

Knowledge, Attitude and Practice (KAP) towards Resistance and use of Antibiotic among Veterinary Medicine and Healthcare Students in DhiQar Province / Iraq

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Abstract:

Antibiotics (ABs) constitute one of the most commonly prescribed medications in the world. Misuse and overuse of ABs are the main contributing causes to antibiotic (AB) resistance. It is expected that more than 50% of ABs are bought without a proper prescription. Identified self-medication with ABs as one type of excessive use leading to increased morbidity and mortality. Self-medication antibiotics assume particular significance for healthcare students since they are potential medical practitioners. The goal of this research is to assess the frequency of antibiotic self-medication among students in healthcare and their awareness and perception of AB use and its dangers. A pre-validated cross-sectional questionnaire was distributed among 255 healthcare students at DhiQar University, Iraq during February 2020, including medical, pharmacy, nursing, associate physician, dental, and veterinary medicine graduates. Antibiotic resistance has been called a bigger global problem than obesity, food safety, or climate change ($p < 0.001$). The majority of the participants (95 percent) thought AB resistance will be a challenge for their possible practice, but less (69 percent) thought the ABs they should administer, prescribe or dispense will lead to the issue. Twenty percent of the participants believed they had adequate information about the use of AB for their potential research. This exploratory study shows that students of animal and human health care are aware of the value of AB resistance yet there are still some misunderstandings on others. These could be resolved by promotions and enhanced educational programs applying methods of behavioral insights.

Keywords: antibiotic; antimicrobial; education; animal health; resistance; medical.

1. Introduction

Antimicrobial resistance is an important topic right now. Its threats were undervalued in many countries (Chen et al., 2005; Levy, 1998). This is recognized as a major health concern by the World Health Organization, which questions our ability to tackle diseases and demands immediate action (WHO, 2001). The abuse, misuse, and underuse of ABs contribute to problems of antimicrobial resistance globally (Okeke, et al., 2005). A 2014 study of antimicrobial resistance reported that the annual death rate due to the antimicrobial resistance was 700,000 and that the figure could grow to 10 million by 2050 if no steps are taken to minimize the improper use of ABs (O'Neill, 2014).

In numerous studies, the use of an extra dose of antibiotics may lead to the production of resistant bacteria and decrease oral flora's ability to resist colonization of harmful micro-organisms, leading to multi-resistance bacterial superinfections (Okeke, 2009; WHO, 2004). The second- or even third-line ABs in particular, which are very costly, may be needed and conduce prolonged hospitalization and further side effects (Sawair et al., 2009; WHO, 2014; Burroughs et al., 2003).

Furthermore, misuse of ABs when treating viral diseases is widespread and the incidence of self-medication in developed countries is alarmingly high (Levy, 1998; WHO, 2001; Okeke, et al., 2005). Studies in Iraq, Jordan, Palestine, India, and China find that the excessive use of antibiotics by students has deteriorated antibiotic resistance due to lack of awareness, attitude, and practice (Darwish *et al.*, 2014; Mahmood *et al.*, 2019; Mikhael *et al.*, 2019; Al-Yasseri & Hussain 2019; Sawalha, 2008; Suaifan *et al.*, 2012; Huang *et al.*, 2013; Ganesh & Sridevi, 2014). Iraq is classified as a third nation country and far behind the antimicrobial resistance robust governance. The ABs may be offered by staff with no qualifications. People can buy antibiotics quickly, without a prescription, at any pharmacy. The lack of adequate regulatory bodies and institutional control systems has led Iraq to use antibiotics irrationally and improperly (Darwish *et al.*, 2019; Mahmood *et al.*, 2019; Mikhael *et al.*, 2019). There is little evidence in Iraq concerning antibiotic resistance. Latest reports of acute respiratory diseases have shown that over half of the cases examined were immune to first-line antibiotics (Darwish *et al.*, 2014; Mahmood *et al.*, 2019; Mikhael *et al.*, 2019; Al-Yasseri & Hussain 2019).

