

# Knowledge and Perceptions of Medical Students Regarding Antibiotic Use

KULSOOM TAYYAB<sup>1</sup>, IQRA SHAHZADI<sup>2</sup>, FATIMA MUKHTAR<sup>3</sup>, HASNAIN ALI SHAHID<sup>4</sup>, IMRAN TAHIR<sup>5</sup>, HUSSNAIN GOHAR<sup>6</sup>

## ABSTRACT

**Background:** One of the greatest challenges faced in the medical world today is the way microorganisms are respond to antibiotic treatment; this challenge is termed as antibiotic resistance. Antibiotic resistance has been identified as the biggest public health challenge.

**Aim:** To determine the knowledge and perceptions of fourth and final year medical students regarding antibiotic use at Lahore Medical & Dental College, Lahore.

**Setting:** Lahore Medical & Dental College, Lahore.

**Methods:** This descriptive cross-sectional study was conducted among medical students of fourth and final year MBBS from February to May 2016. Students were invited to participate in the study after obtaining voluntary informed consent and approval of the study from the institutional ethical review board. A pre-tested structured questionnaire was used to collect information from 223 students regarding their demographics; and knowledge and perceptions regarding antibiotic use. Data was analyzed using the SPSS 16.0.

**Results:** Of the 223 students, 123(55%) belonged to fourth year and 100(45%) were final year students. Their assessment of knowledge regarding antibiotic use was: 63(28%) had excellent, 93(42%) had very good, 18(8%) had satisfactory and 5(2%) students had poor level of knowledge. Majority of the students agreed that antibiotic resistance was an emerging health issue globally 214 (97%) and nationally 188(84%).

**Conclusion:** Majority of students were found to have adequate knowledge regarding antibiotics use, and were also aware of antibiotic resistance being a serious health issue globally and nationally. Further studies should be conducted among other private as well as public medical colleges to determine the knowledge and perceptions of medical students regarding antibiotic use.

**Keywords:** Antibiotics use, medical students, antibiotics resistance

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## INTRODUCTION

The world we live in is a spectacle of change. Our lifestyles, our beliefs and practices, research and technology, all of it is subject to constant change. Scientifically speaking, one of the greatest challenges faced in the medical world today is in the way microorganisms are responding to antibiotic treatment; this challenge is termed as antibiotic resistance.

Antibiotic resistance has been identified as the biggest public health challenge by Dr. Tom Friedan, Director, Centers for Disease Control & Prevention. According to him: 'if we are not careful we will soon be in a post antibiotic era, and for some patients and some microbes, we already are'.

Antimicrobial Resistance (AMR) is defined as, 'the ability of microbes to grow in the presence of a chemical (drug) that would normally kill them or limit

their growth. 'AMR makes it arduous to eradicate infections from the system as existing drugs become futile<sup>2</sup>. The root cause of antibiotic resistance sprouts from three major sources. The first being 'bacterial causes of resistance' where the bacteria genetically alter themselves to eliminate or reduce the efficiency of chemotherapeutic drugs. In this case, one susceptible bacterium survives and multiplies to replace all the bacteria that were previously killed off, causing more harm to the host<sup>3</sup>. Then comes the 'pharmacological cause of resistance' where the antibiotic itself is susceptible to resistance due to degradation by the microbe<sup>4</sup>. Lastly, we have 'antibiotic abuse' which is the misuse or overuse of antibiotics that has potentially hazardous effects on health<sup>5</sup>.

