A Questionnaire based Survey on the Knowledge, Attitude and Practises about Antimicrobial Resistance and Usage among the Second year MBBS Students of a Teaching tertiary care Hospital in Central India

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Abstract
Context: Antibiotic resistance (ABR) is an important growing global health issue which needs urgent addressal. Judicious use of antibiotics is the only solution to curb this problem. Awareness of this fact among UG students, who are the future physicians is extremely vital.
Aims: To assess the knowledge, attitude and practices (KAP) related to antibiotic resistance and usage in UG students.
Methods and Design: The questionnaire was distributed to a batch of 86 medical students in their second year of MBBS, whereby their KAP regarding antibiotic use and resistance was assessed by a five point Likert scale, whose responses ranged from ‘strongly agree’ to ‘strongly disagree,’ and ‘always’ to ‘never.’ Some questions were of true and false type.

Statistical analysis: The data was analyzed by using simple descriptive statistics to generate frequencies, percentages and proportions. Wherever it was relevant, the Chi-square test was used to determine any significant difference.

Results: Indiscriminate antimicrobial use leads to the emergence of the growing problem of resistance was known to all n=86(100%) of the participants. The number of respondents who agreed that ABR was an important and a serious global public health issue was 83(96.51%). Ninety four per cent (n = 81) of the respondents were aware that bacteria were not responsible for causing colds and flu.

Conclusions: Our study provides an important insight regarding the knowledge, attitudes and practices regarding antibiotic resistance and usage among the future doctors, which can be considered, in order to plan for an effective undergraduate curriculum.
Keywords: Knowledge, Antibiotic resistance, Indiscriminate use

1. Introduction
   Antimicrobial agents are one of the most commonly used as well as misused drugs. They were viewed as magical bullets when first introduced into clinical practice. However it became evident rather soon after the discovery of penicillin that resistance developed quickly, terminating the magic. This serious development is ever present with each new antimicrobial agent and threatens the end of the antimicrobial era. This is mostly aided by irrational practices of healthcare professionals that fail to incorporate the pharmacological properties of antimicrobials, as well as indiscriminate use of antibiotics. Overprescribing remains widespread, driven largely by diagnostic uncertainty, patient demand and time pressure on clinicians. Rational antibiotic use is thought to be the best way to control resistance.

   Thus, it has been emphasised that adequate training should be provided for the undergraduate medical students regarding the proper prescribing, dispensing and the usage of antibiotics. This important measure will help to promote the judicious use of antibiotics.

   So, this study was undertaken among second year undergraduate medical students, in order to assess their knowledge and attitude concerning antibiotic resistance and self reported practices which are related to antibiotic usage.

2. Subjects and Methods
2.1 Study design
   This study was a cross-sectional, questionnaire based survey which was undertaken in the Department of Pharmacology and Therapeutics of a teaching hospital in Central India conducted between June 2014 and July 2014. The questionnaire which we used was developed by modifying the earlier ones which were used by Wester et al.*, Eng et al.*, and others6-9 with prior permission. The questionnaire was validated by subject experts for its content and relevance.
2.2 Sample size
The questionnaire was distributed to a batch of 86 medical students in their second year of MBBS, during one of their pharmacology classes.

2.3 Study procedure
The Institutional Ethics Committee permission was taken prior to initiation of the study. Each participant was allotted 20 minutes to answer the questionnaire in the form of options which he/she feels is appropriate to answer. They were asked to complete the questionnaire anonymously. Informed consent was obtained from the participants, to utilise their data for research purposes. The questionnaire given in Figure 1 consisted of several parts.

