Knowledge and Awareness of Antibiotics among University Students and General Population in Peshawar, Khyber Pakhtunkhwa, Pakistan

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ABSTRACT

Background: Antibiotic resistance is major problem of global health. The reason behind it is inadequate knowledge, low socioeconomic status, self-medication and misuse/irrational use of antibiotics. This study aim was to assess the knowledge and awareness of antibiotics among university students & general population.

Materials and Methods: This descriptive study was carried in Khyber Medical University in six months. University students and general population were recruited in the study. While children and other non-medical students were excluded. A total of 384 participants were included and data were collected through designed electronic questionnaire. Data were analyzed through SPSS-22.

Results: A total 384 participants were included in which 258 responses were considered. Out of 258, 136 respondents were university students and 122 respondents were general population of Peshawar. Students and general population were know about the antibiotics with 91.2% and 76.2% respectively. Self medication were found 20.6% among students and 14.8% among general population. Antimicrobial testing was used in 38.5% and 44.9% in general population and students respectively. Antibiotics were stop before antibiotic course completion were 30.3% among general population and students (25%). Knowledge of antibiotics resistance were 31.1% to general population and students (19.9%).

Conclusion: Knowledge & awareness of antibiotics among university students was greater than general population, however self prescription was slightly high in university students despite of their high knowledge & awareness of the side effects of antibiotics. Future research should concentrate on individual-level characteristics such as doctor-patient interactions and patient satisfaction to better understand the causes of antibiotic self-medication.

Keywords: Antibiotics, Knowledge, Population, Students, Khyber Pakhtunkhwa, Pakistan

INTRODUCTION

Antibiotics are the types of medicines used to prevent and treat bacterial infections either by killing or inhabiting the growth of bacteria.[1] The discovery of antibiotics was a revolutionary event saving millions of lives; however their effectiveness has lessened because microorganisms have developed resistance, the most common type of resistance is (MRSA) which is developed due to the antibiotics prescribed in UTIs, it came to the surface as a result of a systematic review.[2] This resistance, in turn, increases with the irrational use or empirical use of antibiotics which is common due to either personal lack of knowledge or physician perception about it too which became visible in a survey conducted in the local hospital in Karachi.[3] Another study in Malaysia showed that students of universities do not have adequate knowledge which as a possible outcome increases it's misuse in them which led to MRDS in them unknowingly.[4] This is seriously alarming, it can affect the treatment in later such it does in the case of salmonellosis.[5] A highest antibiotic resistance is also reported by another researcher from Pakistan.[6] Several surveys on its usage are undertaken across the world, but in Pakistan, the studies are restricted, resulting in poor awareness and significant resistance among the Pakistani people. Due to a lack of awareness, Pakistanis typically take it for nominal purposes without considering the consequences.[7]

The usage of antibiotics without prescription is very high among these non-medical university students of Karachi which emphasized the need for strict surveillance of antibiotics prescription and availability.[8] The main justifications for self-medicating with antibiotics were familiarity with the medicine and convenience. The most typical antibiotic used for self-medication was a beta-lactam, and the symptoms most frequently associated with self-medication were temperature and sore throat.[9] A higher chance of self-medication with antibiotics for bronchitis was associated with a high perceived appropriateness of self-medication and an attitude of antibiotics usage for minor diseases. Individual and country data were among the enabling variables.[10] Individually, the perceived availability of antibiotics without a prescription was associated with a higher likelihood of self-medication.[11] Higher GDP (wealth) and correct administration of prescribed pill quantities by pharmacies were independently related with a lower chance of self-medication at the national

level.[12] Interventions targeted at avoiding self-medication should include public education, enforcing antibiotic sales regulations, and enacting laws requiring pharmacists to provide exact prescription pill dosages. We accounted nearly all of the variance at the country level using the listed factors, although not on an individual basis.[11]

In clinical practice, there is a high prevalence of antibiotic abuse for upper respiratory tract illnesses like the common cold. Antibiotic resistance has risen as a result of doctors prescribing too many antibiotics.[13] This prompted us to set out to learn how many doctors in Pakistan are prescribing antibiotics to treat common colds and how well-versed they are in stopping the spread of the illness. The most efficient method for limiting the spread of this illness in daily life as frequent and regular hand washing with high-quality soaps. A significant percentage of doctors recommend antibiotics to treat common colds. Our doctors lack sufficient understanding regarding the causes and treatments of common cold symptoms, as well as the means of preventing these diseases which as a result increased the antibiotic resistance.[14]

