

RESEARCH ARTICLE

Knowledge, attitude and practice towards antibiotic use: An interventional study among medical and dental undergraduates

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ABSTRACT

Background: Adequate importance should be given to antimicrobial chemotherapy and the antibiotics resistance issues during undergraduate training. For successful and sustained intervention, knowledge, attitudes, and practices (KAP) of antimicrobials should be done. So accordingly, this study was planned. **Aim and Objective:** The aim of the study was to compare KAP of antibiotic use among the 2nd year medical and dental students before and after intervention. **Materials and Methods:** Questionnaire-based study was done in medical and dental undergraduate students. After taking consent, responses were collected before and after intervention. Each correct response was given a score of 1 and responses were graded as satisfactory and unsatisfactory. Data collected was statistically analyzed using Microsoft Excel 2010 and results were expressed in percentage. Paired t-test was used to analyze pre and post-interventional data. **Results:** Significant rise in mean Knowledge, attitude, practice, and overall scores after intervention in medical and dental students were observed. Satisfactory responses were significantly reduced from 73% to 63% in medical students. Casual attitude towards self-use and irregular use of antimicrobial agents (AMA) was observed which may lead to antibiotic resistance. Significant improvement in overall satisfactory responses was also observed after intervention. **Conclusion:** Medical and dental students showed improved knowledge about AMA use and antimicrobial resistance (AMR) after pharmacology teaching. However, predominant low scores of attitude and perception indicate the need for further educational interventions such as small group exercises, prescription audits, frequent discussion on rational pharmacotherapy, skillful communication with the patient about prescription. To reduce AMR, students should be trained about AMA use and its adherence by patients as well.


KEY WORDS: Knowledge; attitudes and practices; Intervention; Antimicrobial agents; Antibiotic Resistance

INTRODUCTION

Antibiotics have been used in the management and treatment of infectious diseases. It is, therefore, one of the most commonly prescribed, used, and misused

drugs worldwide.^[1] This use, which could be indiscriminate, has been viewed as a key factor for the emergence of antibiotic resistance.^[2] Antibiotics are available without prescription and so individuals use it indiscriminately. General population should be instructed and educated and the health care providers^[3] should be told about antibiotic resistance and its dangerous consequences.^[4]

Adequate importance should be given to antimicrobial chemotherapy and the antimicrobial resistance (AMR) issues during undergraduate training. For successful and sustained intervention, knowledge, attitudes and practice (KAP) towards

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these aspects should be modified.^[5] According to WHO, antimicrobial agents (AMA) should be used appropriately which are economical, having more efficacy with less adverse reactions so that AMR will not be developed.^[6] Yet most of the health care providers do not follow the global strategy as well as interventions to curtail chances of AMR.

This study was conducted to determine the KAP concerning AMA usage in undergraduate medical and dental students before and after the intervention of complete antimicrobial teaching. The comparison was done to assess KAP of these students regarding AMA usage.

MATERIALS AND METHODS

The study was initiated after the approval of the Institutional Ethics Committee. (Ref: BVDUMC/MC/E25 dated 17/03/2016) The procedure of the study was explained to the students. Written informed consent was taken from the students and they were assured about the confidentiality of the data. An interventional questionnaire-based study was undertaken in the Medical and Dental College of Bharati Vidyapeeth, Pune in Western Maharashtra, India from April 2016 to August 2016. The questionnaire used by Wester *et al.*^[7] and Karandikar *et al.*^[8] was used in this study with some modifications. It was reviewed for its content, design, relevance, readability and comprehension and validated by the faculty members of the department. The 2nd year medical (batch of 150 students) and dental (batch of 100 students) undergraduate students were explored to the questionnaire.

Study Procedure

Self-administered questionnaires were distributed to the students. It had demographic variables such as age, gender, and address. It also had 21 questions of knowledge, 7 questions of attitude, and 15 questions of practice regarding AMA use and AMR. The same questionnaire was used after intervention. 3-point Likert scale, agree/disagree/uncertain was used for the attitude part of the questionnaire. The antimicrobial teaching intervention was done in form of lectures, tutorials, case studies, etc which lasted for about 3 months of training sessions. Score 1 was given to each correct response in all the sections of the questionnaire. Hence, there were maximum scores of 21, 7 and 15 in knowledge, attitude, and practice section, respectively. Responses were graded as satisfactory and unsatisfactory depending upon mean scores.

Statistical Analysis

Data collected was statistically analyzed using Microsoft Excel 2010 and results were expressed in percentages. Quantitative variables were mentioned as Mean \pm Standard Deviation (\pm SD). Paired “*t*” test was used to test average

difference in means of pre and post-intervention analysis. $P < 0.05$ was considered statistically significant.

