ABSTRACT

Background: Self-medication is becoming a common type of self-care behavior among the population of many countries. Self-medication with antibiotics may be associated with undesirable effects, such as decreased effectiveness and worsening clinical conditions and has become an important factor driving antimicrobial resistance.

Objectives: (1) To estimate the prevalence of self-medication with antibiotics among undergraduate medical students of a government medical college. (2) To evaluate the factors associated with the practice of self-medication with antibiotics.

Methods: The study was a cross-sectional predesigned questionnaire-based study carried out among undergraduate medical students of the government medical college in December 2014. The information regarding self-medication practices were collected and results were analyzed by using percentage, proportion, and Chi-square test, when applicable, with the help of Microsoft Excel 2007 and Statistical Package for Social Sciences version 16.0 statistical software.

Result: A total of 221 undergraduate medical students participated in the study. Among them, the majority were males (53.4%) and majority (57.5%) were in 17-19 years age group. The prevalence of self-medication with antibiotics during 1 year prior to the study was 84.6%. Azithromycin was the most popular (34.4%) antibiotic for self-medication besides amoxicillin (29.4%) and fluoroquinolones (18.6%) to treat the following symptoms: Cough, cold, and sore throat (62.4%), fever (25.3%), and gastrointestinal tract infection (18.6%). There were no socio-demographic variables significantly associated with the practice of using self-mediated antibiotics. However, year of MBBS ($P = 0.006$) and gender ($P = 0.008$) were significantly associated with frequency of self-medication.

Conclusion: Self-medication with antibiotics is frequently prevalent among undergraduate medical students. Interventions are required to reduce the frequency of antibiotic misuse.

Key words: Antibiotics, Drugs, Medication, Self-medication, Undergraduate

INTRODUCTION

Medication is defined as the act of consuming medicines for prevention, diagnosis, or treatment of diseases. Physician prescribes correct medication when he examines the patient reporting with any symptom or disease in the hospital or clinic to alleviate the condition which is usually followed by filling with such prescriptions at the pharmacy by the pharmacist.\(^1\)

Self-medication terms refer to the use of drugs to treat self-diagnosed disorders or symptoms or the intermittent or continued use of prescribed drugs for chronic or recurrent disease or symptoms. Over-the-counter drugs are a form of self-medication.\(^2\) Some of the problems associated with self-medication such as masked diagnosis, use of excessive drug dosage, prolonged duration of use, drug interactions, polypharmacy, and superinfection can occur in self-medicating individuals.\(^3\)
The most prescribed drugs worldwide are antibiotics and antibiotic resistance is one of the major public health problems. There is a need for research on antibiotic usage patterns to help develop appropriate interventions. Self-medication with antibiotics may be a threat to the individual who practiced it as well as to the whole community. It is documented in literature that use of antibiotics as self-medication has led to several waterborne and food-borne infections by antibiotic-resistant bacteria, enteropathy, drug hypersensitivity, etc.

A study conducted at All India Institute of Medical Sciences, New Delhi observed that self-medication was proportionately high among undergraduate medical and paramedical students in India, and it increased with medical knowledge of the student. There are many reasons for the increased likelihood of self-medication among medical students. These students have easy access to information from drug indices, literature, and other medical students to self-diagnose and self-medicate. Furthermore, they have easy access to the medication itself through physician samples provided by pharmaceutical representatives, and “The White Coat” guarantees trouble-free access to drugs available in pharmacies.

The impact of the problem of self-medication practices among health care professionals varies from mild to severe. The consequences of inappropriate self-medication among health care professionals have been found to have severe implications including legal, ethical, health defects, negative impacts on patient, and quality of health care delivery. Like any other person, they should also be encouraged through appropriate provision to enter the patient role more rationally. Furthermore, the recommendations can be made for interventions on enhancing awareness about antibiotics and their resistance and introducing standard therapeutic guidelines. This is the only potential solution to decrease the high prevalence of self-medication among health care professionals. There is a paucity of literature on the prevalence of self-medication among undergraduate medical students. Thus, the present study was undertaken with the objective to estimate the prevalence of self-medication with antibiotics and assess the factors associated with it among undergraduate medical students of a government medical college.

**Objectives**

1. To estimate the prevalence of self-medication with antibiotics among undergraduate medical students of the Government Medical College.
2. To evaluate the factors associated with the practice of self-medication with antibiotics.

