

Original article

Experience of Antibiotic Use and Resistance Among Pharmacy Students in the University of Kerbala

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Received: 17-4-2019
Revised: 2-6-2019
Published: 31-7-2019

Keywords:

*Antibiotic use,
Antibiotic resistance,
Pharmacy students*

Abstract: Introduction: Antibiotic resistance occurs when bacteria develop the ability to defeat the drugs designed to kill them. Antibiotics dispensing without prescription, misuse of antibiotics are considered as a major cause of antibiotic resistance. Antimicrobial resistance causes extra health care cost and leads to loss of productivity; also patients with resistant infections are more expensive and difficult to treat. Many strategies and steps can be taken at all levels of society to reduce the impact and limit the spread of resistance. The pharmacist has effective role in averting antibiotic resistance. Methodology: A questioner form was designed to assess student's knowledge, attitude and perception about antibiotic use and resistance, 146 pharmacy students from the fourth stage and fifth stage in the University of Kerbala, were selected randomly. Result: A total number of 146 students, (70 from the fourth stage and 76 from the fifth stage) were participated in this study of both sexes (30 male: 116 female). About 82% of students understand what the antibiotic resistance term mean. 87% of students knew that antibiotics shouldn't be used for common cold. 84% of students did not stop taking antibiotics until taken all of the antibiotics as directed. 34% of students usually consult a doctor before starting an antibiotic. Less than 23% of students did not stop taking antibiotic when any side effect appears. Conclusion: Based on results obtained in this study that done in Kerbala University / College of Pharmacy it has been concluded that students were of high level in knowledge and perception about antibiotics use and resistance, but the students were of lower level in attitudes, lower percent of student have good attitude toward antibiotics use.

Cite this article as: Sahib, A.S., Abbas, S., Hasson, K and Mahmoud, M. (2019) Experience of Antibiotic Use and Resistance Among Pharmacy Students in the University of Kerbala. *Journal of basic and applied Research in Biomedicine*, 5(1): 21-30



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INTRODUCTION

Antibiotics and similar drugs are together called antimicrobial agents that have been used for the last 70 years to treat patients who have infectious diseases. Since the 1940s, these drugs have efficiently reduced illness and death from infectious diseases. These drugs have been widely used, making microbes adapt to the antibiotics that are designed to kill these microbes, thus reducing the effectiveness of these drugs (CDC, 2018). Today, almost all important bacterial infections in the United States and throughout the world are becoming resistant to antibiotics (FDA, 2018; Tarawneh et al., 2011; Qaralleh et al., 2010; Majali et al., 2015; Khleifat et al., 2019). Antibiotic resistance occurs when bacteria become resistant to antibacterial drugs that are used for treating the infections they cause. Several studies revealed that no significant variation between gram-negative and gram positive bacterial susceptibility beyond a duration of 24 h, however, later to 48 h of incubation, the gram negative bacteria was more

susceptible than gram positive (Qaralleh et al., 2009). These differences in susceptibility between bacteria related to the outer membrane of gram negative bacteria which bestows the bacterial surface with strong hydrophilicity and acts as a strong permeability barrier. Every time antimicrobial agents are used, it diminishes the effectiveness for all users, because its usage increases the possibility for the bacteria to become resistant (Abboud et al., 2009; WHO, 2018).

Causes of antibiotic resistance

Antibiotic resistance is mainly driven by inappropriate use. Global antibiotic usage in humans has increased by 36% between 2000 and 2010. Half of this increased use is regarded as unnecessary, e.g. when antibiotics are used to treat diseases like common colds that are caused by viruses, where antibiotics have no effect. In many countries, antibiotics can be bought from pharmacy without prescription or do not have underlying standard treatment guidelines. Misuse of

antibiotics, without culture and sensitivity test, use of sub lethal dose, wrong indication also causes antibiotic resistance (Qaralleh, 2018; WHO, 2018).

Development of antibiotic resistance

Resistant bacteria can be transmitted to people through various channels such as the food chain, animal-to-human contact, and the environment. Globalization fuels the spread of antimicrobial resistance where transmission is facilitated by increased trade, travel and both human and animal migration. Travelers often carry home resistant bacteria from holidays or business trips (WHO, 2018).

