antibiotic from pharmacy without any prescription. It was also noticed that about 79.6% of the people did not attend any antibiotic awareness program. Accordingly, there is an urgent need to conduct antibiotic awareness campaigns or educating the general population through media/health professionals about the antibiotic use, antimicrobial resistance and its consequences. Further, the Ministry of Health should implement strict legislatures on the dispensing of antibiotics without prescription.

Keywords: Antibiotic resistance, Knowledge, Awareness, Adherence, Northern Border, Saudi Arabia.**Corresponding author:****Mohd. Imran,**

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INTRODUCTION:

Antimicrobial resistance (AMR) has become a global concern for the human health. Approximately 10 million tons of the antibiotics are globally used every 10 minutes, which mostly are not related to the rational use of the antibiotics [1-2]. The AMR has also caused the emergence and spread of multidrug-resistant (MDR) pathogens in many parts of the world and has also made many bacterial infections difficult to treat. According to one estimate one patient dies in the USA or Europe every 10 minutes because of the fatal infections caused by the antibiotic resistant bacteria [1]. According to another estimate about two million people become infected with the antimicrobial resistant pathogens, and there are twenty thousand antimicrobial resistance related deaths annually in the USA [3]. The AMR has also become the leading cause of economic loss worldwide [4]. Accordingly, there is a need to take remedial actions with respect to the issues related to the antimicrobial resistance.

The Kingdom of Saudi Arabia is one of the richest developing countries in the Middle East. The population of the KSA comprises people from many countries [5]. According to the published data [6-8], the total population of KSA comprises Saudi nationals (68.9%) and non-Saudi people (31.1%). Further, every year million of people from all over the globe visit KSA for Hajj and Umrah practice. During the Hajj and Umrah practice by million of people the non-prescription and irrational use of antibiotics increases. However, because of the differences in the socioeconomic, and demographic characteristics of Saudi, non-Saudi and pilgrim population, the response to antimicrobial therapy and the clinical outcomes may differ. This is one of the factors in the increase of AMR incidences in the KSA [9-13]. Furthermore, the access to antibiotics is uncontrolled among the people living in the KSA. Antibiotics are available and accessible to the public and can be bought over the counter. This free access to antibiotics changes the context of antibiotic related interventions in the KSA. Data on the awareness, among the patients and the public, about antibiotic resistance has revealed that antimicrobial resistance is an escalating serious concern in the KSA [10,14]. It has been reported that the antimicrobial resistance issue requires urgent attention and raising awareness of the antimicrobial resistance issue among the general public of the KSA to limit the irrational use of the antibiotics [1]. Recently, a study has been published that addressed this issue [14]. However, this study was mainly limited to the people of the Southwestern region of the the KSA as well as some randomly selected participants from other regions of the kingdom. However, this study was silent about the participation from the people of the

Northern Border Region of the KSA. To the best of our knowledge, there are no data available about the knowledge, awareness, and adherence to the antibiotic use and the antimicrobial resistance among the people of the Northern Border Region of the KSA. Therefore, this study was planned with the expectations that it will help us to suggest some measures to be taken by the ministry of health to increase the awareness of the public towards the antibiotic resistance and its consequences.

MATERIALS AND METHODS:

This cross-sectional epidemiological study using a pretested and structured questionnaire was carried out from November 2015 to March 2016 among the Northern Border Region population (800 participants) of the KSA. The questionnaire was developed according to the scientific literature and the antimicrobial resistance report by the World Health Organization [14-19]. The questionnaire included the socio-demographic characteristics of the Northern Border Region population; knowledge and beliefs about the antibiotics among the Northern Border Region population; awareness regarding the antibiotic resistance among the Northern Border Region population; and the adherence to the antibiotic treatment among the Northern Border Region population as predictors for antibiotic usage. The inclusion criteria were that participants had to be Saudi nationals and legal resident non-Saudi nationals. All participants had to be between the age of 15 years to 60 years and had to sign a written consent. To avoid double counting of the participants, each participant was provided with a unique identification number. The identity of the participants was anonymized through the process of data analysis. The questionnaire was provided to each participant in English and/or Arabic language. The questionnaire was provided to the participants at the place of their choice .e.g. public areas, clinics, hospitals, houses, and universities, etc. Informed consent were obtained from the participants after the study protocol was explained to them. The participants were assured of the anonymity and confidentiality of the information. The data obtained was analyzed using the Statistical Package for Social Sciences (SPSS) version 19.