A survey exhibited disparities between specializations regarding antimicrobial use and knowledge and showed that house staff are aware of the significance of antimicrobial resistance and feel better antimicrobial use will address this problem.[15] Our hospital's house staff has inadequate knowledge of antibiotics, and this information did not significantly improve after their training. Although academic centers require and are likely to welcome antimicrobial education, it might be more effective if it is customized to particular specializations.[16]

This survey will assist us in drawing conclusions based on precise assessments of public perceptions of antibiotic use and its potential unintentional abuse that could later cause significant harm to healthcare systems. This will assist us in developing a national antibiotics strategy that will establish a method for how much of the proper antibiotics should be administered, as well as after having it confirmed through microbiological testing. In addition to the information already available on the use of antibiotics and public perception of them, we hope that this survey will be very significant. We are hoping that this survey will contribute a bit to the Pakistan antibiotics stewardship strict national policy that will regulate the use of antibiotics in order to slow down the already fasten growing resistance which is causing delay in treatments of man fatal illnesses. The aim of this study was to determined the knowledge and awareness about the antibiotic use among institute students and general population.

MATERIAL AND METHODS

This descriptive cross-sectional survey was conducted in duration of six (n=60 months from January to June 2023. In this study, medical students of Institute of Paramedical Sciences, Khyber Medical University and general population of Peshawar were included in the study. Other universities or institutes students either medical or other professionals, school and college students were excluded from the study. Moreover, among general population adults population were included irrespective of age and gender. Additionally, people under 15 years & those who were not willing to participate were excluded from the study. Sampling was done by random probability sampling technique. Sample size calculated was 384 by 50% probability sampling on open epidemiological calculator (http://openepi.com/Menu/OE_Menu.htm).

A designed proforma was used for data collection and data were collected through electronic questionnaire. A questionnaire were shared with students and other general population through social platforms. The collected data were extracted in Microsoft Excel sheet 2016 and then coded for further analysis through Statistical Package for Social Sciences version 22 (SPSS-22). Data were shown in percentage and frequency in graphs and tables form.

RESULTS

Among total of 384 responses, 258 respondents were considered in the study, among which 136 respondents were university students of KMU-IPMS and 122 respondents were general population of Peshawar. Among 122 responses of general population, 73(59.83%) respondents were 15-25 years of age, 37(30.32%) respondents were 25-35 years & the remaining 12(9.83%) respondents were 35-45 years of age respectively. Among 136 respondents of university students 20(14.70%) respondents were 15-20 years of age, 58(42.64%) respondents were 20-25, 46(33.8%) respondents were 25-30 years & the remaining 12(8.8%) respondents were 30-35 years of age respectively (Table 1).

Table 2: Age-wise distribution of participants (University students and General Population)

Age of participants	Students Age (n=136)	General Population (122)
15-25	73	0
25-35	37	78
35-45	12	58

Total of 258 respondents were taken into account, 136 respondents were of university students, among them 123 respondents have higher education with a frequency of 91.2%, 9(6.8%) respondents have secondary education & the remaining 2(2%) respondents have primary education. While 122 respondents were of general population, among them 52(42.6%) respondents have higher education, 50(41%) respondents have secondary education & the remaining 20(16.4%) respondents have primary education (Table 2).

Total of 258 respondents were observed, among which 122 general population respondents, 23(18.9%) respondents were upper class people, 61(50%) respondents were middle class people & the

remaining 38(31.1%) respondents were lower class people. And 136 respondents were university students among which 11(8.5%) respondents were upper class students, 119(87.5%) respondents were middle class students & the remaining 6(4%) were lower class students (Table 3).