The danger of antibiotic resistance

Antibiotic resistance affects high, low and middle-income countries. There is particular disease that has higher rates of antimicrobial resistance such as tuberculosis and gonorrhoea, for example a Nevada woman dies from a bacterial infection resistant to all 26 antibiotics available in the United States (IDSA, 2018).

Economic impact of antibiotic resistance

Antimicrobial resistance causes extra health care cost and leads to loss of productivity. Patients with resistant infections are more expensive and difficult to treat and are more likely to require longer hospitalization than patients infected with drug susceptible strains (WHO, 2018).

Strategies to combat antibiotic resistance

Strategies and steps can be taken at all levels of society to reduce the impact and limit the spread of resistance, for example CDC recommends 12 steps to prevent antimicrobial resistance in a healthcare setting : 1.rational drug use, 2.infection control and prevention, 3.antimicrobial surveillance, 4.ban on OTC antibiotic and educate motivate, 5.research and development drug / vaccine and immunization coverage, 6.hand hygiene, 7.standard treatment guidelines, 8. new AMR programs, 9.AMR committee, 10.essential drug list, 11.national policy, 12.increased collaboration (Rajesh et.al.,2014).

The WHO suggest a global action plan on antibiotics resistance. In the May 2015, which outline five objectives: 1.increase awareness and understanding of antibiotics resistance through efficient communication, 2.education, training and strengthen the knowledge and evidence base through surveillance and research, 3. through effective sanitation minimize the incidence of infection,4. Optimize the use of antimicrobial agents in human and animal health, hygiene and infection prevention measures, 5.develop the economic case for sustainable investment that takes account of the needs of all countries around the world and to increase investment in new drugs,

vaccines, diagnostic tools, and other interventions. This action plan underscores the need for an effective “one health” approach involving coordination between international sectors and actors, including human and veterinary medicine, agriculture, finance, environment, and well-informed consumers. The action plan addresses the variable resources nations have to fight antimicrobial resistance and the economic factors that contribute to decrease in the development of replacement products by the industry of pharmaceuticals. WHO with the United Nations will work to tackle antimicrobial resistance at the political level. The strong collaboration with FAO and OIE will continue. A framework is being developed for monitoring and evaluating national activities. The objective is to have multisectoral national action plans in place by the 2017 World Health Assembly. Antibiotics resistance is a crisis that must be managed with the utmost urgency. As the world enters the aspirant new era of sustainable development (Khleifat et al., 2006; WHO, 2018).

The role of pharmacist in averting antibiotic resistance

In 2008, International Pharmaceutical Federation (FIP) published a revised statement on antimicrobial resistance (AMR) entitled, FIP Statement of policy - control of antimicrobial medicines resistance (AMR) , whereby FIP takes duty for the professional leadership through a range of activities. It Encourages pharmacists to: provide suitable counseling and appropriate written information when dispensing antibiotics, motivate patients to take the full prescribed regimen and, if not possible, to get rid of any unused antimicrobial agents appropriately, work with prescribers so that dosages prescribed are adequate for the accomplishment or continuation of a course of therapy, recommend therapies other than antibiotics for minor diseases, provide updated information on antibiotic agents to prescribers as well as health-care professionals who administer or influence the use of medicines, be actively involved in matters of infection control and hygiene in all health-care settings, effectively monitor the supply and use of antibiotic agents by their patients (WHO,2018) .

The aim of the study was to investigate the knowledge, attitude and perception of pharmacy students in the university of Kerbala toward usage and resistance of antibiotic in Iraqi society.

METHODOLOGY

This study was carried out on the pharmacy students in Kerbela University, Iraq; on 11 - October - 2018. The students asked about their knowledge, attitude and perception about antibiotics use and resistance. A questionnaire form (Appendix 1) was designed for this purpose depending on previous studies. The questionnaire

form consists of a demographic part beside 20 questions. The demographic part consists of a details of students (gender, age and stage). The students participate in this study were selected randomly and allocated to the following groups:

1. Group A: consists of 70 students from fourth stage.
2. Group B: consists of 76 students from fifth stage.

The questionnaire form was completed by students by mean of direct interview.

