Journal of Health Informatics in Developing Countries
http://www.jhidc.org/
Vol. 16 No. 2, 2022

Submitted: June 25th, 2022 Accepted: Oct 1st, 2022

Knowledge and Practice of Physicians about antibiotic resistance in Saudi Arabia after law enforcement on dispensing antibiotics without prescription: Findings from a cross-sectional study

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Abstract

Background: Dispensing antibiotics without prescription has emerged as a problem of concern in the middle east. Despite implementing laws and regulations, compliance with the law and enforcement of the law is not 100%. While several studies have been carried out to assess the knowledge of people about antibiotic resistance, none of the studies has focused on physicians in Saudi Arabia. Hence, this study aimed to assess the knowledge and practice of physicians regarding antibiotic resistance after law enforcement against dispensing antibiotics without prescription in Saudi Arabia.

Methods: A cross-sectional study was undertaken on a sample of physicians (n=378) in Riyadh Saudi Arabia. A study questionnaire was sent to physicians online to assess their knowledge about antibiotic resistance and the practice of using antibiotics. Frequencies and proportions were calculated regarding various domains of knowledge and practice of using antibiotics in the clinical setting. SPSS software was used to analyze the data.

Results: The study results demonstrate that 48.10% of the physicians see 15-30 patients per day on average and more than half of the physicians (52.38%) prescribe > 10 antibiotics per day. Further 93% of the physicians knew about drug resistance to bacteria in the local community. Similarly, 90.5% of the physicians mentioned that several infections are becoming increasingly resistant to treatment by antibiotics and 85.2% were aware that if the bacteria are resistant to antibiotics, it can be difficult or impossible to treat the cause of the infection. Only 77.5% of the physicians acknowledged antibiotic resistance as an issue that could affect communities and 33.9% of the physicians believe that antibiotic resistance is an issue in other countries but not here and 47.4% of them thought that antibiotic resistance is only a problem for people who take antibiotics regularly.

Conclusion: The knowledge of physicians regarding antibiotic resistance seems to be higher in Saudi Arabia after implementing the law against dispensing antibiotics without prescription. However, physicians' beliefs about antibiotic resistance being not an issue for Saudi Arabia needs to be corrected as antibiotic resistance can be a problem for countries such as Saudi Arabia.

Keywords: Knowledge, practice, antibiotic resistance, Saudi Arabia.

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1. Introduction

Antibiotic resistance has remained one of the major challenges in public health [1]. This threat has posed an enormous economic burden on families and communities [2]. People can face severe health expenses due to prolonged stay in the hospital and also may experience morbidity and mortality[3]. Without resolving the issue of antibiotic resistance by taking urgent actions at the policy level, this threat of antibiotic resistance can lead to an increased burden of mortality and financial burden on families [3, 4]. Given the higher burden of antibiotic resistance, antibiotic resistance has been considered as one of the important agendas across the globe [5, 6].

One of the main reasons for antibiotic resistance is the unnecessary prescription of antibiotics by health care professionals [2, 7]. Further, self-medication by people or the use of over-the-counter antibiotics could also be another potential reason for antibiotic resistance [8]. Such irrational use of antibiotics without any reason contributes to the spread of antimicrobial resistance across the globe [9-12]. To overcome these issues of dispensing antibiotics without a prescription, multiple countries have enforced laws and policies on dispensing antibiotics without a prescription. Simultaneously, fines and penalties are enforced for violating the laws and legislation. Dispensing antibiotics without prescription is not legal, however, practiced widely across the countries.

Dispensing antibiotics without prescription has emerged as a problem of concern in the middle east [13, 14]. Besides, despite the laws and regulations, the enforcement of the law is not 100%. For instance, the issue of antibiotic resistance also prevails in countries such as Saudi Arabia [15]. Consequently, there have been efforts to enforce laws or legislation to avoid dispensing antibiotics without prescription. After discussion and debate, the Ministry of Health enforced laws and regulations prohibiting dispensing antibiotics without a prescription. However, there does not appear to be compliance with the law, and non-adherence with law enforcement prevails across Saudi Arabia as shown by several studies.

While several studies have been carried out to assess the impact of law on Saudi populations [16, 17], none of the studies have been conducted to assess the knowledge and practice of physicians about antibiotic resistance in Saudi Arabia after law enforcement. Hence, we conducted this study to assess the knowledge and practice of physicians regarding antibiotic resistance after law enforcement against Dispensing antibiotics without prescription in Saudi Arabia. The findings of the study will inform policymakers and ministries to take additional actions, if required, to implement the law effectively for favorable outcomes.