Table 2: Educational-wise distribution of participants (University students and General Population)

Educational status	Students Age (n=136)	General Population (122)
Primary	0	20
Secondary	0	50
High	136	52

Table 3: Socio Economic Distribution of Participants (University Students and general population)

Socio Economic Classes	University Students	General Population
Lower Class	6 (4%)	38 (31.1)
Middle Class	119 (87.5%)	61 (50%)
Upper Class	11 (8.5%)	23 (18.9%)
Total	136	122

In total of 258 respondents, 122 respondents were general population among which 51(41.8%) respondents were from Southern KPK, 56(45.9%) respondents were from Northern KPK & the remaining 15(12.3%) were from Afghanistan and other areas. While 136 respondents were university students among which 59(44.1%) respondents were from Southern KPK, 60(43.4%) respondents were from Northern KPK & the remaining 17(12.3%) respondents were from Afghanistan and other areas (Table 4).

Table 4: Ethnicity of Participants (University students and general Population)

Ethnics Group	University Students	General population
Southern KPK	59 (44.1)	51 (41.8%)
Northern KPK	60 (43.4)	56 (45.9%)
Afghanistan and others	17 (12.3)	15 (12.3%)
Total	136	122

Total of 258 respondents were asked if they know about antibiotics, 136 respondents were university students among which 91(91.2%) of the respondent knows about antibiotics & 9(8.8%) of the respondents were unaware of antibiotics. While 122 respondents were general population among which 76(76.2%) respondents have knowledge about antibiotics & 24(23.8%) respondents have no knowledge about antibiotics (Table 5).

Out of 256 total respondents 121 were general population among which 28(23.1%) respondents have taken antibiotics for fever, 50(41.3%) respondents have taken it for respiratory illness, 28(23.1%) respondents have taken for UTIs, 12(10%) have taken it for pain/inflammation & 3(2.5%)

respondents have taken antibiotics for throat infection.

Table 5: Knowledge and awareness of antibiotics among participants (University Students and general population)

Knowledge of antibiotics	University students	General Population
Yes	124 (91.2%)	93 (76.2%)
No	12 (8.8%)	29 (23.8%)
Total	136	122

Among 258 respondents, 136 respondents were university students, among which 91(66.9%) responded that they have taken clinically prescribed antibiotics, 28(20.6%)respondents have taken self prescription. 11(8%)of the respondents have taken antibiotics from pharmacies & the remaining 6(4.5%) respondents have taken antibiotics on friend suggestion. While 122 respondents were general population, among which 66(54.1%) respondents have taken clinically prescribed antibiotics, 18(14.8%) respondents have taken self prescription. 20(16.4%) respondents have taken antibiotics from retail pharmacies & the remaining 18(14.8%) respondents have taken antibiotics on friend suggestion (Table 6).

Table 6: Prescription of antibiotics in participants (University students and general population)

Prescription	University students (n=136)	General population (n=122)
Clinical Prescription	91 (66.9%)	66 (54.1%)
Self-prescription	28 (20.6%)	18 (14.8%)
Retail pharmacy	11 (8%)	20 (16.4%)
Friend's suggestion	6 (4.5%)	18 (14.8%)
Total	136	122

Out of 256 total respondents 121 were general population among which 28(23.1%) respondents have taken antibiotics for fever, 50(41.3%) respondents have taken it for respiratory illness, 28(23.1%) respondents have taken for UTIs, 12(10%) have taken it for pain/inflammation & 3(2.5%) respondents have taken antibiotics for throat infection. While 135 were general population among which 25(18.5%) respondents have taken antibiotics for fever, 45(33.3%) respondents for respiratory illness, 33(24.4%) respondents for pain/inflammation, 26(19.3%) respondents for UTIs & the remaining 6(4.5%) respondents have taken antibiotics for other infections (Table 7).

Among 121 of the respondents of general population 69(57%) responded that they have fully recovered after taking antibiotics, 22(18.2%) respondents did not recovered, 16(13.2%) respondents slightly recovered & 14(11.6%) responded that they still have

an infection. While among 135 respondents of university students, 92(68.2%) respondents had fully recovered, 36(26.7%) respondents have slightly recovered, 4(3.2%) respondents did not recovered & the remaining 3(2%) respondents still have an infection (Table 8).

