The Knowledge of Nursing and Medicine Students Regarding Antibiotic Misuse and Bacterial Resistance

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Abstract

Objective**:** The Disease Control and Prevention Centers points out that the number of deaths from antibiotic resistance nearly doubles every year in countries around the world, so it's imperative to spread and increase knowledge among patients and health providers about how to prevent the misuse of antibiotics and the importance of taking them as properly prescribed by a physician. Methods**:** A study was conducted on a sample of 200 students at the colleges of nursing and Al Zahra medicine to assess their knowledge of antibiotic misuse and the resulting resistance in pathogenic bacteria by exposing them to a questionnaire questions, the results were collected and analyzed statistically. Results**:** it has been showed a ratio of %51.5 of all students had a good level of knowledge, while %16.5 of them are poorly informed and there were no significant differences between nursing and medical students in knowledge where $P>0.05$. Also, a significant difference was found between the levels of answers to questions for part 3 higher than for part 2 of the questionnaire ($P<0.05$). The correct answer rate per student was 7 versus 3 wrong for each part of the questionnaire. **Conclusion:** More than half the students (%51.5) had a good level of knowledge, (%32) were average, and the rest (%16.5) were poor, so these weak students need further education about the benefits and dangers of antibiotics and their proper use.

Keywords: Knowledge, Antibiotic Misuse, Bacterial Resistance.

Introduction

Antibiotics have revolutionized medicine, saving countless lives since their discovery in the early 20th century. As they continue to be used, the alarming rise of

this global crisis in antibiotic resistance has increased, resulting from the continued adaptability of microorganisms, finding by the misuse and overuse of antibiotics [1].

The use of antibiotics to successfully and effectively treat many serious infections, including fatal. Antibiotic resistance is one of the most harmful and dangerous side effects. Resistance occurs when bacteria develop their ability to overcome the antibiotics used to eliminate them. Misuse and overuse lead to antibiotic microbiology resistance and it's critical to address this issue to reduce the imminent death of the main threat of antibiotic resistance. If this problem is not resolved, the correct use of antibiotics is expected to be adversely affected [2].

Bacterial resistance is the ability of bacterial cells to block the effects of antibiotics, whether persistent or lethal. Ignorance and unintentional excessive use of antibiotics contribute to the development of resistance in bacteria. Resistant microorganisms have evolved over time and problems have arisen with these resistant microorganisms in the treatment of some infections. Antibiotic resistance is a major public health problem globally at present, and a major issue in the way of manufacturing new drugs and developing [3].

The misuse and overuse of antibiotics, as well as poor infection prevention and control, accelerate antibiotic resistance. The impact of resistance can be minimized and its spread reduced by taking steps at all levels of society as well as raising the awareness of the general public by taking actions such as preventing infections to avoid the need for antibiotics, using antibiotics only when prescribed by a certified health professional, always taking a full prescription, not using residual antibiotics and not sharing antibiotics with others. Prescribers also respond to people's expectations and demands, so increasing everyone's understanding of when antibiotics may be beneficial, and when they aren't, should reduce the frequency of their introduction [4]. Over the counter and inaccurate use of antibiotics due to lack of medical guidance then antibiotics become ineffective, leading to bacterial infections and increased morbidity and mortality [5].

Frequent and low doses of antibiotics are not strong enough to kill and encourage a section of bacteria to develop means of survival, or become "resistance". Bacteria can develop ways to fight antibiotics by Prevent antibiotics from reaching target cells such as extracellular infusion of drugs, alteration of cell wall permeability, change the structure of target cells or replace them completely, or Production of enzymes that destroy antibiotics. Antibiotic resistance will eventually occur because of evolutionary natural selection, but the Misuse and overuse of antibiotics is dramatically escalating the process. When antibiotics are used incorrectly in human or animal medicine for too short a time, or too small a dose, at inadequate strengths, or for the wrong disease bacteria are not killed and can pass on survival. Traits to even more bacteria. This results in stronger infections, increased illness and even death [6].

Bacteria have developed their ability to cope with environmental conditions in order to survive in the most hostile environments, including the human body. Bacteria need to compete for nutrients and avoid the attack of molecules produced by competing organisms within a particular host, bacterial organisms are constantly attacked by the host's immune system, and to protect themselves in certain biological outlets, it is crucial that they adapt and deal with these stressful situations. Thus, bacterial pathogens

have created very complex mechanisms to avoid disrupting pivotal cellular processes. Such as, cell wall synthesis and membrane balance. The development of Daptomycin (DAP) and Vancomycin resistance (low level in *S. aureus*) are the most clinically relevant examples of resistance phenotypes that are the result of a global cellular adaptive response to the antibacterial attack [7].