This study was a cross-sectional epidemiological study using a pretested and structured questionnaire and did not involve any risk to the participants. The participants were just asked to fill the questionnaire to evaluate their knowledge, awareness, and adherence to the antibiotic use and the antimicrobial resistance. Accordingly, this study did not require a review board approval.

RESULTS:

A total of 800 participants from the Northern Border Region of the KSA were contacted for this study. However, the participants who were below the age of 15 years (7 participants); more than the age of 60 years (1 participant); and participants who did not

complete the questionnaire (28 participants) were excluded from the study. Accordingly, the data on a total of 764 participants was compiled and analyzed. The socio-demographic characteristic data of the Northern Border Region population (N = 764) is provided in Table 1 & Figure 1.

Table 1: The socio-demographic characteristics of the Northern Border Region population (N = 764)

Parameter	N	(%)
Sex		
Male	517	(67.7)
Female	247	(32.3)
Age		
Mean age in years (standard deviation)	28.5±7.9	
Marital Status		
Unmarried	303	(39.7)
Married	444	(58.1)
Widow/Divorced/Separated/Unspecified	17	(2.2)
Educational status		
Illiterate	4	(0.5)
Elementary school	11	(1.4)
Middle school	18	(2.4)
High school	265	(34.7)
University graduates	466	(61)
Occupational Status		
Housewife	71	(9.3)
Student	173	(22.6)
Employee	407	(53.3)
Self-employed	113	(14.8)