Table 7: Reasons of taking antibiotics in participants (University students and general population)

Reasons	University students (n=136)	General population (n=122)
Fever	26 (19.2%)	29 (23.8%)
Respiratory illness	45 (33.1%)	50 (40.9%)
Pain/inflammation	33 (24.2%)	28 (22.9%)
UTIs	26 (19.1%)	12 (9.9%)
Infections	6 (4.4%)	3 (2.5%)

Table 8: Recovery from infections in participants (University students and general population)

Recovery from infection	University Students (n=136)	General population (n=122)
Fully recovered	93 (68.4%)	70 (57.4%)
No recovery	36 (26.5%)	22 (18.0%)
Slightly recovered	4 (2.9%)	16 (13.1%)
Still have infection	3 (2.2%)	14 (11.5%)

Total of 258 respondents were asked the side effects of antibiotics, out of which 122 were general population, among these 41(33.6%) respondents encounter the side effects of diarrhea, 20(16.4%) respondents encounter nausea, and the remaining 61(50%) respondents encounter the other mentioned side effects in approximately equal proportions. While 136 were university students, among which 38(27.9%) respondents encounter the side effects of diarrhea, 15(11%) respondents encounter headache/fever, 30(22.1%) respondents encounter dizziness & the remaining 53(39%) respondents encounter the other mentioned side effects nearly in equal proportions (Table 9).

Table 9: Side effects encountered by participants (University students and general population)

Side effects	University students	General population
Diarrhea	38 (27.9%)	41 (33.6%)
Headache/ fever	15 (11%)	13 (10.7%)
Dizziness/Nausea	30 (22.1%)	20 (16.4%)
Other problems	53 (39%)	48 (39.3%)

When total of 258 respondents were asked that whether they find the cause of infection by antimicrobial testing then 122 of the general population responded among which 75(61.5%) responded that they had find the cause of infection by antimicrobial testing & 47(38.5%) did not find the cause by antimicrobial testing. While among 136 university students, 75(55.1%) responded that they had find the cause of infection by antimicrobial testing & 61(44.9%) responded that they did not find the cause of infection by antimicrobial testing (Table 10).

Table 10: Antimicrobial testing in participants (University students and general population)

Antimicrobial Testing	University students (n=136)	General population (n=122)
Yes	75 (55.1%)	75 (61.5%)
No	61 (44.9%)	47 (38.5%)

Among 258 total respondents, 122 were general population respondents among which 58(47.5%) respondents have fully complete the course of antibiotics, 27(22.1%) respondents have completed half of the course & the remaining 37(30.3%) respondents have stop the course after recovery. While 136 respondents were university students among which 72(52.9%) respondents fully complete the course of medication, 30(22.1%) respondents have completed half of the course & 34(25%) of the respondents stop the course after recovery (Table 11).

Table 11: Course completion of antibiotics by participants (University students and general population)

Antibiotic course	University students (n=136)	General population (n=122)
Fully complete the course	72 (52.9%)	58 (47.5%)
Half of the course	30 (22.1%)	27 (22.1%)
Stop the course after recovery	34 (25%)	37 (30.3%)

Among 122 respondents of general population 69(68.9%) respondents think that antibiotics exposure can leads to antibiotics resistance & 31(31.1%) respondents think that antibiotics exposure cannot leads to antibiotics resistance. While among 136 responses of university students 80(80.1%) respondents think that antibiotic exposure can actually leads to antibiotics resistance & 20(19.9%) respondents think that antibiotic resistance cannot leads to antibiotics resistance (Table 12).

All the 258 respondents were asked whether they believe that antibiotic resistance is contagious or not, out of them 122 respondents were of general population, among which 69(68.9%) respondents believe that antibiotic resistance is contagious & 31(31.1%) respondents believe that antibiotic resistance is not contagious. While 136 respondents were university students among which 73(72.8%) respondents believe that antibiotic resistance is

contagious & 27(27.2%) respondents believe that antibiotic resistance is not contagious (Figure 1).