The National Action Plan for antimicrobial containment 2019 was released based on recommendations from the WHO and promising to lead efforts in a coordinated attempt to tackle urgent and severe drug-resistant problems affecting people (MOH & WHO, 2019). The initiative has described the excessive use of antibiotics as one of the focal points for countering AB resistance and very few works have been carried out on this topic in Iraq. Al-Yasseri & Hussain (2019) emphasized the need for more research among healthcare professionals to improve Iraq's curriculum on antibiotic use and self-medication (Mikhael *et al.*, 2019).

Fewer issues are centered on students in medicine and non-medicine, given the fact that their awareness, attitude, and conduct about antibiotic use has a significant effect on the antibiotic-related consequences.

Until now, there have been only a few studies among nursing and dental students in Iraq (Darwish *et al.*, 2014; Mahmood *et al.*, 2019). This study aims to evaluate the knowledge, attitude, and practice (KAP) linked with the use and resistance of the antibiotic among the healthcare students at Dhi Qar University, Iraq.

2. Methods

This cross-sectional study was conducted using a questionnaire among healthcare students from human and animal health classes of Dhi Qar University and The College of Veterinary Medicine in Shatrah, located in Dhi Qar Governorate, Southern Iraq. The survey was conducted by filling out the questionnaire by students on various courses in human or animal health. The research was conducted in February 2020 voluntarily.

The authors designed the survey questionnaire with the help of previous studies on the subject. Including details perceptions and AB use, tolerance, and understanding of antimicrobials, the survey contains 19 questions, Tables 1, 2, 3.

Table 1. Questions on the knowledge of AB use and resistance.

1	How important do you think the following challenges are in the world today? the scale of 1 [not important]											
		1	2	3	4	5	6	7	8	9	10	
	Climate change											
	Food security											
	Antibiotic resistance											
	Gender inequality											
	Obesity											
2	Are the following statements true or false?											
		True			False			I don't know				
	AB kills both bad and good bacteria.											
	Ab kills viruses.											
	Abisactive against colds.											
	Overuse of ABs makes them unsuccessful.											
	ABs have side effects for instance diarrhea.											
	Bacteria can develop resistant ABs.											
	People can develop resistance to ABs.											
Animals can develop resistance to ABs.												
A treated lamb with ABs can be slaughtered the next day.												
3	Where are most 3 ABs in human healthcare used?											
4	What are the types of the following drugs?											
		Antibiotic			Anti-inflammatory			Other				
	Amoxicillin											
	Simvastatin											
	Thyroxine											
	Cephadrine											
	Aspirin											
	Erythromycin											
	Ibuprofen											
5	How many people die each year from resistant bacterial infections?											
6	How many deaths are predicted worldwide by 2050 as a result of AB resistance if current patterns continue?											
7	Which is the distinction between Antimicrobials and Antibiotics?(Select one)											
	ABs are drugs that destroy bacteria, while antimicrobials destroy viruses, fungi, or bacteria											
	Natural compounds and not organic compounds are often referred to as ABs.											
	An AB and an antimicrobial don't vary.											
	I don't know											
8	Have you ever heard of antimicrobial stewardship or the word 'antibiotic stewardship'? Yes or no											
9	Have you heard of a proposal to use antimicrobials safely in veterinary practice? Yes or No											
10	What of those is NOT effective in preventing resistant species from spreading? (Pick one)											
	a. Clean hygienic hands.											
	b. Treatment of pathogens for longer periods to prevent resistance.											
	c. Isolation of patients that have colonized resistant species like MRSA.											
	d. Eviting the use of ABs to treat colds and flu.											
	e. Take up the flu vaccine.											
11	Could bacteria which are antimicrobial-resistant spread to humans? Yes or no											
	a. Contact anyone with an AB-resistant infection											
	b. Contact someone who is getting an AB-resistant infection.											
	c. Touch live bacteria resistant to ABs from milk, food, or water											
12	What is the safest way to disinfect your hands to avoid bacteria from spreading? (select one)											
	a. Rinse with hot water											
	b. Use the sanitizing gel/foam											
	c. Wash well with soap and water											
	d. Using gloves											

Table 2. Questions on the practice of AB use and resistance.