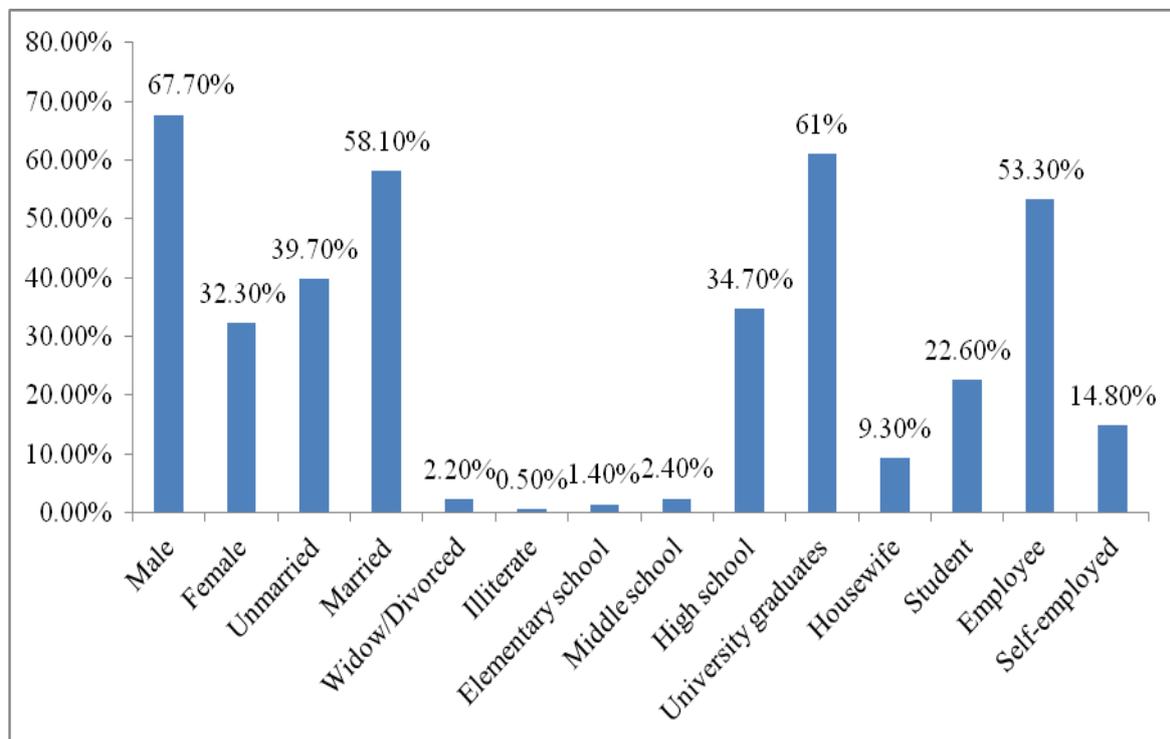


Fig 1: The socio-demographic characteristics of the Northern Border Region population (N = 764)

Among the respondents, 67.7% were male and 32.3% were female. The mean age of of the study population was 28.5 ± 7.9 . About 39.7% respondents were unmarried; 58.1% were married; and about 2.2% were widow/divorced/separated. About 61% of the respondents were University graduates while 34.7% were high school pass. About 53.3% of the

respondents were employees while about 22.6% respondents were students.

The data about the knowledge and beliefs about the antibiotics among the Northern Border Region population (N = 764) is provided in Table 2 and Figure 2 & Figure 3.

Table 2: The knowledge and beliefs about the antibiotics among the Northern Border Region population (N = 764)

Question	Strongly agree (%)	Somewhat agree (%)	Uncertain (%)	Somewhat disagree (%)	Strongly disagree (%)
Antibiotics are safe drugs	8	26.4	43.5	14.9	7.2
Antibiotics treat viral infections	13.1	40.6	34	5.2	7.1
Some germs can become resistant to the antibiotics if they are taken in inadequate doses	16.5	32.3	37	8.9	5.2
If I have a cold or cough it is better to get an antibiotic to get rid of it	22.4	42.8	15.7	11.4	7.7
When I get a fever, antibiotics help me to get better more quickly	17.7	44.2	21.2	10.6	6.3
It is not important to follow antibiotic doses strictly	6.4	18.7	22.8	25.7	26.4

