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A cross sectional study of awareness regarding Antibiotic Resistance and Self-medication in Medical students from an urban area in Sangli district (Maharashtra), India.**Waghachavare V.B¹, Disa A.R, Dhumale G.B², Gore A.D⁴, Jaikhani S.M⁴, Dhobale⁴ R.V¹****Affiliation:** 1Associate Professor, 2MBBS Student, 3 Professor & Head, 4Assistant Professor, Department of Community Medicine, Bharati Vidyapeeth (Deemed to be University) Medical College & Hospital, Sangli.**Date of Submission** : 30-11-2019**Date of online Publication** : 26-12-2019**Date of Acceptance** : 15-12-2019**Date of Print Publication** : 31-12-2019***Author for correspondence:** Dr. Vivek Baliram Waghachavare, Shivam Apt., Opp. To Market Yard, Near Hotel Shivechha, Sangli-Miraj Road, Sangli (Maharashtra), India – 416416. Email: vivek416416@gmail.com**ABSTRACT**

Background: Antibiotic resistance is a great challenge to medical fraternity. Self-medication is widely regarded as one of the contributing factor for development of antibiotic resistance. Various studies conducted all over the globe have found that self-medication is prevalent in medical students. The current study was planned to understand the prevalence of self-medication and its pattern among the medical students from Sangli City (Maharashtra), India. **Methods:** Study design: A cross sectional study. Study population: Students studying in Medical colleges of Sangli Municipal Corporation area. Sampling technique: Cluster random sampling. Sample Size: Calculated sample size was 263. As all the students from selected cluster were included, hence the total participants in the study were 399. Permissions and consent: Required ethical clearance, permissions from institute heads and written consent from each participants was also taken. Study tools: Pre-designed, pre-validated, self-administered questionnaire. Statistical analysis: It was done using Microsoft Excel 2012 and SPSS-22. Percentage and Chi-square test were used to analyze the data. **Results:** Prevalence of self-medication among medical students was 99.25%. Self- knowledge and convenience were the most important reasons for self-medication. Awareness and attitude regarding antibiotic resistance had increasing trend with first to final year. Majority of students 243 (60.9%) had poor practices regarding to antibiotic use; these were not associated with years of medical education. **Conclusion:** Self-medication is common among M.B.B.S students. Knowledge regarding antibiotic resistance is insufficient. There is a need for better training of medical students regarding antibiotic resistance and its effects.

Key Words: Medical Students; Antibiotic Resistance; Self Medications; Awareness; India.**INTRODUCTION**

The rapid emergence of resistant bacteria is occurring worldwide, endangering the efficacy of antibiotics. The resistance has eventually been seen to nearly all antibiotics that have been developed. The situation is considered as a crisis.¹ The organisms such as methicillin-resistant *Staphylococcus aureus*, *Clostridium difficile*, multidrug and extensively drug-resistant *Mycobacterium tuberculosis*, *Neisseria gonorrhoeae*, carbapenem-resistant Enterobacteriaceae, *Escherichia coli*, etc. are of particular concern. Similarly, there has been a steady decline in the discovery of new and effective antibiotics due to increased costs, lack of adequate support from the government, poor returns on investment and regulatory hurdles.² If the situation continues to deteriorate then the world might enter in a post-antibiotic era, where even minor infections could prove life threatening.³ Acknowledging the gravity of situation and to highlight the problem, the theme for World Health Day – 2011 was, “Antimicrobial resistance: no action today, no cure tomorrow”.⁴

Self-medication is defined as, “The self administration of

medication not prescribed by a physician or in a manner not directed by a physician”.⁵ Families, friends, neighbours, pharmacists, previous prescribed drugs, or suggestions from an advertisement in mass media are common sources of self-medications.⁶ Urge of self-care, feeling of sympathy toward family members in sickness, lack of time, lack of health services, financial constraint, ignorance, misbelieves, extensive advertisement and availability of drugs in other than drug shops are responsible for growing trend of self-medication.⁷ Self-medication is identified as the contributing factor of antibiotic resistance.⁸ Theme for World antibiotics awareness week, 13-19 November 2017 is, “Seek advice from a qualified healthcare professional before taking antibiotics”.⁹ This highlights the global efforts against self-medication in order to prevent antibiotic resistance.

Self-medication is very common in the society.¹⁰ Various studies conducted globally have highlighted the tendency of self-medication among the medical students.^{11,12,13} However, it was observed that many medical students have insufficient knowledge regarding the correct diagnosis, required drugs,

dosage, adverse effects and schedule of the drugs. Similarly most of them followed inappropriate practices during self-medication, like discontinuation of the drug on feeling improvement.^{14,15} Various studies have observed that Medical students have inadequate knowledge regarding antibiotic resistance and highlighted the need for better inclusion of the topic in the curriculum.^{16,17}

There are very few studies considering awareness of antibiotic resistance and practices of self-medication among the Indian medical students. Hence the current research was conducted with the objective of estimating the prevalence and study the pattern of self-medication; as well as to understand the knowledge about antimicrobial resistance among the medical students from an urban area in Sangli district (Maharashtra), India.