Statistical analysis: descriptive statistics was done using software package (Qaralleh et al., 2019), results represent percent of total, bar diagram was also done for each question.

RESULTS

Demographic data

A total number of 146 students were participated in this study; with age range (20-25 years) of both sexes (30 male: 116 female); the demographic data of study participants are summarized in table (1).

Table 1: details of participated students

Stage	n	Age (years)	Male / Female
Fourth	70	20 - 24	20 (28.57%): 50 (71.42%)
Fifth	76	21 - 25	10 (13.15): 66 (86.84%)

Knowledge about antibiotics use and resistance:

This part of the study covered the levels of knowledge of the students about the antibiotic use and resistance.

Higher proportion knew that antibiotics are medicines that help to fight bacteria 44(62.85%) for 4th stage ,44(57.89%) for 5th stage compared with other students who thought that antibiotics are effective to fight all microbes 26(37.14%) for 4th stage, 32(42.10%) for 5th stage; while zero percent respondents from each stage thought that antibiotics are effective to treat virus.

Table 2: Respondents' knowledge about antibiotics resistance

Question		4 th stage	5 th stage
1. Antibiotics are powerful medicines that help to fight:	a. viruses	0 (0%)	0 (0%)
	b. bacteria	44 (62.85%)	44 (57.89%)
	c. all microbes	26 (37.14%)	32 (42.10%)
2. What is antibiotic resistance?	a. Antibiotic resistance occurs when bacteria develop the ability to defeat the drugs designed to kill them	55 (78.57%)	65 (85.52%)
	b. Antibiotic resistance occurs when your body becomes resistant to antibiotics and they no longer work as well	10 (14.28%)	9 (11.84%)
	c. Antibiotic resistance occurs when antibiotics have the ability to effectively control or kill bacterial growth	5 (7.14%)	2 (2.63%)
3. Misuse of antibiotics resistance can lead to antibiotic	a. Agree	63 (90%)	66 (86.84%)
	b. Disagree	1 (1.42%)	5 (7.89%)
	c. Neither agree nor disagree	6 (8.57%)	4 (5.26%)
4. Common cold and flu should always be treated with antibiotics as this will make the patient recover more quickly?	a. True	10 (14.28%)	8 (10.52%)
	b. False	60 (85.71%)	68 (89.47%)
5. When I get fever, antibiotics help me to get better more quickly?	a. True	29 (41.42%)	12 (15.78%)
	b. False	41 (58.71%)	64 (84.21%)
6. If taken too often, antibiotics are less likely to work in the future?	a. True	63 (90%)	63 (82.89%)
	b. False	7 (10%)	13 (17.10%)
7. Do you think that new generation antibiotic is more efficient?	a. Yes	70 (100%)	70 (92.10%)
	b. No	0 (0%)	6 (7.89%)

Results represented as percent of total

Table 3: Respondents' attitude about antibiotics resistance are summarized in (table 3.3)

Question				4 th stage	5 th stage
1. When do you think you should stop taking antibiotics once you've begun treatment?	a. When you feel better			3 (4.28%)	5 (6.57%)
	b. When you've taken all of the antibiotics as directed			60 (85.71%)	63 (82.89%)
	c. Don't know			7 (10%)	8 (10.52%)
2. Do you read the leaflet of antibiotic before taken it?	a. Yes			54 (77.14%)	45 (59.21%)
	b. No			16 (22.85%)	31 (40.78%)
3. when I have a sore throat I prefer to use an antibiotic?	a. Agree			36 (51.42%)	24 (31.57%)
	b. Disagree			6 (8.57%)	30 (39.47%)
	c. Neither agree nor disagree			28 (40%)	22 (28.94%)
4. It is okay to stop taking antibiotic when symptoms are improving even before the dose completed?	a. Agree			4 (5.71%)	3 (3.94%)
	b. Disagree			62 (88.67%)	73 (96.05%)
	c. Neither agree nor disagree			4 (5.71%)	0 (0%)
5. Skipping one or two doses does not contribute to the development of antibiotic resistance?	a. Agree			23 (32.85%)	26 (34.21%)
	b. Disagree			39 (55.71%)	41 (53.94%)
	c. Neither agree nor disagree			8 (11.42%)	9 (11.84%)
6. Prescribing broad-spectrum antimicrobials when equally effective narrower spectrum antimicrobials are available increases antimicrobial resistance?	a. Agree			51 (77.85%)	57 (75%)
	b. Disagree			11 (15.71%)	10 (13.15%)
	c. Neither agree nor disagree			8 (11.4%)	9 (11.84%)
7. Do you consult a doctor before starting an antibiotic?	a. Usually			24 (34.28%)	26 (34.21%)
	b. Sometimes			42 (60%)	46 (60.52%)
	c. Never			4 (5.71%)	4 (5.26%)
8. Do you check expiry date of antibiotic before using it?	a. Usually			59 (84.28%)	65 (85.52%)
	b. Sometimes			11 (15.71%)	11 (14.47%)
	c. Never			0 (0%)	0 (0%)