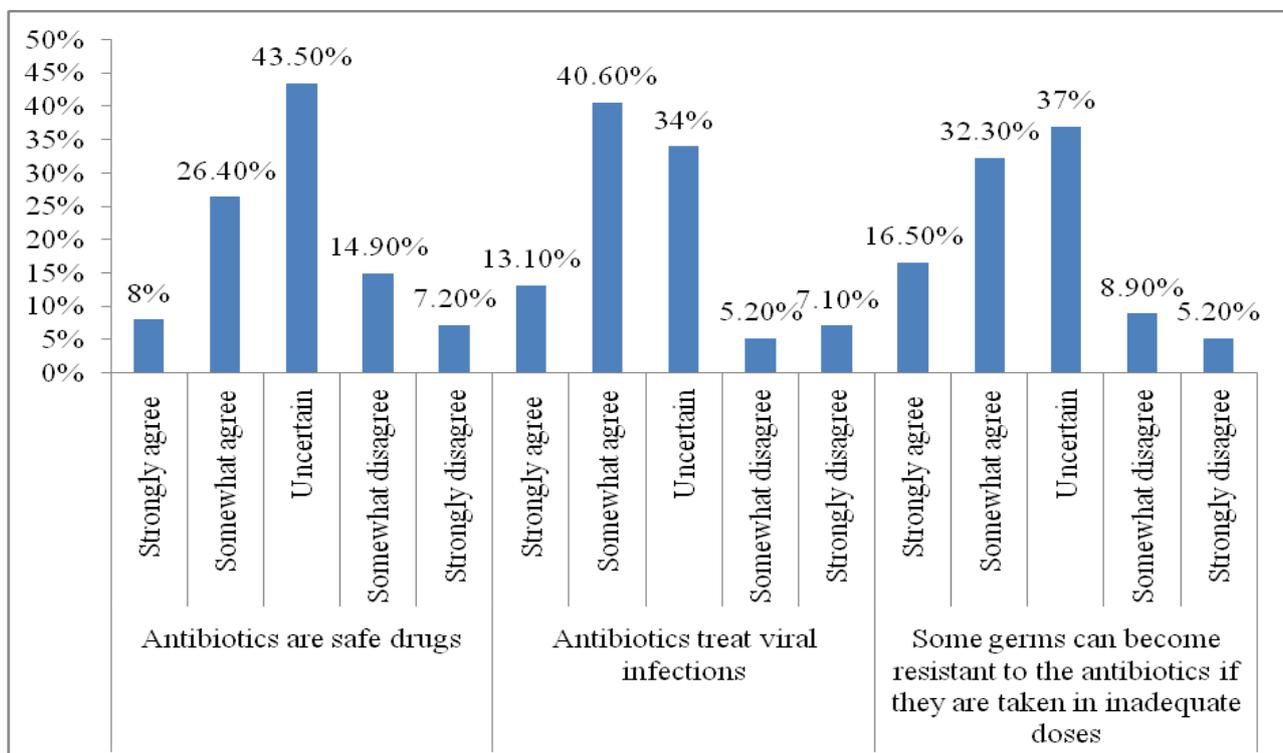


Fig 2: The knowledge and beliefs about the antibiotics among the Northern Border Region population (N = 764)

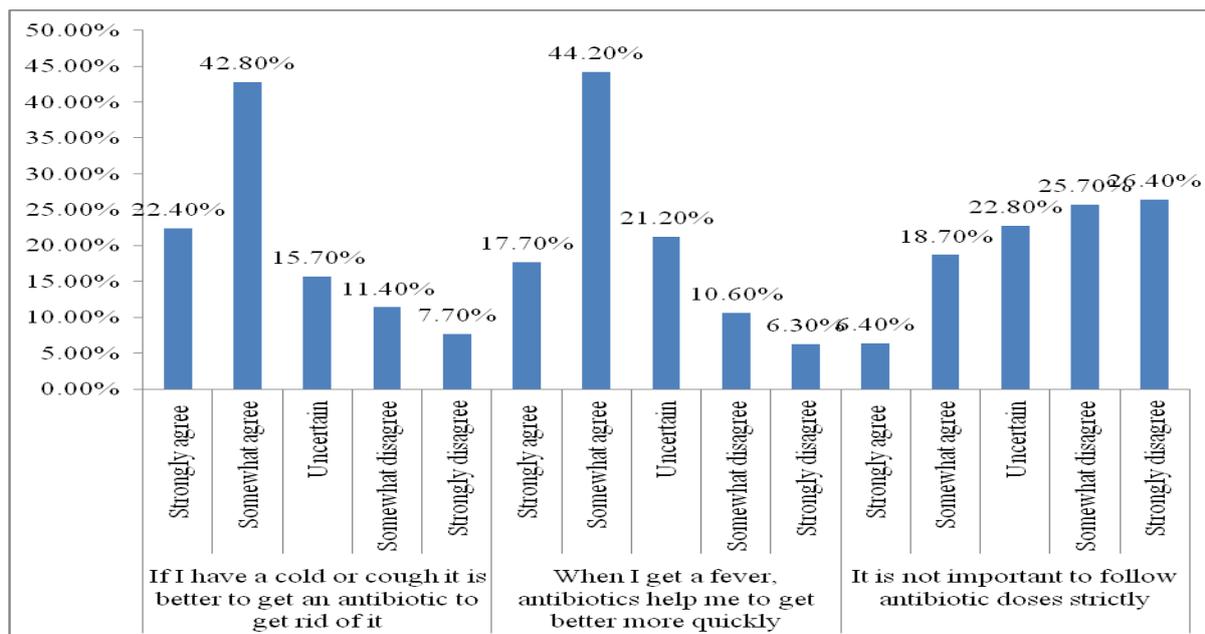


Fig 3: Knowledge and beliefs about antibiotics among the Northern Border Region population (N = 764)