MATERIAL & METHODS

It was a cross sectional study, with study population of MBBS students studying in the Medical colleges situated in Sangli Municipal Corporation area of Maharashtra state, India. Kasulkar et.al (2015), observed the prevalence of self-medication among the Indian medical students at 71.7%.¹⁸ Hence the calculated sample size ($\alpha=1\%$, allowable error, $d=10\%$) was 263. Sampling technique was cluster random sampling. Out of the two medical colleges situated in the study area, one was selected by sampling random sampling method. The selected college was considered as a cluster and all the available samples were included in the study. Hence the total study participants included in the final analysis were 399. Duration of the study was six months, June to December 2015.

Ethical clearance was obtained from the institution ethical committee. The permission for data collection was taken from the institution head. Written informed consent was acquired from every student after explaining the study as well as assuring anonymity on participation. Students declining to consent or withdrawing the consent were excluded from the study. The underage students (<18yrs) or students absent during the data collection visit were also excluded. The students undergoing compulsory rotatory internship after completion of final MBBS were excluded from the study.

Study tools was pre-designed, pre-tested and validated self-administered questionnaire. It had five sections. Section 1 consisted of questions regarding socio-demographic factors like gender, class etc. Section 2 had questions on self-medication; causes, frequency etc. It helped in understanding frequency, reasons and drugs used for self-medication. Section 3 was knowledge on antibiotic resistance scale. The 8- itemed scale was developed to access knowledge. It had questions regarding whether they know the problem of antibiotic resistance & its gravity, services that were hampered due to it, reasons for development of resistance, effects on patient, future consequences and methods to reduce the problem. Range of possible score was 0 to 14. Score of 7 or less was considered as poor knowledge. The section 4 was a questions enquiring attitude and practices of

antibiotic use. The practices were accessed using a 4-itemed scale with range of possible scores 0 – 4. These has questions enquiring into their antibiotic use, like whether do they self-medicate with antibiotics, do they abruptly stop taking or change antibiotics, reasons from stop the usage etc. Score of 3 or 4 was considered good practice, while 0 to 2 was considered as poor practice. The scales were developed with help of field experts and published literature.^{3,19,20} The scales had good internal consistency (Cronbach's alpha 0.57 - 0.67) and test-retest reliability. The final section (section 5) consisted of questions regarding felt need by the students for information on antibiotic resistance and methods of its effective dissemination. Pilot studies were conducted to understand, evaluate and fine-tune the study tool & study procedure.

Following the permission from the Institute head, students were contacted after their lectures. Care was taken to ensure that no participant was due to take any examinations in a month following the study. The nature and purpose of the study was explained in detail, and willing students satisfying the inclusion criteria were provided with questionnaires and consent forms. The principal investigator was present in the class for answering any queries but the teachers were requested to wait outside. Privacy and comfort were maintained. Upon completion of the questionnaire, each participant was requested to drop their questionnaire and consent form in separate drop-boxes.

Statistical analysis was done using Microsoft Excel 2012 and SPSS-22. Percentage and Chi-square test are the statistical tests used to analyze the data. The data from the pilot studies and incomplete questionnaires were not used in final analysis.

RESULTS

Total 427 students participated in the study, however 399 questionnaires were duly complete and hence used in the final analysis. Out of 399 participants, 195 (48.9%) were male and 204 (51.1%) were female. One hundred twenty-three i.e. 30.8% were first MBBS students, 100 (25.1%) were second MBBS students; while 110 (27.6%) and 66 (16.5%) were third part-I MBBS and third part-II MBBS students respectively. (Table 1)

Only three (0.75%) students did not practice self-medication, while 396 (99.25%) students self-medicate. The mean frequency of self-medication per year was 5.62 (std. deviation ± 4.28 , range 1 – 25, mode 4). The reasons selected by the students for preference to self-medication were self-knowledge 247 (61.9%), convenience 149 (37.3%), cost saving measure 15 (3.8%) and lack of trust in other doctors 12 (3%).

For self-medication non-antibiotic and antibiotics drugs were used by 372 (93.23%) and 376 (94.24%) students respectively. Self-medication with pain-killers, antacids, cough syrups, antipyretics and anti-allergens was practiced by 301 (75.4%), 282 (70.7%), 258 (64.7%), 221 (55.4%) and

214 (53.6%) students respectively. Self-medication with Central Nervous System (CNS) stimulants and antidepressants was practiced by 17 (4.3%) and 10 (2.5%) students. The basis for selection of non-antibiotics drugs was self-knowledge 251 (62.9%), non-doctor family member or friend 68 (17%), pharmacists recommendations 36 (9%) and previous prescription 114 (28.6%).