Research has shown that more than half of the time, antibiotics are prescribed when they are not needed. In 1995 in USA alone, the amount of unnecessary antibiotics prescribed annually for viral infections was found to be 20 million and in 2003, tens of millions of unnecessary antibiotics were prescribed<sup>6</sup>. Self-medication, another leading cause

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<sup>1,2,4,5,6</sup>4th year Medical Student, Lahore Medical & Dental College,  
<sup>3</sup>Associate Professor, Dept. of Community Medicine, Lahore Medical & Dental College, Lahore  
Correspondence to Dr Fatima Mukhtar, Email: fatimamukhtar@doctor.com Cell: 0300-8434477

of antibiotic resistance also appears to be on the rise. A study was conducted amongst medical students of the School of Medicine, at the University of Torino regarding the use of antibiotics. Around 20% students were of the view that antibiotics were appropriate for viral infections and 15% said that they stop taking drugs when symptoms decrease<sup>7</sup>. In Pakistan, a similar survey was conducted by students of Aga Khan University, Karachi where they revealed how an alarmingly high number of medical students, approximately 35.2% took antibiotics without proper clinical evaluation<sup>8</sup>. Such practices make a common infection difficult to treat and evolve into a life threatening situation<sup>9</sup>.

AMR an old phenomenon has become a worldwide public health concern. In addition to affecting the health and well-being of populations, it threatens to impinge on the national health care budgets and even have repercussions beyond the health sector. Knowing that there is a paucity of new antibiotics being introduced in the market, the time to employ preventive strategies in halting AMRs' emergence and subsequent spread is now<sup>9</sup>. The World Health Organization has identified six policy areas for action in order to control antibiotic resistance in its Global Strategy for Containment of AMR 2001. These include surveillance, rational use in humans, rational use in animals, infection prevention and control, innovations and political commitment<sup>9</sup>.

Increasing the awareness of individuals connected with antimicrobial use is one way of ensuring the rational use of antibiotics in humans. The knowledge of prescribing physicians regarding AMR and their role in creating awareness and properly educating patients regarding antibiotic usage plays a pivotal role in AMR<sup>10</sup>. Insufficient education of graduate and postgraduate students in the proper use of medicines has also been identified as a contributory factor<sup>9</sup>. One method of intervention identified by experts is providing comprehensive knowledge on AMR to undergraduate medical students. Because once they enter the medical field after graduation it is difficult to change their views<sup>11</sup>.

It is important to identify the gaps in knowledge of medical students regarding antibiotic use in order to improve prescription practices. This study intends to determine the knowledge and perceptions of fourth and final year medical students regarding antibiotic use at Lahore Medical & Dental College, Lahore. The results will be useful for planners of curricula and teachers of medical college to implement meaningful changes. In this study, knowledge and perceptions were operationalized as:

Knowledge was categorized as excellent, very good, good, satisfactory, poor and very poor. It was

excellent if all questions regarding knowledge were answered correctly. The rest were 80%, 60%, 50%, 30% and 20% or less respectively and perceptions were recorded as per the questionnaire in affirmative or otherwise.

## METHODOLOGY

A cross-sectional descriptive study was undertaken at the Lahore Medical & Dental College (LMDC), Lahore. The study was initiated in February 2016 after approval from the Institutional Ethical Review Committee of LMDC, and took three months to complete. Medical students of fourth and fifth year MBBS were invited to participate in the study. After obtaining voluntary informed consent from 223 respondents, a pre-tested structured questionnaire was used to collect information on students' demographics, and their knowledge and perceptions regarding antibiotic use. A 5-point Likert Scale was used to collect data regarding students' knowledge and perceptions of antibiotic use. The data thus collected was recorded and analyzed using the statistical package for social sciences version 16. Data is described in the form of frequencies and percentages. It is presented in figures and tables.

## RESULTS

In the research study that was conducted, a total of 223 students participated. The respondents comprised of 123(55%) fourth year and 100(45%) final year students. With respect to gender: the number of female students who took part in the survey was 153(69%) and the number of male students was 70(31%).

