## Original Research Article

# Comparative assessment of antibiotic resistance among first and second year undergraduate medical students in a tertiary care teaching hospital

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### ABSTRACT

**Background:** Antibiotics are one of the commonest prescribing drugs in day to day practice. However indiscriminate and irrational use of antibiotics has given rise to the emergence of antibiotic resistance. Thus, intervention in the form of educating students and making them aware about this important concept should be initiated at the gross root level right from the beginning of medical profession. Objective was to assess the comparative awareness regarding antimicrobial resistance between first and second year MBBS students.

**Methods:** This was a comparative, cross-sectional questionnaire based study. Two forty six undergraduate medical students, 118 students from 1st year and 129 students from 2nd year MBBS were included in the study to assess the extent of knowledge and about the problem of antibiotic resistance. Self-administered questionnaire was used to collect the data from respondents. The questionnaires of both the groups were analyzed for the responses of the students and were compared using student 't' test and chi-square test.

**Results:** Majority of the participants 63.6% and 72.9% had completed the full course of antibiotics as prescribed by the physician. Statistically significant difference (p<0.05) was found between the two groups where in 58.4% of the first year and 16.3% of the second year students were of the view that antibiotics can be used for viral illnesses. Only 44.1% students of first year knew the reasons for antibiotic resistance.

**Conclusions:** It can be concluded from the present study that second year medical students were more aware regarding antimicrobial resistance as compared to first year MBBS students who represented the general public. Thus, it is very important to educate the students in a practical manner about this concept as they are the future health care givers who can promote the rational use of antibiotics in near future.

**Keywords:** Antibiotics, Antibiotic resistance, Awareness, Medical undergraduates

## INTRODUCTION

Antibiotics are the most commonly prescribed drugs in day to day medical practice. However, with the increased prescribing and usage of antibiotics, the problem of irrational prescribing and improper usage is also on the rise.[1] Thereby this has led to the problem of antibiotic resistance due to the emergence of drug-resistant organisms.[2] Thus, antibiotic resistance has become a major public health problem worldwide and thus the whole world is heading towards a post antibiotic era.[3] Various factors have been implicated in the bacterial development of resistance to antibiotics. Resistance could be intrinsic (natural) usually through genetic change.

However, the misuse and overuse of antimicrobials is accelerating this problem.[2]

Antibiotics are overused and misused and often given without professional oversight. Antimicrobial resistant microbes are found in people, animals, food and in the environment i.e. water, soil and air. They can spread between people and animals including from food of animal origin and from person to person. Poor infection control, inadequate sanitary condition and inappropriate food handling encourages the spread of antimicrobial resistance. Even new resistance mechanisms are emerging and spreading globally threatening our ability to treat common infectious diseases resulting in prolonged illness, disability and death.[4,5]

The other factors implicated in the emergence of bacterial resistance are the patient's insisting to write antibiotics, incentives given to the doctors by the pharmaceutical industry in writing particular type of brands, over the counter availability, lack of culture and sensitivity reporting and lack of public awareness regarding the antimicrobial resistance.[6] Antimicrobial resistance increases the cost of healthcare due to lengthier stays in hospital, additional tests, usage of more expensive drugs and more intensive care required. Without effective antimicrobials for prevention and treatment of infections, medical procedures such as organ transplantation, cancer chemotherapy, diabetes management and major surgeries become very high risk.[7] If there were a continuous supply of new and novel antibiotics, then antimicrobial resistance wouldn't be of such a great concern.[8] Therefore, efforts are being made to reduce the rate and curb the extent of antimicrobial resistance by raising awareness in the community at large and targeting the public specifically.[8]

Therefore, coordinated action from all the stakeholders is required to minimize the emergence and spread of antimicrobial resistance. Greater innovations and investments are required in research and development of new antimicrobial medicines, vaccines and diagnostic tools.[3] Moreover to overcome the problem of antimicrobial resistance effective interventions must be enforced by the government but mere imposition of rules and regulations can't mitigate this problem.[9,10] Thus, to entangle with this problem more effectively the general public must be sensitized and educated by the health care professionals.[11] Therefore, it is very necessary to make healthcare professionals aware of this global health problem so that they can make choice of the use of antimicrobials properly and rationally from the very beginning and can make people aware of this problem effectively.[11] Thus, in view of this the present study was planned to analyze the awareness of undergraduate medical students of 1st and 2nd year as it is really important to make students sensitized of this growing problem of antimicrobial resistance as they are the future health care givers and will be the future prescribers of drugs. Since the 2nd year students were taught about the topic of antimicrobials and the developing resistance to these drugs in pharmacology theory classes, therefore a baseline assessment of awareness of both 2nd and 1st year medical students was done and after that a comparative assessment of awareness was also done between the two groups as the 1st year medical students generally represents the general public without any prior education regarding the antimicrobial resistance. This will help in taking up the appropriate interventions and future educational initiatives in this regard.