Table 1: Gender distribution of the students.

Gender/Class	First	Second	Third (Part-I)	Third (Part-II)	Total
Female	64 52.00%	54 54.00%	60 54.50%	26 39.40%	204 51.10%
Male	59 48.00%	46 46.00%	50 45.50%	40 60.60%	195 48.90%
Total	123 100.00%	100 100.00%	110 100.00%	66 100.00%	399 100.00%

Table 2: Awareness about antibiotic resistance according to year of medical education

Awareness/Class	First	Second	Third (Part-I)	Third (Part-II)	Total
Poor	88 71.50%	42 42.00%	20 18.20%	7 10.60%	157 39.30%
Good	35 28.50%	58 58.00%	90 81.80%	59 89.40%	242 60.70%
Total	123 100%	100 100%	110 100%	66 100%	399 100%

Chi-Square = 97.217, d.f. = 3, P = 0.000

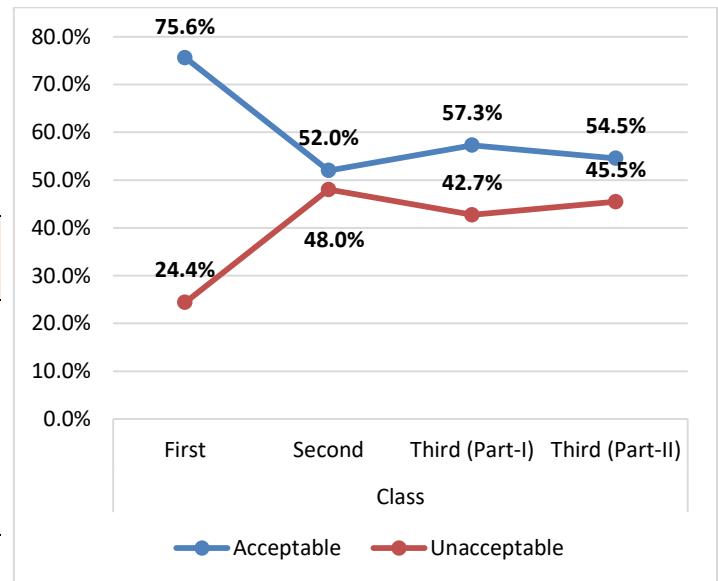
Majority of students i.e. 253 (63.9%), 248 (62.6%) and 224 (56.6%) had self-medicated with antibiotics for complaints of sore throat, wounds/injuries and fever respectively. While for the complaints like runny nose and cough, 192 (48.5%) and 187 (47.2%) students respectively had self-medicated with antibiotics. Similarly self-medication with antibiotics was used for symptoms like nasal congestion 135 (34.1%), vomiting 119 (30.1%) and aches & pains 99 (25%). Most commonly used antibiotics were Ofloxacin 248 (62.2%), Azithromycin 245 (61.4%), Amoxicillin 205 (51.4%) and Erythromycin 158 (39.6%).

The basis for selection of antibiotics for self-medication was self-knowledge 249 (62.4%), non-doctor family member or friend 77 (19.3%), pharmacists recommendations 59 (14.8%) and previous prescription 139 (34.8%). The considerations made while selecting an antibiotic were indication of use 212 (53.1%), type of antibiotics 39 (9.8%), adverse drug reaction 110 (27.6%) and brand of antibiotic 39 (9.8%).

Mean awareness score was 7.44; median, 25th & 75th percentile scores were 8, 6 & 10 respectively. Two (0.5%) students had scored 14 points in awareness scale, while 36 (9%) had scored 0. Awareness was poor (score 7 or less) in 157 (39.3%) students, while good in 242 (60.7%) students. Awareness was not associated with gender. It significantly associated with year of medical education, had increasing trend with year. (Table 2)

Considering attitude towards self-medication with antibiotics, 155 (38.8%) believed it to be unacceptable practice. While 244 (61.2%) considered it acceptable; among them 44 (11%), 91 (22.8%) and 109 (27.3%) believed that antibiotic self-medication should be practiced regularly, moderately and limited to exceptional situations respectively. Statistically there was no significant difference in attitude of males and females. The percentage of students believing to be unacceptable practice increased with increased year of medical education and the difference was statistically significant (Chi-Square = 16.258, d.f. = 3, P = 0.001). (Figure 1)

Fig 1: Trend of attitude regarding antibiotic self-medication according to year of medical education



The score of 0 for practices scale was observed in 55 (13.8%) students, while score of 4 in 49 (12.3%) students. Mean and median scores were 2.02 and 2 respectively. Poor practices were observed in 243 (60.9%) and good practices in 156 (39.1%) students. Practices were not statistically associated with gender or years of medical education. Many students 141 (35.34%) has switched antibiotics before completion of course, due to reasons like lack of effect 87 (21.8%), adverse reactions 32 (8%), previous stock ran out 22 (5.5%) and cost saving 17 (4.3%). One hundred fifty (37.6%) students complete the antibiotic course, while 220 (55.1%) stop the antibiotics after relieving of symptoms or perceived recovery and 29 (7.3%) stop after few days irrespective of outcome.