17	Have you taken some antibiotics in the last 12 months?	Yes	No
18	How did you get the last course of ABs you have used?		
19	What subjects would you like more details on? (put a mark)		
	a. How to use ABs.		
	b. Resistance to ABs.		
	c. Medical situations for which ABs are used.		
	d. Prescription of ABs.		
	e. Relationship between the environment and the health.		

Table 3. Questions on the attitude of AB use and resistance.

13	Which of these are important to AB resistance?	Very Important	Important	Not Important	Unsure						
	a. Many ABs prescriptions.										
	b. Broad-spectrum ABs use.										
	c. Long period of ABs treatment.										
	d. Dosing of ABs too low.										
	e. AB in food production.										
	e. Wide use of AB in food production										
	f. Poor infection control.										
	g. Pay attention to advertising										
h. Awareness of AB resistance											
14	Are you agree or disagree with these?	Strong disagree	disagree	unsure	agree	S. agree					
	The resistant bacteria spread easily persons										
	Coughs and colds get better without ABs										
	Healthy people can carry resistant bacteria										
	Biosecurity is important in food production										
	When there is poor biosecurity, I use antibiotics										
15	Answer each of the following questions: (Yes- No- Unsure)			Yes	No	Unsure					
	a. Is prescribing inappropriate antibiotics unethical?										
	b. Do you think we have enough antibiotics?										
	c. Do you think the opposition to AB is a national issue?										
	d. Is AB resistance going to bean problem to your future practice?										
	e. Do you think that AB resistance will be a future problem?										
	a. Is the AB you will prescribe will increase the problem?										
	g. Do you feel you have the knowledge on AB use for the future?										
16	How important do you think resistance is as a problem among these microbes: scale 1 [not important]										
		1	2	3	4	5	6	7	8	9	10
	Bacteria (excluding tuberculosis)										
	Tuberculosis										
	Fungi										
	Virus										

It excluded the individual answers in which less than half of the questions had been answered by students. Aside from questions regarding the supposed importance of resistance to AB and personal use, there was only a sub- of responses examined to restrict the attendance of particular university courses from which 10 replies were obtained. All tests were conducted with descriptive and inferential statistics by (Microsoft Excel 2016 (Microsoft Inc., Redmond, WA, USA), (T-tests). Stats shall be presented by a form of course in health and by rank (1st and 2nd or 3rd year or above) of students in their respective grades.

3. Results and Discussion

3.1. The participants' students

Two hundred and fifty-five students from DhiQar University and The College of Veterinary Medicine in Shatrah participated. The categories of courses included, nursing (two students), associate physician (3), dentistry (11), medicine (12), veterinary medicine (71), and pharmacy (156)

Responses were given for all students on (a) the apparent value of AB resistance, and (b) personal AB use.

There was also an analysis of a sub-set of responses limited to particular colleges' replies, which contained [10] responses.

This group included 210 students from six DhiQar University colleges, 3 (134 undergraduate students), 2 (65), and one (11); the number of responses to each question varied slightly, as all students did not respond to all of the questions.

3.2. Individual use of ABs

Approximately one third (86/242) of the students took oral antibiotics in the previous 12 months. Among those, three bought antibiotics, one from a random seller, and one from a prior stock from friends or relatives.

3.3. Knowledge and understanding of ABs and resistance to ABs

Most students agreed that ABs destroy all commensal and pathogenic bacteria (88%) and that over-use of ABs is less effective (96%). So few (1%) thought ABs had viruses destroyed. The majority of students (92 percent) accepted that most coughs, colds, and sore throats were safer alone without AB, but 25 percent of dentistry students still believed ABs were successful in combating colds.