Kindly spare a few minutes to sincerely fill this questionnaire

I. Demographic data:
AGE-....... SEX-....... ADDRESS-.................................................................

II. Reply with True or false or uncertain:
1.) Indiscriminate antimicrobial use leads to the emergence of the growing problem of resistance-...............
2.) Antimicrobial resistance means that if they are taken too often, antimicrobials are less likely to work in the future-...............
3.) Bacteria cause common cold and influenza-..........................
4.) Antibiotic Resistance is an important and serious global public health issue- ..................
5.) Ineffective treatment can occur due to indiscriminate and injudicious antimicrobial use-

III. Reply with: Strongly agree, somewhat agree, undecided, somewhat disagree, strongly disagree:
6.) Antibiotics are safe drugs, hence they can be commonly used medication

........................................
7.) Skipping one or two doses does not contribute to the development of antibiotic resistance. ...............
8.) Adverse effects of antimicrobials are reduced by using more than one antimicrobial at a time-.............
9.) Injudicious use of antimicrobials shortens the duration of illness-..................
10.) When you have a cough and sore throat, antimicrobials are the first drug of choice for early treatment and to prevent emergence of resistant strains-..................

IV. Reply with always, usually, sometimes, never:
11.) The Doctor prescribes a course of antibiotic for you. After taking 2-3 doses you start feeling better.
   a) Do you stop taking the further treatment?  ......................
   b) Do you save the remaining antibiotics for the next time you get sick? ..............................
   c) Do you discard the remaining, leftover medication?  ...................
   d) Do you give the leftover antibiotics to your friend/roommate if they get sick?  .................
   e) Do you complete the full course of treatment? ..........................

12.) Do you consult a doctor before starting an antibiotic?  ......................

13.) Do you check the expiry date of the antibiotic before using it?  ................

14.) Do you prefer to take an antibiotic when you have cough and sore throat?  ................

15.) What according to you is the solution for the growing problem of Antimicrobial Resistance?..........................

- The first part (I) pertained to a collection of demographic information of the students: Age, gender, address.
- The questions in the second part (II) of the questionnaire assessed the students’ knowledge about antibiotic resistance and usage. The participants’ knowledge was assessed by using a set of true and false questions and the results were tabulated as percentages as shown in Table 1.
- The third part (III) of the questionnaire addressed questions related to their practices related to use of antimicrobials. These questions were intended to study the attitude of the participants regarding antibiotic resistance and usage. They were analyzed by using a 5-point Likert scale, whose responses ranged from ‘strongly agree’ to ‘strongly disagree’ and the results were tabulated as percentages as shown in Table 2.
- The fourth part (IV) of the questionnaire addressed questions related to their self reported practices regarding antibiotic usage. They were also assessed by using a Likert scale which ranged from ‘always’ to ‘never and the results were tabulated as percentages as shown in Table 3.

In order to simplify the analysis, we reduced the five point response options of the Likert scale into three, such as true/false/uncertain, agree/disagree/uncertain and yes/no/uncertain.

The possible answers “strongly agree” and “agree” were considered as a “positive” answer, while the possible answers “disagree” and “strongly disagree” were considered as a “negative” answer and remaining were uncertain.
The possible answers “always” and “usually” were considered as a “yes” answer, while the possible answers “never” were considered as a “no” answer and possible answers “sometimes” were considered as uncertain.

- Finally in the last part (V) of the questionnaire, participants were asked an open ended question to give solutions to curb this growing problem of antimicrobial resistance and their replies are tabulated in Table 4.

3. Results

The response rate was 100 per cent among the 86 medical students who were asked to participate in the survey. The results are tabulated as percentages in Table1, Table 2, Table 3 and Table 4.

### Table 1

<table>
<thead>
<tr>
<th>Q. No.</th>
<th>Question</th>
<th>True N (%)</th>
<th>False N (%)</th>
<th>Uncertain N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Indiscriminate antimicrobial use leads to the emergence of the growing problem of resistance</td>
<td>86(100%)</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Antimicrobial resistance means that if they are taken too often, antimicrobials are less likely to work in the future</td>
<td>78(90.69%)</td>
<td>8(9.31%)</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Bacteria cause common cold and influenza</td>
<td>5(5.81%)</td>
<td>81(94.19%)</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Antibiotic Resistance is an important and serious global public health issue</td>
<td>83(96.51%)</td>
<td>3(3.49%)</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Ineffective treatment can occur due to indiscriminate and injudicious antimicrobial use</td>
<td>75(87.20%)</td>
<td>11(12.8%)</td>
<td>-</td>
</tr>
</tbody>
</table>