The growing and worsening problem of bacterial resistance caused by the poor use of antibiotics and their health effects on humans necessitating the discovery of new effective antibiotics constantly, this study was conducted to research the subject. This study aimed to evaluate and compare the level of knowledge among the students of Nursing and AL-Zahra medicine colleges regarding bacterial resistance to antibiotics, their causes, health effects and the ways to avoid their occurrence and spread.

Methodology

Design of study:

The study was conducted on a sample of students of the Nursing College and Al-Zahra Medicine College to evaluate their knowledge regarding the misuse of antibiotics for treatment and the resulting resistance to pathogenic bacteria. The study started on October 16, 2023 to March 20, 2024.

Study's sample and instruments:

The study included a sample of 200 students , distributed in half between the Nursing and AL- Zahra medicine colleges , were (52) male and (148) female from different study stages. The paper data were collected by distributing a questionnaire, prepared according to scientific sources related to the subject of the research and was approved by the specialized professors, to the students. The questionnaire consisted of (3) parts, the first part included questions about student's demographic information, while the second and third parts each contained (12) questions about the knowledge and perceptions in the misuse of antibiotics, bacterial resistance and the correct behaviors to prevent them. The answer scores for the questionnaire questions were (3) for the correct answer, (2) for the mid answer and (1) for the wrong answer.

Data statistical analysis:

The data were collected, sorted and subjected to statistical analysis using the program of SPSS version 26. Statistics included a T-test to calculate data rates, standard deviation, P-values and significant differences.

Result

Table (1) shows the demographic information of the students who underwent the study project. The sample consisted of 200 students divided evenly between the college of Nursing and AL- Zahra Medicine, from the second to the fifth study stage.52 of the students were male and 148 were female, ranging in age from 19-30. Year, and 109 were from urban while 91 were from rural.

Table 1: Demographic information of study project's student

Variables		Frequency
College	Nursing	100
	AL- Zahra Medicine	100
	Total	200
Study stage	Second	55
	Third	60
	Fourth	60
	Fifth	25
Genus	Male	52
	Female	148
Age	19-21	124
	22-24	67
	25-30	9
	Total	200
Residence	Urban	109
	Rural	91

Table (2) shows the distribution of students by level of answer to questionnaire questions, where the student answer total rate at a good level was 103 (51.5%) , while the rate at moderate level was 64 (32%) and at weak one was 33 (16.5%) out of 200 student.

Table 2: Distribution of students according to answer level of questionnaire questions

Questionnaire part	No. of questions	No. of students	Good Level	%	Mid. Level	%	Weak level	%
Part 2	12	200	95	47.5	66	33	39	19.5
Part 3	12	200	111	55.5	62	31	27	13.5
Total Average	12	200	103	51.5	64	32	33	16.5

According to table (3) of the T-test, there were no significant differences in the level of knowledge between Nursing and Al- Zahra Medicine students, where P- values >0.05.

Table 3: T-test and significant differences between the knowledge of Nursing and Al-Zahra medicine students

Domain	College	N	Mean	Sd.	P-value	Sig.
Part Two	Nursing	100	2.38	0.259	0.474	Ns
	Medicine	100	2.36	0.264		

Part Three	Nursing	100	2.20	0.224	0.267	Ns
	Medicine	100	2.32	0.260		
Total	Nursing	100	2.29	0.202	0.520	Ns
	Medicine	100	2.34	0.209		

Ns: non-significant at P> 0.05 level and df = (n1 + n2 – 2) = 198

Table (4) shows the questionnaire answer rates for students to show the difference between question levels, where the correct answer rate for Part 2was(7.14), higher than the correct answer rate for Part 3 (6.03).Conversely, part 2 had a wrong answer rate of (2.8) ,less than part 3 (3.13).In sum , the total correct answer rate per student was nearly (7) in opposite to (3) for the wrong answer out of (12) questions per each part of questionnaire .

Table 4: Student answer rate to parts 2 and 3 questions of the questionnaire

Questionnaire part	No. of questions	Rate of questions with correct answer	Rate of questions with mid answer	Rate of questions with wrong answer
Part 2	12	7.14	2.06	2.8
Part 3	12	6.03	2.85	3.13
Total Average	12	6.59≈ 7	2.46≈ 2	2.97≈ 3

Table (5) of the T-test revealed a high significant difference in the difficulty level of the questionnaire questions and the method of answering them for favor of part 3 over part 2, where P-value = 0.00.

Table 5: T-test and significant differences between answers of questionnaire questions

Domain	Mean	N	Sd.	P - value	Sig.
Part 2	2.37	200	0.261		
Part 3	2.26	200	0.250	0.00	S

S: significant at P≤ 0.05 level and df = (N – 2) = 19

Discussion

The medicine and nursing student's Knowledge of the correct use of antibiotics and the healthy damage resulting in the event of misuse is very important, given that the specialty of their studies and later work is a health care providers in hospitals and health centers .Equally important factors are getting information to the patient on how to prevent misuse, when antibiotics are necessary, and when to take them as prescribed by the physician. Giving this information can help prevent one of the major threats facing patients worldwide - antibiotic resistance.