Most students agreed that bacteria could be immune to AB, but many still believed that humans or animals were immune.

Table 4. Knowledge of what can become immune to ABs among the students.

Statement	Agree (%)					
	All Students (n = 165)	Veterinary (n = 53)	Pharmacy (n = 104)	Dentistry (n = 8)	≥3rd Year (n = 97)	<3 Year (n = 68)
Bacteria can be resistant to ABs	100%	100%	100%	100%	100%	100%
Humans can be resistant to ABs	41%	28%	48%	25%	37%	46%
Animals can be resistant to ABs	44%	34%	50%	25%	39%	51%

Students regard resistance to ABs as a global problem (mean 9.0) more significant than climate change (8.4) (mean 9.0), obesity (8.0), food health (7.7), and gender disparity (7.3), with all comparisons $p < 0.001$.

The students in all courses reported various important factors contributing to resistance, including over-requirements for AB (100%), insufficient use of ABs in animal husbandry and food processing (98%), insufficient infection prevention and control practices (96%), inappropriate AB (83%), and long-term care for AB (75%).

3.4. Activities to address ABs resistance

Forty-four percent of the students heard about antimicrobial stewardship or AB stewardship. Students were more likely to have experienced the concept in their 3rd or later years of study than early years in their classes (61% vs. 18%, $p < 0.01$). Sixty-six percent of veterinarians had already learned of a 7-point program to use antimicrobials safely in the veterinary practice.

Nearly (95 percent) of the students thought, it was morally wrong to recommend, distribute, or manage ineffective or excessive ABs. Though most of the students (95 percent) thought the concern will be with AB resistance, and less of the ABs that could be prescribed, administered, or discarded were (69 percent) likely to contribute to AB resistance.

3.5. Further Education is required

Just a quarter of the students believed that their potential clinical practices had adequate knowledge of antibiotic use. In their third or subsequent year of study (28% versus 11%, $p < 0.05$) students were more likely to report having adequate knowledge.

Table 5 shows the chosen topics on which more information is required by the students.

Table 5. Topics that students in healthcare want further information on.

Topic	Want Further Information (%)			
	All Students (n = 204)	Veterinary (n = 62)	Pharmacy (n = 132)	Dentistry (n = 10)
Use the ABs	25%	11%	33%	20%
Abs resistant	63%	47%	70%	80%
ABs prescription	45%	27%	54%	30%
Animals and the environment	49%	69%	42%	10%

This research examined the knowledge, behaviors, and activities of students about the use and resistance of ABs. It is the first study to take classes in surgery, dentistry, nursing, medicine, and veterinary studies simultaneously, to our knowledge.

For instance, most students want more AB training (Minen et al. 2010; Ahmad et al., 2015; Justo et al., 2014; Dyer et al., 2014). Some findings have been similar to previous studies of medical and pharmacy students.

This will highlight some of the more creative findings in this review segment and those that are particularly relevant for awareness and education programs in medical courses.

3.6 The Importance of ABs Resistance

Studying AB resistance is a more critical global problem than other main problems, including climate change, obesity, and food insecurity; students across courses have consistently argued in this research. The problem was posed at the outset to mitigate partiality based on subsequent concerns while participating students would realize that the survey included AB resistance.

We conclude that recent efforts to sensitize people to the use of AB resistance have potentially affected the prioritization of antibiotic resistance among the students; however, there are no previous studies that would require direct comparison.

The World Health Day 2011 was the subject of worldwide antimicrobial resistance, with

AB resistance among the top three public health challenges by the World Health Organization (WHO, 2017). Since then, several high-level attempts have been made to combat antibiotic resistance, including public education drives by the Iraqi public health (MOH & WHO 2019), and effort that helps healthcare professionals more.

3.7 What can become resistant to ABs?

Almost all students have recognized that overuse of ABs decreases their effectiveness and that bacteria in line with high AB-resistance know-how can become resistant to ABs.