RESULTS

Participants in this study were II- year Medical (121) and Dental (73) students. Mean ages of medical and dental participants were 19.95 ± 0.09 years and 19.65 ± 0.79 years respectively.

Improvement in knowledge was specifically observed about the initiation and purpose of using AMAs. 98% medical and 90% of dental students would start AMAs only after prescription of the doctor. Improvement of knowledge about over-the-counter use of AMAs, use according to doctor's advice was also improved. Though overall knowledge about the purpose and duration of AMAs was improved after intervention in both medical and dental student groups, knowledge about AMR was increased, especially in dental students [Table 1].

Post-intervention analysis of overall attitude showed no significant improvement in medical as well as dental students. However, improvement in attitude was mainly seen in medical and dental students for considering treating doctor as good/bad doctor (88% and 80% respectively). Attitude toward the development of AMR due to missing doses of AMA was improved in medical students. However, to our surprise, reduced attitude in these students was observed towards self and irregular use of AMA after intervention. (84% to 55% and 83% to 51%, respectively). About 11% and 17% of the students had not made their minds clear (opted uncertain) regarding self-use of AMA and their irregular use respectively. [Figure 1].

Improvement in practice about the source and ineffectiveness of AMA was noted mainly in dental students. However, practice towards checking expiry date of AMA and completing the full course of treatment was better in medical as well as dental students. Opinion about using AMA for cough and sore throat was comparable both in medical and dental students even after intervention [Table 2].

Statistical significant improvement in pre-mean score of practice and overall scores of medical students was observed as compared to pre-mean score of dental students. Also significant improvement was seen in post-mean score of knowledge and attitude of medical students as compared to post-mean score of dental students. Results of paired *t* test demonstrated statistically significant rise in knowledge, attitude, practice and overall scores after intervention in medical as well as dental students [Figure 2].

Figure 3 depicts comparison of satisfactory scores of Knowledge, attitude, practice and overall scores among the study population. Significant reduction of satisfactory

Table 1: AMA: Knowledge among medical and dental students

Questions	Correct response	Medical Students		Dental Students	
		Pre-intervention (%)	Post-intervention (%)	Pre-intervention (%)	Post-intervention (%)
A. AMA are used					
1. To reduce temperature	False	50	68	25	38
2. To overcome pain	False	74	91	38	92
3. To overcome malaise and fatigue	False	76	91	49	81
4. To treat common cold	False	59	69	25	53
5. To treat infections	True	93	97	90	88
B. AMA course initiated:					
1. if they are found at home in order not to waste time	False	84	97	49	74
2. only on doctor's prescription	True	90	98	93	90
3. by following over the counter practice	False	63	81	47	61
C. Period of drug use is:					
1. Until drug is finished	False	77	87	48	81
2. Until the symptoms disappear	False	70	83	42	82
3. according to doctor's prescription	True	90	88	86	87
D. Time of administration of a drug is					
1. Morning and Night	False	74	89	42	89
2. Once a day	False	78	90	42	72
3. As per doctor's advice	True	88	93	90	87
E. AMA use:					
1. AMA not used appropriately will lead to some danger	True	92	96	81	82
F. Adverse effects					
1. Avoid AMA if that AMA had produced some allergic reaction previously	True	82	81	78	88
2. AMA alters bacterial flora in the body	True	77	85	51	92
3. AMA decreases the body's own capacity to fight off infections	True	70	72	62	84
G. Resistance					
1. Indiscriminate AMA use leads to problem of AMR	True	90	87	64	82
2. Inappropriate AMA use leads to problem of AMR	True	93	90	67	89
3. AMR is public health issue worldwide	True	93	91	67	93

AMR: Antimicrobial resistance, AMA: Antimicrobial agents

knowledge was seen in medical and dental students after intervention. However, significant improvement of satisfactory levels of attitude, practice and overall scores was observed in medical students after intervention. Satisfactory level of practice and overall score was significantly improved in dental students after intervention.