### Table 2

<table>
<thead>
<tr>
<th>Q. No.</th>
<th>Question</th>
<th>Agree N (%)</th>
<th>Disagree N (%)</th>
<th>Uncertain N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Antibiotics are safe drugs, hence they can be commonly used medication</td>
<td>37(43.02%)</td>
<td>49(56.98%)</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Skipping one or two doses does not contribute to the development of antibiotic resistance</td>
<td>27(31.39%)</td>
<td>57(68.61%)</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Adverse effects of antimicrobials are reduced by using more than one antimicrobial at a time</td>
<td>42(48.83%)</td>
<td>42(48.83%)</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Injudicious use of antimicrobials shortens the duration of illness</td>
<td>16(18.60%)</td>
<td>70(81.4%)</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>When you have a cough and sore throat, antimicrobials are the first drug of choice for early treatment and to prevent emergence of resistant strains</td>
<td>45(52.32%)</td>
<td>40(47.68%)</td>
<td>1</td>
</tr>
</tbody>
</table>

### Table 3

<table>
<thead>
<tr>
<th>Q.No.</th>
<th>Question</th>
<th>Yes N(%)</th>
<th>No N(%)</th>
<th>Uncertain N(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11(a)</td>
<td>Do you stop taking the further treatment?</td>
<td>11(12.7%)</td>
<td>73(87.3%)</td>
<td>2</td>
</tr>
<tr>
<td>11(b)</td>
<td>Do you save the remaining antibiotics for the next time you get sick?</td>
<td>21(24.41%)</td>
<td>62(75.59%)</td>
<td>3</td>
</tr>
<tr>
<td>11(c)</td>
<td>Do you discard the remaining, leftover medication?</td>
<td>18(20.93%)</td>
<td>64(79.07%)</td>
<td>4</td>
</tr>
<tr>
<td>11(d)</td>
<td>Do you give the leftover antibiotics to your friend/roommate if they get sick?</td>
<td>31(36.04%)</td>
<td>51(63.96%)</td>
<td>4</td>
</tr>
<tr>
<td>11(e)</td>
<td>Do you complete the full course of treatment?</td>
<td>81(94.18%)</td>
<td>5(5.82%)</td>
<td>-</td>
</tr>
<tr>
<td>12</td>
<td>Do you consult a doctor before starting an antibiotic?</td>
<td>80(93.02%)</td>
<td>6(6.98%)</td>
<td>-</td>
</tr>
<tr>
<td>13</td>
<td>Do you check the expiry date of the antibiotic before using it?</td>
<td>86(100%)</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>14</td>
<td>Do you prefer to take an antibiotic when you have cough and sore throat?</td>
<td>46(53.48%)</td>
<td>38(46.52%)</td>
<td>2</td>
</tr>
</tbody>
</table>

### Table 4

| 15.)What according to you is the solution for the growing problem of Antimicrobial Resistance? | Yes N(%) |
| Judicious, careful and rational use of medicines                                      | 29(33.72%) |
| Complete the full course of antimicrobials in the prescribed dose                       | 16(18.64%) |
| Avoid self medication                                                                  | 12(13.95%) |
| Multidrug therapy                                                                      | 8(9.30%) |
| Symptomatic management in self limiting conditions                                     | 7(8.13%) |
| Awareness among patients by organising public health campaigns                          | 5(5.81%) |
| No response                                                                            | 5(5.81%) |
| Prescribe using culture sensitivity reports                                             | 3(3.48%) |
| New drug discovery                                                                     | 1(1.16%) |

Our study provides useful information about the knowledge, attitudes, perceptions and the practices of second year medical students with respect to antibiotic resistance and usage.

Out of study participants, 96.51% (n=83) of the students were aware that antibiotic resistance is an important and serious global public health issue. All the student participants (100%) in the survey were aware that indiscriminate...
antimicrobial use leads to the emergence of the growing problem of resistance. Seventy eight students (90.69%) believed that if antimicrobials are taken too often, they are less likely to work in the future.