The highest proportion of respondent 55(78.57%) for 4th stage, 65(85.52%) for 5th stage knew that Antibiotic resistance occurs when bacteria develop the ability to defeat the drugs designed to kill them; while 10(14.28%) for 4th stage, 9(11.84%) for 5th stage thought that Antibiotic resistance occurs when the body becomes resistant to antibiotics and they no longer work as well and the lowest proportion 5(7.14%) for 4th stage, 2(2.63%) for 5th stage of respondents thought that antibiotic resistance occurs when an antibiotics have the ability to effectively control or kill bacteria.

The majority of respondent 63(90%) for 4th stage, 66 (86.84%) for 5th stage realized that misuse of antibiotics can lead to antibiotic resistance; while 1(1.42%) for 4th stage, 6(7.89%) for 5th stage disagreed and 6(8.57%) for 4th stage, 4 (5.26%) for 5th stage neither agreed nor disagreed.

The majority of respondents knew that Common cold and flu shouldn't always be treated with antibiotics 60(85.71%) for 4th stage, 68(89.47%) for 5th stage; while 10(14.28%) for 4th stage, 8 (10.52%) for 5th stage thought common cold and flu should always be treated with antibiotics as this will make the patient recover more quickly.

Some of respondents 29(41.42%) for 4th stage, 12(15.78%) for 5th stage incorrectly believed that when they get fever, antibiotics help them to get better more quickly; while 41(58.71%) for 4th stage, 64(84.21%) for 5th stage didn't.

Higher proportion of respondents 63(90%) for 4th stage, 63(82.89%) for 5th stage knew that antibiotics If taken too often are less likely to work in the future; while 7(10%) for 4th stage, 13(17.10%) for 5th stage didn't know.

In the question (Do you think that new generation antibiotic is more efficient?) about 70(100%) for 4th stage, 70(92.10%) for 5th stage of respondents answered the question as yes and 0(0%) for 4th stage ,6(7.89%) for 5th stage answered the question as no.

Attitude:

The second part of the study important to determine the attitude of the students about the antibiotic use and resistance.

Result represented as percent of total

The majority of respondents 60(85.71%) for 4th stage, and 63(82.89%) for 5th stage reported that they would stop taking antibiotics once they've begun treatment When they've taken all of the antibiotics as directed; while 3(4.28%) for 4th stage ,5(6.57%) for 5th stage stop taking antibiotics when they feel better beside that 7(10%)4th stage ,8(10.52) 5th stage didn't know.

More than the half of respondents 54 (77.14%) for 4th stage, 45 (59.21%) for 5th stage read the leaflet of antibiotic before taken it; while 16 (22.85%) for 4th stage, 31 (40.78%) for 5th stage do not.

Some of respondents 36 (51.42%) for 4th stage, 24 (31.57%) for 5th stage of agreed that antibiotics are useful treatment for sore throat; while 6 (8.57%) for 4th stage, 30 (39.47%) for 5th stage disagreed and 28 (40%)4th stage, 22 (28.94%)5th stage neither agreed nor disagreed.