## METHODS

A comparative cross-sectional questionnaire-based observational study was conducted in Acharaya Shri Chander College of Medical Sciences and Hospital, Sidhra, Jammu, J and K in the month of April and May 2017. Institutional Ethical Committee approval was taken before commencement of the study. Two forty six undergraduate medical students 118 students from 1st year and 129 students from 2nd year MBBS were included in the study to assess the extent of knowledge and awareness about the problem of antibiotic resistance The students who were not willing to participate in the study were excluded. Self-administered questionnaire was used to collect the data from respondents. The purpose of the study was explained and written informed consent was obtained from all the participants before being given the questionnaires. The questionnaire was developed based on the objective of the study and it was validated by conducting a pilot study on a sample of twenty undergraduate MBBS students from 1st and 2nd year who were excluded from the study.

The final questionnaire consists of two parts. The first part pertained to a collection of demographic information of the students (age, gender, year of study). The second part of the questionnaire contained questions pertained to antimicrobial resistance. The students were given 30 minutes to fill the questionnaire. First of all, the 1st year MBBS students were given the questionnaires and on the same day 2nd year students were also given the questionnaires and were also instructed to fill the questionnaires in given stipulated time of 30 minutes. The questionnaires of both the groups were analyzed for the responses of the students with the help of descriptive statistics and were compared using student 't' test and chi-square test.

## RESULTS

The present comparative, cross-sectional study was carried out on undergraduate medical students 118 of first year MBBS and 129 of second year MBBS students. Majority of the participants 63.6% and 72.9% had completed the full course of antibiotics as prescribed by the physician. Statistically significant difference (p<0.05) was found between the two groups where in 58.4% of the first year and 16.3% of the second year students were of the view that antibiotics can be used for viral illnesses.

Majority of the students 91.5% of first year and all 2nd year students were aware of the term antibiotic resistance (p<0.01). However, only 44.1% students of first year knew the reasons for antibiotic resistance. The details of the questions regarding antibiotic awareness and the comparative responses between group 1 and group 2 are enlisted in Table 1.

**Table 1: Comparison of antibiotic awareness between first and second year medical students.**

| S.no. | Questions | First year (n=118) | | Second year (n=129) | | |
|---|---|---|---|---|---|---|
| | | Yes (%) | No (%) | Yes (%) | No (%) | p-value |
| Q1 | Are you aware of antibiotic resistance | 108(91.5) | 10(8.5) | 129(100) | 0(0) | 0.01 |
| Q2 | Do you complete the full course of antibiotic prescribed by the physician | 75(63.6) | 43(36.4) | 94(72.9) | 35(27.1) | 0.12 |
| Q3 | Do you always take antibiotics as prescribed by the physician | 104(88.1) | 14(11.9) | 110(85.3) | 19(14.7) | 0.51 |
| Q4 | Do you take antibiotics prophylactically | 42(35.6) | 76(64.4) | 25(19.4) | 104(80.6) | 0.01 |
| Q5 | Do you think that antibiotics should be taken for viral illnesses like common cold, flu etc. | 69(58.4) | 49(41.6) | 21(16.3) | 108(83.7) | 0.01 |
| Q6 | Do you save the remaining leftover antibiotics for future | 69(58.5) | 49(41.5) | 71(55.1) | 58(44.9) | 0.67 |
| Q7 | Do you think that taking antibiotics for inadequate duration of time leads to antibiotic resistance | 91(77.1) | 27(22.9) | 105(81.4) | 24(18.6) | 0.43 |
| Q8 | Do you know the reasons for antibiotic resistance | 52(44.1) | 66(55.9) | 126(97.7) | 3(2.3) | 0.01 |
| Q9 | Do you think that high population density contributes to antibiotic resistance | 45(38.1) | 73(61.9) | 33(25.6) | 96(74.4) | 0.04 |
| Q10 | Do you think that antibiotics used in animals can lead to antibiotic resistance | 41(34.7) | 77(65.3) | 45(34.9) | 84(65.1) | 0.98 |
| Q11 | Do you think that skipping one or two doses doesn't lead to antibiotic resistance | 60(50.9) | 58(49.1) | 52(40.3) | 77(59.7) | 0.07 |
| Q12 | Do you think that use of higher antibiotics as initial therapy for mild infections may increase the risk of antibiotic resistance | 83(70.3) | 35(29.7) | 121(93.8) | 8(6.2) | 0.01 |