In this survey, students who were un enough aware of the use of antibiotics were the lowest (%16.5) of students with average knowledge (%32) and Those with good knowledge (%51.5) according to table (2), while there was no significant differences (P>0.05) in the level of knowledge between the students of each the college of Nursing and Al-Zahra' medicine, for the questions of both parts2and 3 of the questionnaire (table 3). The correct answer rate for students (table 4) of good level was 7 questions per student out of 12 questions per each part of questionnaire, and 2 questions were moderately answered while 3 were wrong. According to table (5), a significant difference has been observed between the difficulty levels of part 3 questions over part 2 of the questionnaire (P<0.05).

The desired behavioural outcome is improved health-promoting behavior regarding the use of antibiotics. The researchers have found that educating health providers and patients about the use of antibiotics can improve their perceptions positively and may reduce the rate of increase in antibiotic resistance [8].

The current study concluded that with increased education, students were more inclined to increase knowledge of the appropriate use of antibiotics and avoid antibiotic resistance. Many studies were mentioned results similar to the present research .A study conducted by [9] found that many misconceptions about antibiotic resistance were wrong, and suggested that these misconceptions could contribute directly to the spread of antibiotic resistance. Similar results were observed in another study conducted by [10] which regarding the patient's understanding of the appropriate use of antibiotics for the treatment of diseases in an outpatient setting: approximately 30% of prescribed antibiotics were unnecessary. This study showed how important it is for patients and healthcare providers to identify the contributing factors that lead to over-prescribing antibiotics .Researchers have determined that finding and developing educational curricula that are easy to study and understand about the appropriate use of antibiotics will make it easier for specialized scholars to understand the right information to provide the necessary health care. Education for health students should be strengthened, enriched, and developed in the use of antibiotics, facilitating a better relationship later between health-care providers and patients, and helping to improve the proper use of antibiotics [11].

The study of Hill (2017) showed convergent results in a positive correlation between antibiotic resistance and the awareness and education aspects about antibiotic

resistance. The study also indicated that as knowledge increased, health providers' perceptions and understanding of how to use antibiotics increased. Previous research has shown that doctors admit that they are prescribing antibiotics inappropriately because they believe that patients are always looking for antibiotics, and they want patients to feel satisfied with the care they receive. The study also revealed, regarding assessing antibiotic resistance awareness, inappropriate use of antibiotics shows that when there is excellent education about the need for antibiotics to be used and included in health care programs, it greatly reduces the likelihood of antibiotics being taken wrong [12].

Studies have also indicated that if proper health education is provided about the proper use of antibiotics, there is likely to be more compliance because of increased understanding and awareness. Also, when a person gets sick, they may not always get antibiotics, so they may need to be educated about their disease. A research study by [13]. Found that building good relationships between the health provider and the patient provides an opportunity to educate about their care and to increase their understanding of the use of antibiotics. In a study on how parents perceive antibiotic prescriptions for their children, when they visit doctor's office for respiratory infection symptoms, showed that communication between doctors and parents about antibiotic treatment can be a way to reduce unnecessary antibiotic prescriptions [14].

The current study gave a conceptual about the importance of education for students studying in health. It found a positive correlation between students' education and what is right and wrong in antibiotic treatment. Education is the key to preventing the disastrous effects of bio-resistance, which are increasing as antibiotics continue to be misused. This study was based on a survey on the knowledge and perception of antibiotic use among Nursing and Al-Zahra college students only. Therefore, the survey results cannot be generalized because the participants in the study sample do not represent all students studying in the health and medical colleges in Basrah city.

Conclusion

The goal of the current research is to determine students' knowledge and perception about the appropriate use of antibiotics. According to the results, the researchers determined that knowledge and perception of the appropriate use of antibiotics are directly related to their level of education and understanding of the difference between bacterial and viral infections. The results indicated that 51.5% were aware of a good level of the cognitive questions of the questionnaire, which totaled 24 questions. Only 5 of the participating students were able to answer 20 questions correctly, while 4 students answered only 7 questions correctly. The percentage of participants was 16.5% who answered at a weak level and 32% who answered at an average level. The study indicated that as medical and nursing student knowledge increases, the experience and knowledge, in providing quality health care regarding to the suitable use of antibiotics, will also increase and improve. This study concluded that there is a lack of knowledge about the differences between viruses and bacteria. In addition, how to deal with them

so students need further education about the benefits and risks associated with using antibiotics when prescribing them to treat bacterial infections.

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