Small proportion 4 (5.71%) for 4th stage, 3 (3.94%) for 5th stage agreed that It is ok to stop taking antibiotic when symptoms are improving even before the dose completed; while 62 (88.67%) for 4th stage, 73 (96.05%) for 5th stage disagreed and 4 (5.71%) for 4th stage, 0 (0%) for 5th stage neither agreed nor disagreed.

More than half the respondents 39 (55.71%) for 4th stage, 41 (53.94%) for 5th stage disagreed that Skipping one or two doses does not contribute to the development of antibiotic resistance; while 23 (32.85%) for 4th stage, 26 (34.21%) for 5th stage agreed and 8 (11.42%) for 4th stage, 9 (11.84%) for 5th stage neither agreed nor disagreed.

higher proportion of the respondents 51 (77.85%) for 4th stage, 57 (75%) for 5th stage agreed that Prescribing broad-spectrum antimicrobials when equally effective narrower spectrum antimicrobials are available increases antimicrobial resistance; while 11 (15.71%) for 4th stage,10 (13.15%) for 5th stage disagreed and the lowest proportion 8 (11.4%) for 4th stage, 9 (11.84%) for 5th stage neither agreed nor disagreed.

The Highest proportion of respondents 42 (60%) for 4th stage, 46 (60.52%) for 5th stage reported that Sometimes they consult a doctor before starting an antibiotic and 24 (34.28%) for 4th stage, 26 (34.21%) for 5th stage reported that they usually consult a doctor before starting an antibiotic; while

4 (5.71%) for 4th stage,4 (5.26%) for 5th stage never consult a doctor.

The question (Do you check expiry date of antibiotic before using it?) the majority of respondents 59 (84.28%) for 4th stage, 65 (85.52%) for 5th stage answer the question as Usually and 11 (15.71%) for 4th stage, 11 (14.47%) for 5th stage answer the question as sometimes; while zero percent respondents answer the question as never.

Perception:

The third part of the study covers the pharmacy student's perception about antibiotics use and resistance.

Table 4: Respondents' perception about antibiotics resistance

Question		4 th stage	5 th stage
1. Is it matter for you to take antibiotic before or after food?	a. Yes	64 (91.42%)	66 (86.84%)
	b. No	6 (8.57%)	10 (13.15%)
2. Do you stop antibiotic when any side effect will appear?	a. Yes	54 (77.14%)	62 (81.57%)
	b. No	16 (22.85%)	14 (18.42%)
3. Antibiotic resistance is an important and serious	a. True	68 (97.14%)	75 (98.68%)
	b. False	2 (2.85%)	1 (1.31%)
4. Antibiotic resistance is an issue that could affect me or my family or society?	a. True	68 (97.14%)	70 (92.10%)
	b. False	2 (2.85%)	6 (7.89%)
5. Do you think this statement is "true " or "false " (It's okay to use antibiotics that were given to a friend or family ember, as long as they were used to treat the same illness)?	a. True	8 (11.42%)	9 (11.84%)
	b. False	62 (88.57%)	67 (88.15%)

Result represented as percent of total

The question (Is it matter for you to take antibiotic before or after food?), the majority of respondents 64(91.42%) of 4th stage, 66 (86.84%) of 5th stage answer the question as yes and only 6 (8.57%) of 4th stage, 10 (13.15%) of 5th stage answer the question as no.

The majority of respondents 54 (77.14%) of 4th stage, 62 (81.57%) of 5th stage reported that they

stop antibiotic when any side effect will appear and 16 (22.85%) of 4th stage, 14 (18.42%) of 5th stage do not.

Concerning the statement (Antibiotic resistance is an important and serious public health issue facing the world) 68 (97.14%) of 4th stage, 75 (98.68%) of 5th stage respondents thought its true and 2 (2.85%) of 4th stage, 1 (1.31%) of 5th stage thought its false.

Regarding the statement (Antibiotic resistance is an issue that could affect me or my family or society) 68 (97.14%) of 4th stage, 70 (92.10%) of 5th stage respondents answered the question as true and 2 (2.85%) of 4th stage, 6 (7.89%) of 5th stage respondents answered the question as false.