**Table 2: Source of awareness about antibiotic resistance for first time.**

| Source | First year (n=118) | Second year (129) |
|---|---|---|
| Newspaper | 33(27.9) | 31(24%) |
| Media/Internet | 21(17.8) | 23 (17.8) |
| Friends/Relatives/Home | 16(13.6) | 14 (10.8) |
| Medical College | 28(23.7) | 47 (36.4) |
| School | 5(4.2) | 6 (4.6) |
| Books/Journals/Magazines | 9(7.6) | 3 (2.3) |
| Doctor | 6(5.1) | 5 (3.9) |

Table 2 shows the sources of information about antibiotic resistance among medical students. From the table it can be seen that newspapers 27.9% were the main source of information regarding antibiotic resistance among the first year MBBS students and medical colleges in 36.4% of the students was the main source among 2nd year MBBS students. Table 3 shows the responses of the first and second year MBBS students regarding the consequences of antimicrobial resistance.

**Table 3: Consequences of antimicrobial resistance as per student's opinion.**

| | First year (n=118) | Second year (n=129) |
|---|---|---|
| Prolongation of illness | 22(18.6) | 15(11.6) |
| Lengthier stays in hospital | 16(13.6) | 6(4.7) |
| Increase in cost of healthcare | 43(36.4) | 21(16.3) |
| All of the above | 37(31.4) | 87(67.4) |

## DISCUSSION

Antibiotic resistance is a global problem. Emergence of antibiotic resistance is mainly due to excessive and often unnecessary use of antibiotics. The spread of antibiotic resistant bacteria in hospital and other places can be attributed to overcrowding, poor sanitation and hygiene.[3] Thus the knowledge about antimicrobial resistance and important risk factors associated with it and its consequences should be imparted to medical students.[11] Knowledge and awareness about antimicrobial resistance must start from gross root level. So, it is important to test whether the knowledge imparted is adequate and meets

the desired goal in curbing antimicrobial resistance. Therefore, this study was planned to assess awareness about antibiotic resistance among first and second year medical students.

In the present study, about 91.5% of the students in first year and all the students of second year MBBS were aware of the term antibiotic resistance. This is in consistent with previously published studies.[12] However, only 44.1% in first year but 97.7% in second year knew about the risk factors and the reasons that lead to the development of antibiotic resistance. This is in consistent with the previously published studies.[11] Many risk factors like overcrowding, urbanization has led to the emergence of antimicrobial resistance due to the contact dissemination of resistant bacteria from person to person. In the present study, 58.4% students of first year and 16.3% of students of second year believed that antibiotics need to be prescribed for simple viral illnesses. This is consistent with the previously published studies.[9] Unnecessary usage and use of antibiotics in medical conditions where they are not indicated can also lead to the emergence of resistance.

In the present study, as far as consequences of antimicrobial resistance are concerned, 67.4% of the second year students were of the view that antimicrobial resistance can give rise to prolongation of illness, lengthier stay in hospital and increase in cost of healthcare. However, when first year students were enquired about the various consequences of antimicrobial resistance then about 36.4% of the students cited the increase in the cost of healthcare as the commonest consequence of antimicrobial resistance. This is in consistent with the previously published studies.[13] In the present study, main source of gaining information regarding antimicrobial resistance was newspapers by 27.9% of first year students whereas according to 36.4% of second year students their main source of gaining information about antimicrobial resistance are the medical colleges. This is in concordance with the previously published studies.[12,14] Students must be imparted knowledge regarding antimicrobial resistance and the risk factors associated and the mechanisms that lead to antibiotic resistance. Thus, education is the major intervention in making students aware of the important concept of antimicrobial resistance. This will also promote the rational use of antimicrobials in near future.

## CONCLUSION

From the present study it can be concluded that second year medical students were more aware regarding antimicrobial resistance as compared to first year MBBS students. The second year students had already been taught about the topic of antimicrobial resistance whereas the first year students represented the general public. Thus, it is very important to educate the students properly and in a practical manner about this concept as they are the future health care givers. This will also promote the rational use of antimicrobials in near future.

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