The data of the Table 2 revealed that about 34.4% (26.6% + 8%) of the respondents agreed that antibiotics are the safe drugs. About 22.1% (7.2% + 14.9%) disagreed with it while about 43.5% were uncertain about the safety issues of the antibiotics. About 53.7% (13.1% + 40.6%) of the respondents agreed that antibiotics treat the viral infections; about 12.3% (5.2% + 7.1%) disagreed with it while 34% were uncertain about this issue. About 48.8% (16.5% + 32.3%) of the respondents agreed that some germs can become resistant to the antibiotics if they are taken in inadequate dose; about 14.1% (8.9% + 5.2%) disagreed with it while about 37% were uncertain about this issue. About 65% (22.4% + 42.8%) of the respondents agreed that it is better

to use an antibiotic in case of cold or cough; about 19.1% (7.7% + 11.4%) disagreed with it while about 15.7% were uncertain about this issue. About 61.9% (17.7% + 44.2%) of the respondents agreed that use of an antibiotic in fever provides quick relief; about 16.9% (10.6% + 6.3%) disagreed with it while 21.2% were uncertain about this issue. About 25.1% (6.4% + 18.7%) of the respondents agreed that it is not important to follow antibiotic doses strictly; 52.1% (25.7% + 26.4%) disagreed with it while about 22.8% were uncertain about this issue.

The data of the awareness regarding the antibiotic resistance among the Northern Border Region population are provided in Table 3 and Figure 4.

Table 3: The awareness regarding the antibiotic resistance among the Northern Border Region population (N = 764)

%	N	Questions
Are you aware of antimicrobial resistance?		
29.3	224	Yes
70.7	540	No
What is the source of awareness? (Multiple options)		
43.8	335	Doctor
28.4	217	Friends/Relatives
30.1	230	The Media
19.5	149	Personal Experience
12.2	93	Others
Did you take antibiotics without doctor's consultation?		
46.2	353	Yes
45.7	349	No
8.1	62	Antibiotics do not need medical advice
Have you attended any antibiotic awareness program?		
5.1	39	Yes
79.6	608	No
15.3	117	Not interested