DISCUSSION

In modern medicine AMAs are very important and their resistance leads to many problems to mankind all over the world. To reduce AMA resistance, unnecessary use of

AMA should be prohibited.^[9] Appropriate and justified use of AMA will not contribute to the emergence of resistance, but unnecessary and too much of use will definitely lead to worsening of the situation.^[10] AMR prevalence will change drastically between and within countries and between different pathogens.^[11] In developing countries, AMA misuse is facilitated by their availability as over-the-counter sale, without prescription, and through unregulated supply chain.^[10] Significant improvement in post-intervention means of knowledge score was observed [Figure 2], but satisfactory responses were significantly reduced [Figure 3]. The reason for this reduction is improvement in post-intervention knowledge mean (from 11.32 to 16.70). Satisfactory

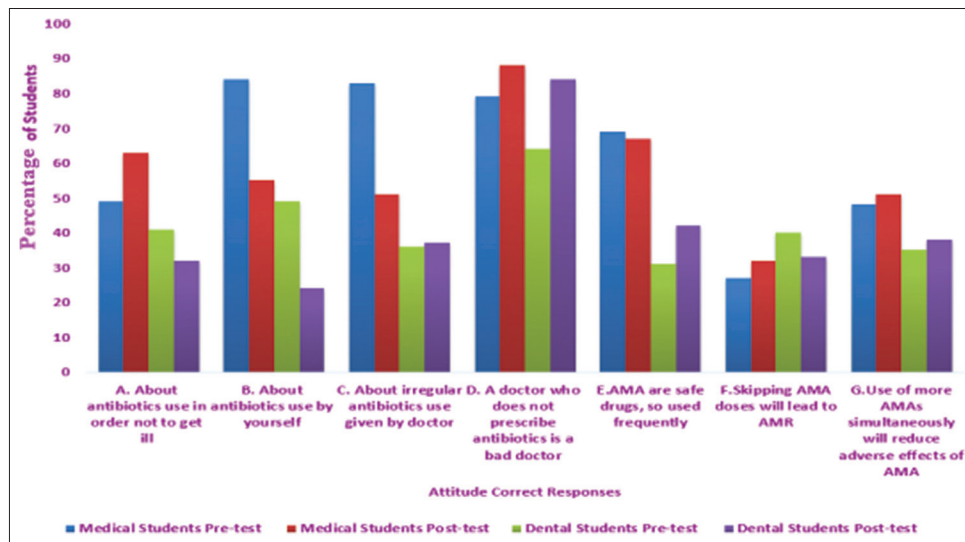


Figure 1: Antimicrobial resistance: Attitude among medical and dental students

Table 2: Antimicrobial agents: Practice among undergraduate students

Questions	Correct response	Medical students		Dental students	
		Pre-intervention (%)	Post-intervention (%)	Pre-intervention (%)	Post-intervention (%)
A. If AMA is ineffective					
1. I will stop the AMA and go back to the treating physician	Disagree	33	35	15	46
2. I will stop the AMA and visit another physician	Disagree	69	68	45	73
3. I will complete the course of same AMA	Agree	74	77	56	67
4. I will use other antibiotics of my own choice	Disagree	87	90	64	81
B. During last illness, I got AMA by:					
1. my friends' advice	Disagree	76	84	59	88
2. previously prescribed by my doctor	Disagree	50	51	25	68
3. visit to physician and as per prescription	Agree	84	80	80	85
4. from the pharmacist (over-the-counter)	Disagree	69	78	48	82
C. After effective few AMA doses, I will					
1. Not take further treatment	Disagree	82	73	53	94
2. Save the remaining AMA for the next time	Disagree	78	82	59	85
3. Discard the remaining leftover medication	Disagree	58	67	47	76
4. Give the leftover AMA to my friends if they get sick	Disagree	71	82	58	82
5. Complete the full course of treatment	Agree	88	89	82	87
6. Check the expiry date of the antibiotic before using it	Agree	85	96	75	88
7. Prefer to take an AMA when I have cough and sore throat	Disagree	44	56	29	44

AMR: Antimicrobial resistance, AMA: Antimicrobial agents

knowledge of dental students was reduced as compared with medical students. Similar observation was made by Marwa *et al.*^[12] Different stakeholders and health agencies are raising concern that AMR is a global public health problem and potential threat to mankind and we need to fight out this menace urgently. Khan *et al.*^[13] observed the same among

undergraduate medical students. Self-medication holds key to the development of antibiotic resistance. The study done by Shubha *et al.*^[14] and Zafar *et al.*^[15] demonstrated that there is increase incidence of self medication in dental and university students which contradicts this study. Complete course of the prescribed treatment was followed by most of them. AMAs