For the statement (It's okay to use antibiotics that were given to a friend or family member, as long as they were used to treat the same illness) 8 (11.42%) of 4th stage, 9 (11.84%) of 5th stage respondents thought it is true and 62 (88.57%) of 4th stage, 67 (88.15%) of 5th stage respondents thought it is false.

DISCUSSION

The strength of this study is that it addresses a major universal issue of antibiotic use and resistance. This study was taken place for examining the knowledge, attitude and perception about the antibiotic use and resistance among Iraqi undergraduate fourth year and fifth year pharmacy students in Kerbala University, using prepared questionnaire form.

A total number of 146 students were participated in this study of both sexes (30 male: 116 female) with higher number of female because the total number of female in both stages higher than males

Knowledge

The question (Antibiotics are powerful medicines that help to fight :) just over half of respondents chose the answer bacteria; while zero percent respondents from each stage thought that antibiotics are effective to treat viruses, the correct answer for this question is bacteria because antibiotics, also known as antimicrobial drugs, are drugs that fight infections caused by bacteria in both humans and animals and they do not have any effect on viruses (CDC,2019), student chose the answer (all microbes) may be because they do not understand the difference between antimicrobial and antibiotic term because the antibiotics are compounds which are able to fight the bacteria. While the antimicrobial compounds can work against the different micro - organisms. Like protozoa, yeast, fungi, viruses, algae, and some worms (NCBI, 2019).

Concerning the question (What is antibiotic resistance?) more than (78%) of respondents chose the correct answer (antibiotic resistance occurs when bacteria develop the ability to defeat the

drugs designed to kill them); while less than (8%) of respondents chose the answer (antibiotic resistance occurs when an antibiotic have the ability to effectively control or kill bacterial growth). the majority of students answer the question correctly this is because the pharmacy students in the 4th and 5th stage already study microbiology so they accurately understand what meaning antibiotic resistance term.

For the question (Misuse of antibiotics can lead to antibiotic resistance) more than (86%) of students chose the correct answer agree. Approximately similar result reported in the survey that was done in Saudi Arabia on students of health science at Aljouf University, (72.3%) of respondents agreed (Ekremah et.al., 2016). One of the major causes behind the prevalence of resistance pattern among antibiotics is that people usually don't seek advice from any of the health care professional if they purchase antibiotics without prescription. As a result, it leads to antibiotics misuse. Other factor that may lead to antibiotic resistance is that most of the individuals don't follow complete course of antibiotics for a particular infection. It may be a prescribing error. It is the responsibility of health care professionals that they must counsel patients that for how much period of time they have to use antibiotics we think that the only solution to solve the antibiotics resistance is to spread medical awareness and by giving basic medical education among the individuals of different age group (Naveed et.al.,2016).

Regarding the question (Common cold and flu should always be treated with antibiotics as this will make the patient recover more quickly?) more than (85%) of students chose the correct answer false. The common cold is a viral illness for which the etiology can be shown for most cases i.e., rhinovirus. Antibiotic treatment is not necessary in otherwise healthy young adult with common cold (Padmanabha et.al.,2016). Rest, over-the-counter medicines, self-care methods and talking to the healthcare professional may help the patient feel better and there are steps the patient can take to help prevent getting a cold, including: hand hygiene and avoid close contact with people who have colds or other upper respiratory infections (CDC,2019).Survey was done in international Islamic university Malaysia on final year pharmacy and medical students, (95%) of participant's answer the question correctly, this reported result similar to our result (Shazia et.al.,2014).

In the question (When I get fever, antibiotics help me to get better more quickly?) (58.71%) for 4th stage, (84.21%) for 5th stage chose the correct answer false. Because a fever can indicate a serious illness in the body, especially young infant and might be admitted to the hospital for testing and treatment. For a low-grade fever, the doctor may not recommend treatment to lower the body

temperature. These minor fevers may even be helpful in reducing the number of microbes causing your illness (Mayo clinic,2019). Higher percentage of the 5th stage students answer the question correctly compared with the 4th stage students and this can be explained by knowing that the 5th stage students already study antibiotics in pharmacology while the 4th stage student did not. A study done in trended and Tobago on pharmacy students, (16.7%) of students answer the question as true and (83.3%) answer the question as false, this result similar to the result obtained from the 5th stage student (Ahmed et.al.,2015).