Three hundred nine (77.44%) students had witnessed some discussion regarding antibiotic resistance in their institution. One hundred eighty five (46.36%) students felt that current research and technology is insufficient to deal with future challenges posed by antibiotic resistance. Reports published by pharmaceutical companies, education received in medical college, guidelines by appropriate authorities and colleagues were considered as a source of information regarding antibiotics resistance among the practitioners by 110 (27.6%), 100 (25.06%), 88 (22.06%) and 63 (15.8%) students respectively.

To the question of whether students can contribute to research and practices regarding control antibiotic resistance, 48 (12%) students replied negatively. While 67 (16.8%) students believed that they can give minor contribution, 181 (45.4%) believed that they can contribute better if received training and 103 (25.8%) believed that they can positively contribute.

All the students were interested in receiving some information or training regarding antibiotic resistance and rational use. On the question of preferred methods of dissemination of information or training regarding antibiotic resistance 281 (70.4%), 201 (50.4%), 182 (45.6%), 244 (61.2%) and 119 (29.8%) students preferred formal medical syllabus, informative websites, online courses, guidelines by authorities and senior colleagues respectively.

On procuring suggestions for inclusions in any internet based education programme regarding the issue, majority of students suggested incorporation of features like access to latest & additional information, self-study course, information regarding efforts of authorities and contact information of people working in field.

DISCUSSION

We observed that majority (99.25%) of medical students practiced self-medication and even self-medication with antibiotics was common practice (94.24%). Perceived self-knowledge and convenience were most common reasons behind self-medication. Students relied on their knowledge and recommendations from others for selecting antibiotics. Similar study was conducted in Kuwait, by Al-Hussaini et.al., where they observed very high prevalence of self-medication in undergraduate students at 98.8%.¹² High prevalence of self-medication 92.3% in health and non-healthcare students was observed in Slovenia.¹³ Jame H. et.al., observed the medical students from Bahrain found that self-medication was time-saving, economical, convenient and providing quick relief in common illnesses.²¹ Our observations were similar to these studies.

Nearly 40% students were inadequately aware about the issue of antibiotic resistance. Awareness was worst among first year students and had linear increasing trend from first to final year. Better pharmacological knowledge and clinical exposure may be reason for increase in awareness with years of schooling. Less than 40% students believed that antibiotic self-medication was unacceptable, while majority of them supported it. Attitude towards antibiotic self-medication was worst in first year students. This may be attributed to lack of awareness about antibiotic resistance. Majority of the students (60.9%) had poor practices regarding using antibiotics. Only 37.6% students duly complete the antibiotic course. Akin to our results, Scaioli et.al., observed that the level of knowledge about antibiotics amongst the Italian healthcare profession students was quite high but there attitudes and practices were incorrect, depending on the

increasing of the years spent at Medical School.²²

More than 46% students believed that we are ill-equipped to deal with antibiotic resistance. Similarly majority of students believed that they can contribute in control of antibiotic resistance albeit after proper training. All of them were interested in receiving information or training regarding it. Over 70% students preferred increased inclusion of the topic in medical syllabus. In a survey among medical students, Källberg C., observed that majority of medical students believed that current research is ill-equipped to deal with threat of antibiotic resistance. Similarly, majority of his respondents (55%) believed that students can contribute to the work being done to control antibiotic resistance, 148 (30%) answered that students could contribute if they were better trained, 76 (15%) answered that students could contribute marginally.²⁰ We had similar observations.

Conclusion:

Practice of self-medication is very common among medical students. Self-perceived knowledge is an important reason behind the self-medication. Awareness regarding issue of antibiotic resistance is insufficient especially among 1st year students. Overall practices regarding antibiotic consumption are poor, even in final year students. Students feel the need of inclusion of topic in their syllabus and many of them are ready to undertake extra courses for gaining the knowledge.

It is recommended that the issue of antibiotic resistance, causes and effects should be highlighted in the syllabus. From the first year itself, there should be intense exposure regarding the issue. Students should be discouraged by the teacher to practice self-medication. Regular seminars, extra courses should be arranged for the students.

Limitations of the study: The study is based on self-administered questionnaires, hence reporting bias cannot be eliminated. There may be over estimation of positive attitude and good practices. There is no mechanism to confirm the findings. Study is limited to students of one institute hence results cannot be generalized.

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