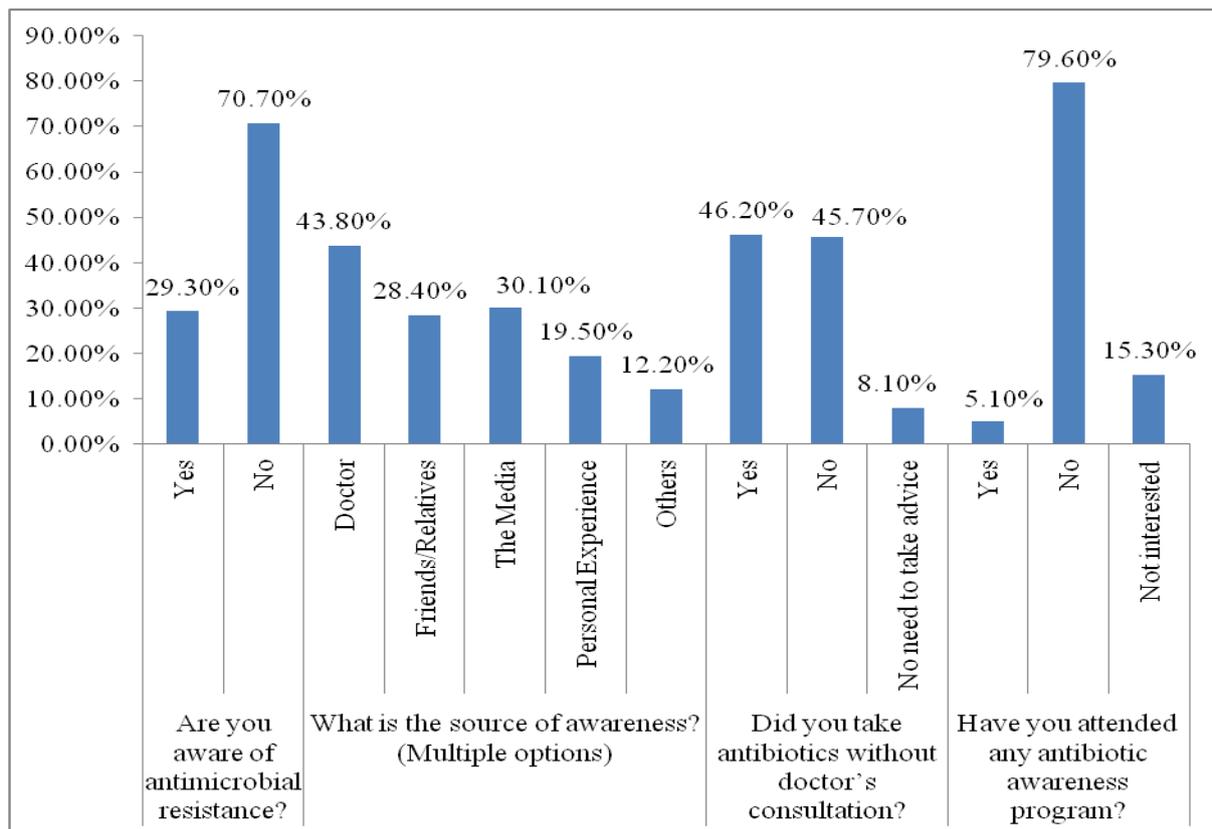


Fig 4: The awareness regarding the antibiotic resistance among the Northern Border Region population (N = 764)

The data related to the awareness provided in Table 3 and Figure 3 revealed that about 70.7% of the respondents were not aware about the antibiotic resistance. About 43.8% of the respondents mentioned doctor as a source of antibiotic awareness; about 28.4% mentioned friends/relatives and about 30.1% mentioned the media as the source of antibiotic awareness. About 46.2% of the respondents stated that they took the antibiotics without doctor's consultation; about

8.1% stated that there is no need to take medical advice for it while 45.7% stated that they took antibiotics after the consultation with the doctor. Surprisingly, about 79.6% of the respondents did not attend any antibiotic awareness program while about 15.3% were not interested in it.

The data of the adherence to the antibiotic treatment among the Northern Border Region population (N = 764) are provided in Table 4 and Figure 5.

Table 4: The adherence to the antibiotic treatment among the Northern Border Region population (N=764)

Questions	Often (%)	Sometimes (%)	Rarely (%)	Never (%)
Did you complete the antibiotic course, as described by the doctor?	43.7	39	13.7	3.5
Did you stop antibiotic course, when you get improved?	56.7	23	10.5	9.8
You are not satisfied when the doctor does not prescribe antibiotic.	18	24.7	25.1	32.2
Can you get antibiotics without a prescription?	34	32.7	13.7	19.6
Do you save the remaining antibiotics for the next time you get sick?	31.4	27.5	15.1	26