The question (If taken too often, antibiotics are less likely to work in the future?) most of the students chose the correct answer true. The overuse of antibiotics increases the probability for antibiotics resistance while the using of antibiotics only when needed, and using short courses when appropriate, will avoid unintended adverse consequences for individuals and reduce the burden of antimicrobial resistance in the long-term (BPAC,2019). This result agreed with the result reported in the survey done in trended and Tobago on pharmacy students, (94.4%) of the students answer the question correctly as true (Ahmed et.al.,2015).

Attitude

Regarding the question (When do you think you should stop taking antibiotics once you've begun treatment) more than (82%) of students chose the correct answer (When you've taken all of the antibiotics as directed) and less than 11% of students chose the answer (Don't know). People prescribed antibiotics should complete full course of the medicine. Individuals who stop taking the antibiotics once the symptoms have lessened but before they have finished their complete courses of medication often have not killed all the bacteria. Surviving bacteria can cause a reinfection. Often with increased resistance to the antibiotics used in attempt to control them (NZWCS,2019). Survey done in Al Rasheed University College of Pharmacy in Baghdad Iraq on the 4th stage pharmacy students, about (83%) of students answer the question correctly (Israa, 2017), this reported result similar to our result.

Concerning the question (Do you read the leaflet of antibiotic before taken it?) (77.14%) for 4th stage, (59.21%) for 5th stage chose the correct answer (yes). The importance of leaflets arises from: firstly, patients have a right to receive good medical treatment, and in order to do so they need to know the medicines they are taking. Second, it is important for healthcare professionals and the patients to share this essential information in order to make the right decision for the patient. Finally, and most importantly, it is to maximize the benefits of the medication as well as to minimize the risk associated with them. In other words, it is critical

for risk minimization by making an early detection and preventing the progression of the disease also leaflets provide other important advantages such as: what drug is and what it is used for and how to take the drug and also possible side effects in addition it tells both the patient and pharmacists how to store the drug.

In the question (when I have a sore throat I prefer to use an antibiotic?) (8.57%) for 4th stage, (39.47%) for 5th stage correctly disagreed. Most sore throats, usually improve on their own within 1–2 weeks (sore throat may be caused by a virus or irritation from the air) and Antibiotics are not needed to treat them and antibiotics will not help. Antibiotic treatment in these cases may cause harm in both children and adults. The healthcare professional may prescribe other medicine or give you tips to help with other symptoms like fever and coughing. Antibiotics are needed if a healthcare professional diagnoses the patient with strep throat, which is caused by bacteria (CDC,2019).

For the question (It is okay to stop taking antibiotic when symptoms are improving even before the dose completed?) more than (88%) of students chose the correct answer (disagree). This result similar to the result reported in survey done in Saudi Arabia on students of health science at Aljuf University, about 72% of respondents disagreed (Ekremah et.al, 2016).

In the question (Skipping one or two doses does not contribute to the development of antibiotic resistance?) about half of the students chose the correct answer disagreed. Skipping one or two doses may result in the development of antibiotics resistance and this resistance develops when potentially harmful bacteria change in a way that reduces or eliminates the effectiveness of antibiotics (FDA,2019). The percent of students chose the correct answer are lower in compared with the survey done in trended and Tobago on pharmacy students, (78.7%) of students chose disagree (Ahmed et.al.,2015).

The question (Prescribing broad-spectrum antimicrobials when equally effective narrower spectrum antimicrobials are available increases antimicrobial resistance?) more than (75%) of students chose the correct answer agree. narrow spectrum antibiotics are more preferable than broad-spectrum antibiotics because broad-spectrum antibiotics pose specific risks, particularly the disruption of native, normal bacteria and the development of antimicrobial resistance (Hopkins,1997). The percent of students chose the correct answer are lower in compared with electronic survey on antimicrobial prescribing and education administered to the 4th year medical students at the university of Miami, the Johns Hopkins university and the university of Washington, about (95%) of participants agreed (Lilian et.al,2013).