A set of questions was put together to assess the knowledge of students regarding the use of antibiotics as is highlighted in table 1. It was found that a substantial number of students 213(96%) agreed to the emergence of bacterial resistance as a major consequence of the indiscriminate and injudicious use of antibiotics, whereas a fewer number 9(4%) disagreed. When asked about the likelihood of antibiotics to work in future if taken too frequently, 198(89%) agreed to it being futile, whereas 24(11%) believed otherwise. In response to antibiotics being an additional burden with regards to medical costs to patients, 206(92%) agreed to it being a contributing factor to the surge in their medical bill, whereas 17(8%) disagreed. Majority of the students 126(57%) disagreed with bacteria being the cause of cold and flu, and 96(43%) of the students said the statement was true.

Table 1: Assessment of respondents' knowledge regarding antibiotic use

Knowledge assessment question	True	False
Indiscriminate & injudicious use of antibiotics can lead to:		
Ineffective treatment	198(89%)	25(11%)
Prolongation of illness	172(77%)	51(23%)
Emergence of bacterial resistance	213(96%)	9(4%)
Additional burden of medical cost to the patient	206(92%)	17(8%)
If taken too often, antibiotics are less likely to work in future	198(89%)	24(11%)
Bacteria are germs that cause common flu and cold	96(43%)	126(57%)

The responses to six questions relating to respondents' knowledge about antibiotic use were categorized into five groups, which included poor, satisfactory, good, very good and excellent. As depicted in Fig.1, out of 223 students 63(28%) had excellent knowledge followed by majority students having very good knowledge regarding antibiotic use i.e., 93(42%). However, 18(8%) and 5(2%) students were found to have satisfactory and poor level of knowledge.

Majority of the students 214(97%) agreed to the emergence of antibiotic resistance as a serious health issue in the world, whereas a fewer number of students disagreed 5(2%), however 2(1%) were indecisive. The number of students who agreed to antibiotic resistance being a health issue in our country, Pakistan, was 188(84%), whereas those who were indecisive were 28(13%) and those who disagreed were 6(3%). Those who concurred to antibiotic resistance being a serious health concern in our hospitals were 136(61%) and a large number of students were found to be indecisive 68/(31%) (Table 2).

A number of questions were asked from students regarding the use of antibiotics that were officially prescribed to them by a physician. In the first question the students were asked whether they stopped taking their prescribed medicines after feeling good for a few days and 11(5%) students responded with 'always', 74(34%) students said they 'usually' stopped taking their prescribed medication and 48(22%) said that they 'sometimes' stopped taking their medicines midway in the course of their treatment. However, those who said they 'never' stopped the course of treatment were 52(24%) students.

When asked if they saved those medicines for a future episode of sickness, 28(13%) responded with, 'always', 43(20%) of the students said they 'usually'

saved the remainder of their medicines and 58(26%) said they 'sometimes' saved them. The least number of students, 27(12%) said they 'seldom' saved any medicines and 65(29%) students said they 'never' kept any leftover medication for the future.

Similarly, when asked if they discarded the leftover medicines instead, a scarce number of students 15(7%) said they 'always' did, 34(16%) said they 'usually' discarded the remaining medicine and a handful 52(24%) said they 'sometimes' did. A good number of students, 40(18%) 'seldom' discarded them and around 79(36%) students 'never' discarded the medicines that remained after a course of treatment.

When asked if they gave these leftover medicines to their peers when they fell sick, 24(11%) said they 'always' did, 54(24%) said they 'usually' did and 60(27%) said they 'sometimes' handed them to their ailing friends. Around 28(18%) students said they 'seldom' gave their peers leftover medicines and 55(25%) said they 'never' did so.

As opposed to the substantial number of students who, in the first question, said that they discontinued medication after feeling better, many of them 71(32%) said they 'always' completed the course, 80(36%) said they 'usually' completed the course of treatment and 45(20%) said they 'sometimes' completed the course of treatment. Very few students, around 13(6%) said they 'seldom' did and 12(5%) said they 'never' completed the course.