2. Material and Methods

A cross-sectional study was undertaken on 377 primary care physicians in Riyadh Saudi Arabia. A structured questionnaire was sent to physicians' online on assessing their knowledge and practice on antibiotic prescription and resistance in their clinic settings. The physicians were asked to mark "yes", "no" or "do not know" to various questions. The questions were of multiple-choice type. However, physicians were provided a space to provide additional comments if any. After cleaning the data and coding the variables, the data were imported into SPSS for analysis. Descriptive statistics were reported with frequencies and their corresponding proportions.

3. Results

3.1. Sociodemographic characteristics of study participants

There was a total of 378 study participants, including physicians, in the study. Of the total 378, 48.15% were 25-34 years older, and about one-quarter (27.78%) were 35-44 years older. Most of the study participants (53.70%) were males, and 47.1% had completed their medical education and worked as physicians in various settings.

3.2. Knowledge of physicians about Antibiotic Resistance

Table 1 shows the responses to knowledge-related domains that were asked from physicians about antibiotic resistance. Around 93% of the physicians mentioned that they believe in the presence of drug resistance to bacteria in the local community. Similarly, 90.5% of the physicians mentioned that several infections are becoming increasingly resistant to treatment by antibiotics. It seems that a greater proportion of the physicians (85.2%) were aware of the fact that if the bacteria are resistant to antibiotics, it can be difficult or impossible to treat the infections they cause. However, only 77.5% of the physicians acknowledged that antibiotic resistance is an issue that could affect them or their families. Surprisingly, 33.9% of the physicians believe that antibiotic resistance is an issue in other countries but not here and 47.4% of them thought that antibiotic-resistant is only a problem for people who take antibiotics regularly. While asking the question on the spread of bacterial resistance from person to person, 71.2% mentioned that bacteria that are resistant to antibiotics can be spread from person to person. However, a reasonable proportion of the physicians (84.9%) mentioned that antibiotic-resistant infections could make medical procedures like surgery, organ transplants, and cancer treatment more dangerous.

Table (1) Knowledge of physicians about Antibiotic Resistance

Questions asked to assess knowledge	Frequency	%
Do you believe about the presence of "drug-resistant", "antibiotic-resistance bacteria" in the local community		
Yes	351	92.9
No	17	4.5
I Don't Know	10	2.6
Many infections are becoming increasingly resistant to treatment by antibiotic		
Yes	342	90.5
No	19	5
I Don't Know	17	4.5
If the bacteria are resistant to antibiotics, it can be difficult or impossible to treat the infections they cause		
Yes	322	85.2
No	34	9
I Don't Know	22	5.8
Antibiotic resistance is an issue that could affect me or my family		
Yes	293	77.5
No	40	10.6
I Don't Know	45	11.9
Antibiotic resistance is an issue in other countries but not here		
Yes	128	33.9
No	194	51.3
I Don't Know	56	14.8
Antibiotic resistance is only a problem for people who take antibiotics regularly		
Yes	179	47.4
No	164	43.4
I Don't Know	35	9.3
Bacteria that are resistant to an antibiotic can be spread from person to person		
Yes	269	71.2
No	58	15.3
I Don't Know	51	13.5
Antibiotic-resistant infections could make medical procedures like surgery, organ transplants, and cancer treatment more dangerous		
Yes	321	84.9
No	24	6.3
I Don't Know	33	8.7

3.3. The practice of physicians regarding Antibiotic Resistance

Table 2 shows the results of the practice of physicians regarding antibiotic resistance. It seems that 48.10% of the physicians see 15-30 patients per day on average and more than half of the physicians (52.38%) prescribe > 10 antibiotics per day. Almost half of the physicians prescribe antibiotics in the form of oral or topical or eye and ear drops. Additionally, the results illustrate that 71.70% of the physicians mentioned facing any case of antibiotic resistance in their practice. However, only 62.20% of the physicians mentioned antibiotic sensitivity testing "antibiotic susceptibility testing" in their clinic or hospital and 74.3% of the physicians mentioned building their choice of antibiotic type on antibiotic sensitivity testing as shown in Table 2 below.