Table 12: Antibiotic resistance perceptions among participants (University students and general population)

Antibiotic resistance perception		Yes	No
University students (n=136)		109 (80.1%)	27 (19.9%)
General population (n=122)		84 (68.9%)	38 (31.1%)
Contagious	University Students	99 (72.8%)	37 (27.2%
	General population	84 (68.9%)	38 (31.1%)

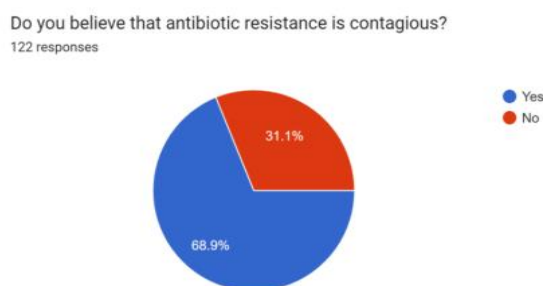Figure 1: Antibiotic resistance in general population.

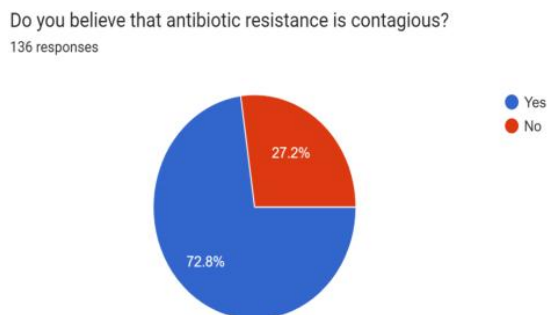Figure 1: Antibiotic resistance in General Population

Figure 2: Antibiotic resistance in university students

DISCUSSION

Antibiotics are life saving drugs, after the discovery of antibiotics the life expectancy increased due to its effectiveness in eradicating and controlling infection but over the years it's misused has increased due to which many of the infection causing agents developed resistance against certain antibiotics.[17] It's a matter of concern because it puts an unnecessary burden on healthcare system and in return increases fatalities. Previously some studies are conducted among the different segments of society to check antibiotics awareness which revealed that inadequate knowledge of antibiotics lead to the self prescription and empirical use because of a previous successful experience and easy availability lead to a resistance in them.[18, 19]

It is commonly recognized that the overuse of antibiotics and the ensuing rapid rise of antibiotic resistance (ABR) pose a threat to sustainability, global development, and health.[20] Although the overall volume of antibiotic usage in general is unquestionably the root cause of ABR, irrational antibiotic use, which is impacted by a number of interconnected factors, is a significant contributing factor.[21] One such study was conducted among nursing students of Karachi which revealed that due to self knowledge about the drug as they are from nursing profession was a key reason for self prescription.[22] Another study was such nature was conducted among no medical students of Karachi revealed that self prescription was also high among them.[23] This self medication is closely related to resistance as we have seen it in a study that was conducted in Malaysian university which doesn't have adequate knowledge and without knowledge they developed MRDS.[4]

A study was conducted in Services hospital of Lahore regarding doctor's prescription of antibiotics. It has also revealed that the resistance is also related to the careless prescription by the doctors.[3] In Pakistan the studies are limited that lead to significant resistance among common Pakistani masses. It had lead to significant amount of resistance in them.[24] Another study was conducted in three different countries Yemen, Saudi Arabia and Uzbekistan. It was to check awareness of instructors in these countries regarding antibiotics. It had shown that the reason for abuse of antibiotics were pharmacies that suggest it without clinical prescription. The self medication was disturbingly high among the instructor that is highly educated.[25] Our study reveals that knowledge and awareness of antibiotics among university students was relatively high as compared to general population. Among 136 respondents 91(91.2%) of the respondents of university knows about antibiotics and 9(8.8%) were unaware of antibiotics. While 76(76.2%) of the respondents of general population know about antibiotics & 24(23.8%) have no knowledge about antibiotics.

Future antimicrobial prescribing interventions should consider the findings of this study for this reason, which include disseminating information on regional resistance rates, promoting confidence in the effectiveness of locally available antibiotics, and promoting an understanding of the fundamental pharmacology of antibiotics. To inform people of the risks associated with the inappropriate use of antibiotics and AMR, national advice and awareness programs should be launched and distributed through the media, social media, and educational institutions.

CONCLUSION

It has been concluded from the study that knowledge & awareness of antibiotics among university students was greater than general population, however self prescription & finding the cause of infection by

antimicrobial testing was slightly high in university students despite of their high knowledge & awareness of the side effects of antibiotics. Future research should concentrate on individual-level characteristics such as doctor-patient interactions and patient satisfaction to better understand the causes of antibiotic self-medication

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