An interesting finding was when the students were asked if they consulted a doctor before starting an antibiotic, around 75(34%) students said they 'always' did, 56(25%) said they 'usually' did and 60(27%) said they 'sometimes' consulted a doctor before starting antibiotics. A handful of students, around 19(9%) said they 'seldom' consulted a doctor and 11(5%) said they 'never' did.

Majority of the students, 157(71%) 'always' checked expiry date before using antibiotics whereas 31(15%) said they 'usually' checked for the expiry date and 17(8%) said they 'sometimes' did. A very scarce number of students, around 8(4%) 'seldom' did and 5(2%) 'never' checked for expiry date.

In the last question the students were asked whether they preferred to take an antibiotic when they had a cough or a sore throat, for which 44(20%) of the students said they 'always' took antibiotics, 70(32%) said they 'usually' took antibiotics and 66(30%) said they 'sometimes' took medication for it. A handful of students, 29(13%) said they 'seldom' did so and 12(5%) said they 'never' took antibiotics to treat a cough or a sore throat.

Fig. 1: Respondents knowledge regarding antibiotic use

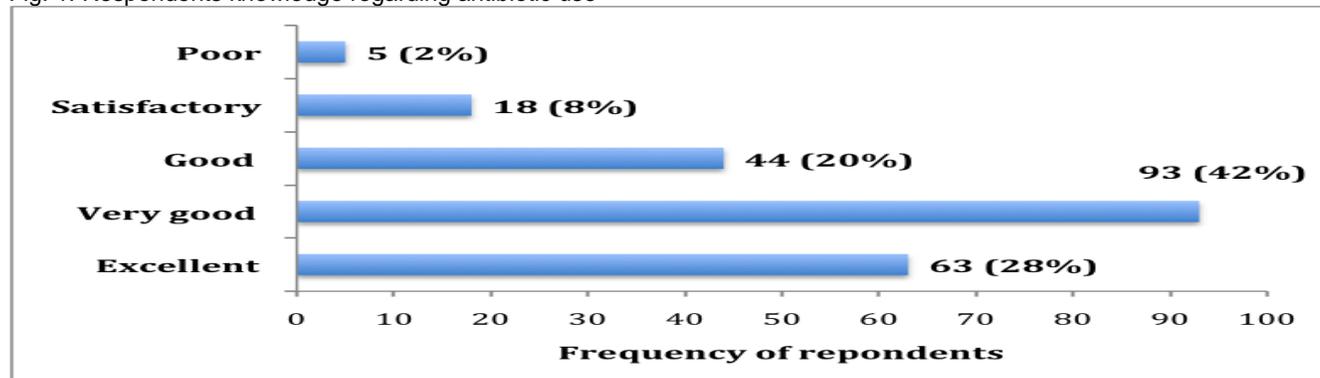


Table 2: Students' perceptions about antibiotic resistance

	Strongly agree	Somewhat agree	Undecided	Somewhat disagree	Strongly disagree
<b>Antibiotic resistance is</b>					
A serious health issue facing world	139(63%)	75(34%)	2(1%)	3(1%)	2(1%)
A serious health issue in our country	96(43%)	92(41%)	28(13%)	4(2%)	2(1%)
A serious health issue in our hospitals	56(25%)	80(36%)	68(31%)	15(7%)	3(1%)

Table 3: Respondents self use of antibiotics

	Always	Usually	Sometimes	Seldom	Never
<b>The doctor prescribes a course of antibiotic for you. After taking 2-3 doses you start feeling better</b>					
Do you stop taking further treatment?	11(5%)	74(34%)	48(22%)	35(16%)	52(24%)
Do you save remaining antibiotics for next time you get sick?	28(13%)	43(20%)	58(26%)	27(12%)	65(29%)
Do you discard the remaining medicine?	15(7%)	34(16%)	52(24%)	40(18%)	79(36%)
Do you give leftover medicine to your friends if they get sick?	24(11%)	54(24%)	60(27%)	28(18%)	55(25%)
Do you complete the full course of treatment?	71(32%)	80(36%)	45(20%)	13(6%)	12(5%)
Do you consult a doctor before starting an antibiotic?	75(34%)	56(25%)	60(27%)	19(9%)	11(5%)
Do you check expiry date of antibiotic before using it?	157(71%)	33(15%)	17(8%)	8(4%)	5(2%)
Do you prefer to take an antibiotic when having cough and sore throat?	44(20%)	70(32%)	66(30%)	29(13%)	12(5%)