Table (2) Practice of physicians regarding Antibiotic Resistance

Questions asked to assess practice and perceptions	Frequency	%
Numbers of patients seen per day (estimate)		
<15	109	28.84
15-30	183	48.10
>30	86	22.75
Numbers of antibiotics prescribed per day (estimate)	183	48.41
<10	20	5.29
<3	160	42.33
>10	198	52.38
Common antibiotic dosage forms which I prescribe		
Eye drops/Ear drops/Topical	23	6.08
Oral	166	43.92
Oral/Topical/Ear drops/Eye drops	189	50.00
Do you face any cases of antibiotic-resistant in your practice	**Frequency**	**%**
Yes	271	71.70
No	74	22.20
I do not know	23	6.10
Do you have Antibiotic sensitivity testing "antibiotic susceptibility testing" in your clinic or hospital		
Yes	235	62.20
No	114	30.20
I do not know	29	7.70
Do you build your choice of antibiotic type on Antibiotic sensitivity testing (if it is available)?		
Yes	281	74.30
No	65	17.20
I do not know	32	8.50

4. Discussion

This study was undertaken to assess the knowledge and practice of physicians about antibiotic resistance in their clinical settings while practicing in Riyadh Saudi Arabia. The results showed that a vast majority of the physicians considered antibiotic resistance as a matter of concern in their community and a greater proportion of the physicians also acknowledged that infections are becoming resistant to the treatment by bacteria. Similarly, a larger proportion of physicians were aware of the fact that antibiotic-resistant infections could make medical procedures like surgery, organ transplants, and cancer treatment more dangerous. However, surprisingly only one-third of the physicians acknowledged that antibiotic resistance is an issue in other countries but not Saudi Arabia. This was in contrast with their practice where they see 72% of the patients with antibiotic resistance. Similarly, less than half of the physicians mentioned that antibiotic resistance is only a matter of concern for those who take antibiotics regularly. It seems that not all physicians had access to antibiotic sensitivity testing in their clinic and three-fourths of the physicians showed a willingness to build the choice of antibiotic type on antibiotic sensitivity testing (if it is available).

The findings regarding knowledge of antibiotic resistance are in contrast to a similar study

conducted in Saudi Arabia where only 32% of the study participants were aware of antibiotic resistance or drug-resistant bacteria. This huge difference may be because of the difference in the type of study participants because our sample comprised physicians whereas the study by Kurdi et al. (2020) was conducted on Saudi residents[18]. The higher level of knowledge about antibiotic resistance could be because of the education level and medical background of the study participants. This explanation of the correlation between a higher level of education and knowledge about antibiotic resistance is confirmed by one study conducted in South India[19]. The authors of that study showed that individuals with medical backgrounds and good education are usually aware of antibiotic resistance. These findings were also confirmed by one more study in Saudi Arabid where authors found a significant relationship between the level of education and knowledge about antibiotic resistance[18].

Moreover, the findings regarding underestimation of the antibiotic resistance by physicians in Saudi Arabia is consistent with other studies as well. For example, in previous studies, most of the respondents considered antibiotic resistance not a problem for their institutions or settings [20, 21]. A study conducted among students in India showed that despite higher knowledge of students regarding antibiotic resistance, the students did not consider antimicrobial resistance as a significant concern for their institution[19]. Such behavior and overconfidence may lead to increased resistance in the future.

4.1 Strengths and Limitations

To the best of our knowledge, this is the first study of its kind that assessed knowledge and practice regarding antibiotic resistance among physicians in Saudi Arabia. The response rate was almost 100% in our study, and we used questions to assess knowledge that have been used previously in similar studies. However, this was a cross-sectional study, and the findings of the study may not be generalizable to other settings because this study was conducted on a small sample of physicians in one region of Saudi Arabia. The sample was also not randomly drawn from the target population, therefore, every physician may not have equal chance to partake in the research and results need to be interpretated with caution. However, the study findings can generate hypotheses for future research and may guide researchers and policy makers to develop strategies to improve knowledge and practice of physicians in prescribing antibiotics and change their beliefs about antibiotic resistance in Saudi Arabia.

5. Conclusion

Despite its limitations, this study provides an important insight on knowledge about antibiotic resistance and practice of physicians to use antibiotics in their clinical settings. The knowledge of physicians regarding antibiotic resistance seems to be higher in Saudi Arabia after implementing the law against dispensing antibiotics without prescription. However, physicians' beliefs about antibiotic

resistance being not an issue for Saudi Arabia needs to be corrected as antibiotic resistance can be a problem for countries such as Saudi Arabia. Further, strategies such as continuous medical education need to be employed to ensure that physicians should be aware of antibiotic resistance and should realize that antibiotic resistance can be a problem for Saudi Arabia as well.

6. Declarations

6.1 Conflict of Interest Statement

The author has no conflict of interests to declare.

6.2 Funding Disclosure

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

6.3 Acknowledgment:

The author would like to thank the Deanship of Scientific Research at Shaqra University for supporting this work.

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