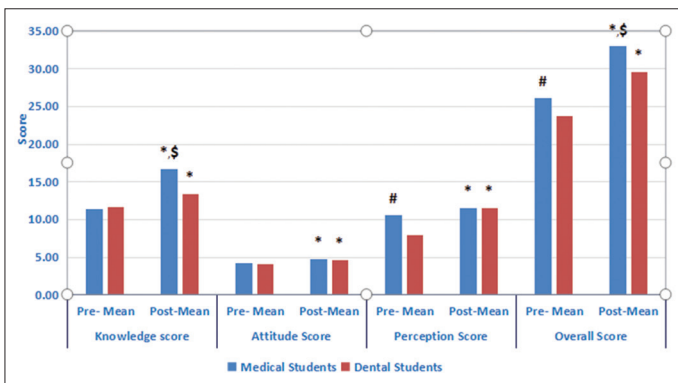


Figure 2: Comparison between knowledge, attitude, practice and overall scores. *– $P < 0.001$ as compared to Pre-mean value of medical and dental students, #– $P < 0.001$ as compared to Pre-mean value of dental students, \$– $P < 0.001$ as compared to post-mean value of dental students

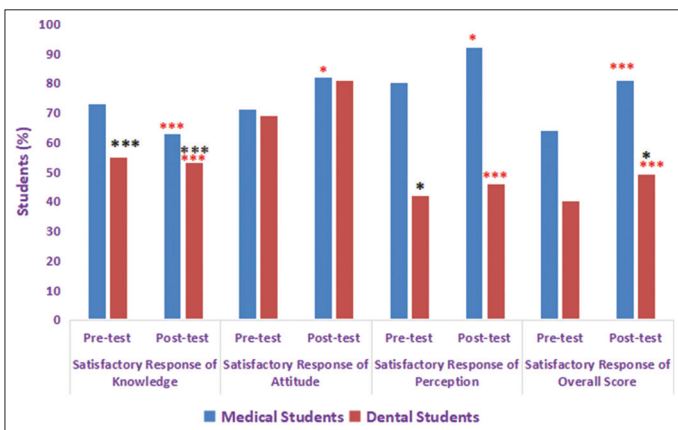


Figure 3: Comparison of satisfactory knowledge, attitude, practice and overall score. *– $P < 0.05$ and *** – $P < 0.001$ as compared to pre and post-intervention satisfactory percentage of medical and dental students, *– $P < 0.05$ and *** – $P < 0.001$ as compared to pre-intervention satisfactory percentage of medical and dental students and post-intervention satisfactory percentage of medical and dental students

are not used to treat common cold. Being viral illness, the common cold does not need AMA and bacterial co-infections are very rare. These misconceptions will increase the use of AMA for wrong indications and more chances of the development of AMR.^[16]

Satisfactory responses towards attitude were increased in both the students. However, attitude towards self-use and irregular use of AMA was less in these students after intervention. Very casual attitude towards this aspect of AMA may be a contributory factor for the development of antibiotic resistance. Study done by Mahajan *et al.*^[16] describes similar findings amongst MBBS undergraduates. Same kind of lax attitude was also seen in other studies by Karandikar *et al.*,^[8] Khan *et al.*,^[13] Dyar *et al.*^[17] and Minen *et al.*^[18] This study revealed use of complete course of antibiotics prescribed by the doctor. Survey done in an Indian university by Virmani *et al.*^[19] observed

similar finding amongst dental students (73.1%), MBBS students (67.4 %) but less in nursing students (31.50%). Another study done by Dawnji *et al.*^[20] amongst 2nd year medical students reported the same finding in 84.9% of participants. Mean practice score and satisfactory practice responses were improved. However, study done by Dutt *et al.*^[21] observed that practice score was less in medical than dental and nursing students about AMA use. Overall post-intervention score and satisfactory responses were improved but there is wide scope to improve the level of attitude and practice toward AMA use. Mahajan *et al.*^[16] discussed medical education strategies to enhance KAP about AMA use and AMR. Undergraduate training in Pharmacology must include protocol for antibiotic use.^[22] Emphasis must be given to control infections in Microbiology^[23] and simple measures like hand hygiene should be inculcated in day to day life.^[7] The medical curriculum should involve strategies to empower knowledge and to change attitude and practice toward AMA use and AMR as well.

Strengths and Limitations of Study

In this study, KAP about AMA of not only medical students but also dental students was collected and that to be before and after intervention i.e. complete chemotherapy teaching. Both the medical and dental colleges were from the same University in the same campus. This was the greatest strength. Limitations of the study were that there were different faculty members in medical and dental colleges to teach chemotherapy. All the faculty members in medical college were MD (Pharmacology) but in dental college, they were M.Sc. (Pharmacology). Furthermore, most of the students were from Urban area. Hence, findings of this study may be considered to represent those of the urban population.

CONCLUSION

Medical and dental students showed improvement of knowledge about AMA use and AMR after getting training in pharmacology. However, predominant low scores of attitude and practice indicate the need for further educational interventions such as small group exercises, prescription audits, frequent discussions on rational pharmacotherapy, skillful communication with the patient about prescription. To reduce AMR, students should be trained about AMA use and its adherence by patients as well.

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