Ironically, nearly half of the dentistry, pharmacy and veterinary students involved believed that humans and animals could be immune to ABs. Previous works have found growing possible biases in the general population (Ewaid et al., 2020; Shallcross & Davies 2015), in their early pre-clinical years, students may have simple convictions common to the general population and find that their convictions had declined significantly in later phases of their course.

It is not clear if these are opinions that ABs have straight effects on human and animal cells that make these cells resistant; instead, students can express the idea that humans or animals may appear to be resistant to treatment with certain ABs by harboring resistant bacteria to this Abs (E.g., commensal bacteria that can become pathogenic).

Considering the key role medical professionals play in their daily contact with the general public, all students must understand and be able to relate these basic concepts, such as the fact that people are not resistant to ABs themselves.

As predicted, students who were later in their courses learned AB stewardship more likely. Nevertheless, during the training course, many AB stewardship principles can be applied and repeated exposure can enhance understanding (O'Neill, 2014; André et al., 2010). The BVA 7-Point system is ideally well known to two-thirds of veterinary students, but this arrangement is not typically aimed at those in the lower years. A previous study (Abed et al., 2019 & Gyssens 2013) highlighted that while AB stewardship education is offered to human health care and veterinary students, it is recommended that this teaching be standardized, which is confirmed by the findings of this survey.

Besides, the number of hours spent teaching AB stewardship in the courses is small (17.75 hours for medical courses, 15.5 hours for veterinary, 12 hours for pharmacy, 10 hours for nursing, and 8.5 hours for dentistry courses) (WHO, 2014).

This experiment indicates there is a need to establish prospectuses that discuss the essential concepts of stewardship methodically. Given that all public health professionals have unique and complementary positions in antimicrobial stewardship, inter-professional training provides a great opportunity.

MacDougall et al. recently created a curriculum incorporating an online learning platform with a laboratory for pre-clinical and pharmacy students and supported by both faculty (Castro-Sánchez et al., 2016). Students who completed the program had strengthened antibiotic resistance skills and attitudes; even more significantly, they had also developed attitudes towards interprofessional education and association.

Also in the later years of their classes, most students assumed that they needed further knowledge about AB use and resistance for their possible medical practices. The majority of students in dentistry and pharmacy needed more knowledge about AB resistance (80% and 70% respectively). Nevertheless, knowledge on the connections between human health, animals and the environment (69% vs. 10% and 42% respectively) was less favorable than veterinary medicine students, although it is becoming increasingly evident that One Health approach is key to combating AB resistance (MacDougall et al., 2017; Ewaid et al., 2020, 2013; Shallcross & Davies 2015).

Students in the human healthcare field may lack awareness and understanding about the part of animal welfare in human health, or they may simply view this as less important to most of their research.

3.8 Limitations of the study

This is a primarily exploratory analysis of prospective health care practitioners taking a variety of healthcare courses in the province of DhiQar. The main disadvantage is that only a small proportion of the participated students in a small number of colleges, and therefore most analyzes had to be limited to students on six courses.

While statistics on the number of qualified students at participated institutions are not available, discrepancies in participation are possibly attributable to how the survey was promoted on various courses. Despite these limitations, we were able to recognize some of the key gaps in knowledge among the students taking part in the study.

Besides, the pilot methodology should be beneficial for notifying future research, including the survey instrument created. These studies could be aimed at making connections between courses and generating more generalizable outcomes, so many participating colleges and many of the students within each college will be expected.

4. Conclusions

This exploratory research shows that students across a wide variety of DhiQar healthcare courses are aware of AB resistance, and trust it is a worldwide problem that is highly important.

Some misunderstandings have been established, and that students feel a need for more training. Campaigns like the Week of the World Antibiotic Awareness lift the outline of The topic has a crucial role to play in the effort to provide this extra education for students and healthcare professionals. Additionally, inter-professional learning methods within colleges are an advanced means of enhancing thematic knowledge and interdisciplinary collaboration skills.

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