Regarding the question (Do you consult a doctor before starting an antibiotic?) about (34%) of students chose the answer usually. This result did not agree with the result of the survey done on medical students of southern Indian teaching hospital, (92.8%) of respondents chose usually (Khan et.al, 2013).

In the question (Do you check expiry date of antibiotic before using it?) the majority of respondents (84% of students) answer the question as usually. Research done for Evaluation of bacteriostatic potency of expired oral pediatric antibiotics and implications on infant health, found that higher resistance and multiple antibiotic resistance rates among expired oral pediatric antibiotics on infantile diarrhoeagenic bacteria. Apart from less-efficacy, administration of expired antibiotics can lead to increased antibiotic resistance and clinical treatment failure, as well as adverse drug reactions. It is also necessary for developing countries like Nigeria to have effectively implemented judicious national policies that will ban sales, as well as ensure non-administration and non-consumption, in any form, of expired antibiotics and other expired medications, most especially in pediatric cases. Effective enforcement of the World Health Organization (WHO) guidelines on drug donations can also curtail such practices. All these can serve as means of justifying advocacy against sales and administration of expired antibiotics, most especially in pediatric cases (Zeidan et al., 2013; Ogunshe and Adinmoyema, 2014).

Perception

The question (Is it matter for you to take antibiotic before or after food?) more than (86%) of students reported that taking antibiotics before or after food matter for them. Antibiotics are usually taken with water because taking them together with fruit juices, dairy products or alcohol can affect how the body absorbs some drugs. Dairy products include milk as well as butter, yogurt, and cheese. After taking an antibiotic the patient may need to wait for up to three hours before eating or drinking any dairy products. Grapefruit juice and dietary supplements containing minerals like calcium may also work dampen the effect of antibiotics. Some antibiotics can be taken before, after with or without a meal (NCBI, 2019).

The question (Do you stop antibiotic when any side effect will appear?) less than (23%) of students chose the correct answer no. If the patients are experiencing a bothersome or serious antibiotic side effect, the patients should contact the health care provider to discuss the symptoms. The outcomes may include: staying on the same antibiotic and managing the side effect, adjusting the dose switching to a different antibiotic. Usually, antibiotic treatment should not be stopped without

a health care provider's approval; all medication should be finished. Stopping antibiotics early due to side effects may allow the infection to worsen and may lead to antibiotic resistance, making an antibiotic less effective (Althunibat et al., 2016, Drugs,2019).

In the statement (Antibiotic resistance is an important and serious public health issue facing the world) more than (97%) of students answer the question correctly as true. The result in this study agreed with the result reported in the survey done in trended and Tobago on pharmacy students, (98.14%) of respondents chose true (Ahmed et.al, 2015; Al-Asoufi et al., 2017).

Regarding the statement (Antibiotic resistance is an issue that could affect me or my family or society) (97.14%) of 4th stage, (92.10%) of 5th stage answered the question as true (the correct answer). The result collected in our study was better than the result reported in the study done in Sri Lankan universities on both junior and senior pharmacy students where about (64%) of junior students chose the correct answer true and (82%) of senior students chose true (Sakeena,et.al,2018).

For the statement (It's okay to use antibiotics that were given to a friend or family member, as long as they were used to treat the same illness) about 88% of respondents chose the correct answer false. This result agreed with the result reported in the survey done in Al Rasheed University College of Pharmacy in Baghdad Iraq on the 4th stage pharmacy students, about (92%) of students answer the question correctly while (8%) of students chose the answer true (Israa,2017).

CONCLUSION

Based on results obtained in this study that done in Kerbala University / College of Pharmacy it has been concluded that students were of high level in knowledge and perception about antibiotics use and resistance, but the students were of lower level in attitudes, lower percent of student have good attitude toward antibiotics use.

RECOMMENDATION

The study recommends designing effective interventions like courses, awareness posters, seminars and conferences to improve the attitude of pharmacy students about antibiotic usage and resistance in Kerbala University, also the pharmacology and clinical pharmacy modules should also include considerable weight on antibiotics and antibiotics resistance. This could be achieved by incorporating more clinical practical components to the curriculum.

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