However, the attitude of the study participants with regards to antibiotic use and resistance was found to be casual and lax. Forty two of the students (48.33%) believed that adverse effects of antimicrobials are reduced by using more than one antimicrobial at a time. Forty five (52 %) of them reported that antibiotics should be taken on developing a cold and 18% of them believed that taking antibiotics on having a cold made them feel better more quickly. Sixty eight percent (n=57) however knew that incomplete therapy using antimicrobials can cause resistance.

Thirty seven (43.02%) participants believed that antibiotics were safe drugs; and hence they could be commonly used. 46(53.48%) preferred to take an antibiotic when they had cough and sore throat. Five per cent (n = 5) were not knowledgeable of the fact that bacteria were not responsible for causing cold and flu. Forty five students (52.32%) thought that antimicrobials are the first drug of choice to prevent the emergence of resistant strains.

A majority; 80 (93.02 %) always consulted a doctor before starting on an antibiotic and most of them 81(94.18 %) always completed the full course of the prescribed treatment. All the participants (100%) checked the expiry date before using antimicrobials.

Lastly, the participants were asked an open ended question, to recommend a solution to curb this growing problem of antimicrobial resistance. Their replies are tabulated in table 4.

4. Discussion

The emergence of bacterial strains resistant to antimicrobial agents presents a growing concern worldwide. Among other factors, the irrational use of antibiotics has contributed to the progressive loss of bacterial sensitivity to antibiotics and spreading of resistant strains of bacteria, with substantial clinical and economic impact.

The clinical effectiveness of antibiotics depends partially on their correct use, depending on patients, physicians and retailers. Physicians' decisions may be influenced by several factors such as the fear of losing a patient's trust, the lack of correct information on indications for antibiotic use and pressure from patients and families. Patient factors relating to incorrect antibiotic use include self-medication, sharing medication with other people, not taking a full course of treatment and keeping part of the course for another occasion.

A majority of the students in our study were well aware of the global as well as the nationwide problem of antimicrobial resistance, but they used antimicrobials irresponsibly. But surprisingly, in spite of this casual attitude, the self reported practices of our study participants with regards to antibiotic use were found to be satisfactory.

Since there is no restriction on Over The Counter (OTC) dispensing of antibiotics without prescription, any antibiotic, including higher-end ones, can be purchased OTC without prescription. Previous studies have shown high rates of self medication (35%) amongst medical students with respect to antibiotics. However, this was not the case with our participants. A majority of the participants always consulted a doctor before starting on an antibiotic and most of them always completed the full course of the prescribed treatment.

Another similar study has reported that more than 60 % of the participants believed that antibiotics should be prescribed for viral illnesses assuming bacterial etiology. Such wrong beliefs may lead to inappropriately high rates of antibiotic consumption, which can result in a corresponding increase in the bacterial resistance. But in our study, majority of the participants were aware that diseases like influenza and common cold are not of bacterial etiology and hence they did not recommend antimicrobial drugs.

Apart from teaching about antibiotic prescribing, the principles of the protocol development for antibiotic use in health care facilities, should form an integral part of the undergraduate teaching. Learning about the antimicrobial prescribing in pharmacology must be connected clearly with the infection control in microbiology. Simple measures like hand hygiene which are emphasised in the lectures, for the control of resistance should be inculcated in day to day life. The medical education strategies should aim, not only to increase the knowledge, but also to change the behaviour and practices among medical students. They have to be tailored as per the youngsters development, capabilities and experience.

5. Conclusion

Our study provides an important insight regarding the knowledge, attitudes, perceptions and practices regarding antibiotic resistance and usage among the future doctors, which can be considered, in order to plan for an effective undergraduate curriculum.

Limitations

The main limitation of this study is that the data provided is of local interest. It is based on a convenience sample which involved only one batch of second year medical students from one single teaching hospital.

Key Messages

Antibiotic resistance (ABR) is an important global health issue which needs urgent addressal. Judicious use of antibiotics is the only solution. Our study provides an important insight regarding the knowledge, attitudes and practices regarding ABR and usage among UG students, which will help to plan for an effective undergraduate curriculum.
References