## DISCUSSION

Majority of students in our study demonstrated sufficient knowledge of antibiotic resistance, including its emergence due to uncontrolled use of medication. Students also agreed that antibiotics were a contributing factor to the surge in patient's medical bill. Similar results have been reported by a South Indian study. They found that a majority of medical students were aware of AMR and its effects<sup>11</sup>. Jamshed et al also published results compatible to our study. Their study conducted amongst final year medical students in Malaysia reported students having adequate knowledge of antibiotic resistance<sup>12</sup>. Scaioli G et al reported that majority of medical students were aware that antibiotic misuse leads to resistance<sup>7</sup>.

A large number of students in the study took antibiotics when they had a cough or sore throat whereas, less than half of the participants believed that sore throat was solely bacterial in origin. This is corroborated by various studies; one such study showed that 60% of respondents believed that

antibiotics should be prescribed for viral illnesses<sup>13</sup>. Another study conducted amongst medical, dental, nursing and other health care professionals at the University of Torino, showed that one fifth of the sample was not aware of the ineffectiveness of antimicrobials against viruses<sup>7</sup>. Jamshed et al postulate that this habit of prescribing antibiotics for viral infections could be due to misconceptions and wrong beliefs about antibiotics<sup>12</sup>. It was found that correct knowledge and attitude towards antibiotic use was associated with decreased chances of inappropriate prescription of antibiotics<sup>14</sup>.

Our medical students believed that the emergence of antibiotic resistance was a global as well as a national health issue. Numerous studies show same results. Dyar et al conducted an online survey among final year medical students of seven European medical colleges, who also highlighted antibiotic resistance as a national health issue<sup>15</sup>. The medical students at the University of Miami and the University of Washington identified antimicrobial overuse and AMR as a problem in their country.

Interestingly, respondents blamed this problem to be the result of practices and behavior of physicians who work in hospitals other than where these students were working or rotating<sup>16,11</sup>. Though it wouldn't be imprudent to deduce that this might be a misconception, as according to one study's results a large number of students overestimated the number of patients who were prescribed an antibiotic on a daily basis in a district hospital<sup>16</sup>. The study within an international student medical organization by Kallberg C concluded that students in high-income countries were less concerned about antibiotic resistance as compared to students in low- and middle-income countries<sup>17</sup>. Few students in our study took antibiotics after consulting a doctor. However according to the study by Buke C et al, 89.1% of University students were of the opinion that antibiotics should be started after doctors' prescription<sup>18</sup>. Scaioli et al reported that 15% of medical students discontinued their antibiotics as their disease symptoms improved, 16% bought antibiotics without a prescription and approximately 18% took leftover medication without doctors' prescription<sup>7</sup>. Interestingly, a Chinese study showed that medical students had poorer behavior towards antibiotic use as compared to non-medical students<sup>19</sup>.

Studies have mentioned students' desire to further their knowledge on antibiotics and their judicious use<sup>11</sup>. Some studies have even detailed measures to educate students and medical professionals at various levels of training, with some advocating a more outcome-based approach for teaching more sensible prescribing practices of antibiotics<sup>20,21,22</sup>.

## CONCLUSION

Majority of students were found to have good knowledge regarding antibiotic use and were also aware of antibiotic resistance being a serious health issue globally and nationally. Further studies (and with different designs) should be conducted among other private as well as public medical colleges to determine the knowledge and perceptions of medical students regarding antibiotic use.

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