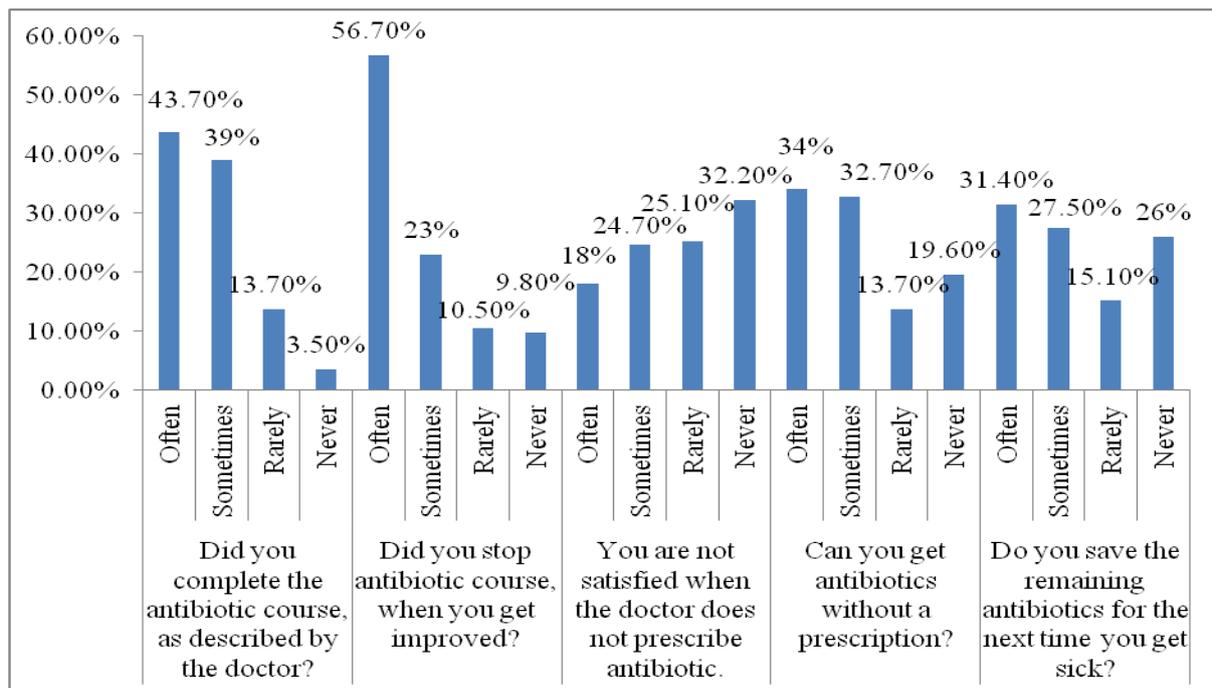


Fig 5: The adherence to the antibiotic treatment among the Northern Border Region population (N=764)

The data regarding the adherence to the antibiotic treatment revealed that only about 43.7% of the respondents completed the antibiotic course. More than 56.7% of the respondents stopped the antibiotic course, when they got improved. More than 34% of the respondents stated that they got an antibiotic without any prescription and more than 31.4% of the respondents kept the antibiotic for future use.

DISCUSSION:

This study has provided a very significant insight about the level of knowledge, awareness & adherence toward the antibiotic use and antimicrobial resistance among the people of the Northern Border Region of KSA. It was found that about 53.7% of the participants believed that antibiotics treat viral infections; about 65% agree to take an antibiotic in case of cold or cough; and about 61.9% understand that use of an antibiotic provides quick relief in fever. This indicates that a majority of the people of the Northern Border Region do not have proper understanding about the main causes of cold, flu, cough, general fever, and viral infections. It has also been found that about 46.2% of the people use the antibiotics without doctor's consultation and about 8.1% believe that there is no need to take any medical advice to use the antibiotics. Further, it has also been observed about 70.7% of the people are not aware of the antibiotic resistance and more than 56.7% stop the antibiotic course when they get improved. Such beliefs, practices and lack of knowledge about the antimicrobial resistance may increase the irrational use of the antibiotics among the public and may also lead to the development of antibiotic

resistance. One interesting finding was that more than 34% of the people of the Northern Border Region of KSA can get an antibiotic without any prescription. This indicates that the policies related to the regulations of antibiotics need improvement. These results are also in line with the previous report published in the KSA on the subject matter [14]. It was also surprising to note that about 79.6% of the people did not attend any antibiotic awareness program. This study has also revealed that the doctor / friends / relative / media are the main sources of the antibiotic awareness. Accordingly, the awareness about the antibiotic use, antimicrobial resistance and its consequences among the general public may be increased either by conducting antibiotic awareness campaigns or educating the general population through media / health professionals.

CONCLUSION:

This study has revealed that people of the Northern Border Region of KSA have a low level of awareness about the use of antibiotics and antimicrobial resistance. There is an urgent need to conduct antibiotic awareness campaigns or educating the general population through the media / health professionals about the antibiotic use, antimicrobial resistance and its consequences. Further, the Ministry of Health should implement strict legislatures on the dispensing of antibiotics without prescription.

CONFLICT OF INTEREST:

The authors declare that no conflict of interest is associated with this work.

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