**METHODS**

The study was a cross-sectional predesigned questionnaire-based study carried out among all 300 undergraduate medical students of the government medical college in December 2014. The approval of Institutional Ethics Committee was sought before commencement of the study. The students were briefed on the aims and objectives of the study, and informed consent was obtained from those who were willing to participate in the study. After obtaining informed consent, a self-administered questionnaire was distributed to the students. The information on the questionnaire included socio-demographic variables such as age, gender and year of Bachelor of Medicine, Bachelor of Surgery (MBBS). In addition to these questions, the questionnaire included questions on involvement in self-medication practices in past 1 year, the frequency of self-medication in past 1 year, sources of antibiotics used, reasons for self-prescribing of antibiotics, names of antibiotics used, etc., among other information. Total confidentiality was ensured to the students. The results were analyzed by using percentage, proportion, and chi-square test, when applicable, with the help of Microsoft Excel 2007 and Statistical Package for Social Sciences version 16.0 Statistical Software (IBM, Chicago, USA). A P < 0.05 was considered as statistically significant for the purpose of this study.

**RESULTS**

Out of 300 undergraduate medical students of this government medical college, a total of 221 students participated in the study giving a response rate of 73.67%. Among them, 53.4% were males (n = 118) and 46.6% were females (n = 103). The mean age of the respondents was 19.73 ± 1.59 years. 57.5% (n = 127) were in 17-19 years age group, 33.9% (n = 75) were in 20-22 years age group, and 8.6% (n = 19) were in 23-25 years age group.

The prevalence of self-medication with antibiotics during 1 year prior to the study was 84.6% (n = 187). 101 male students, out of 118 (85.59%), were involved in self-medication as compared to 86 female students out of 103 (83.49%). Self-medication was proportionately commoner in the 1st year of MBBS as compared to others. Most of the students (32.1%) self-medicated only once in the previous year.

Figure 1 shows the type of antibiotic that was most frequently used for self-medication. Azithromycin was the most popular (34.4%) antibiotic for self-medication besides amoxicillin (29.4%) and fluoroquinolones/ Ofloxacin (18.6%).

The study found that the conditions prompting self-medication (Figure 2) were common cold, cough, and sore throat (62.4%), fever (25.3%), and gastrointestinal tract infections (18.6%) followed by skin ailments (8.6%) and others (8.1%).

Figure 3 shows the reasons for self-medication with antibiotics. The majority of the students self-medicated because they found it easier to apply previous prescription (46.6%), followed by their convenience (21.7%) and their confidence about good knowledge of antibiotics (11.3%). More than half...
of the study participants (53.1%) used old prescriptions for the same illness as a source for information about the drug.

114 (51.6%) of the respondents purchased the drugs directly from community pharmacies. Other sources of the drugs included left-over drugs from previous prescriptions (20.4%) and from family/friends (13.6%).

Table 1 shows the distribution of certain characteristics of undergraduate medical students according to the practice of self-medication. The prevalence of self-medication was found to be inversely proportional to age. It was highest among those aged between 17 and 19 years, but this association was not statistically significant ($P > 0.05$). Self-medication practice was slightly more among males as compared to females, a statistically non-significant association ($P > 0.05$). The prevalence of self-medication was also inversely proportional to a year of MBBS. It was more common in I and II year MBBS students, but this was not a statistically significant association ($P > 0.05$).

Table 2 shows an association of certain characteristics of undergraduate medical students with the frequency of self-medication. Most of the students (32.0%) self-medicated only once in the previous 1 year. The frequency of self-medication was significantly associated with gender and year of MBBS of the undergraduate medical students ($P < 0.05$), but the association with the age group of the medical students and frequency of self-medication was not a statistically significant one ($P > 0.05$).

DISCUSSION

Self-medication with antibiotics is becoming an increasingly important area of healthcare, and this study has shown that it is even more prevalent among medical students. A major problem with self-medication with antibiotics is the emergence of drug resistance. It is widely believed that human malpractices, such as inadequate dosing, incomplete courses, and indiscriminate drug use, have contributed to the emergence and spread of antimicrobial resistance. An understanding of the level of antibiotics self-medication practice, the reasons for such practices and the awareness about antibiotic resistance is necessary to take steps for a more rational use of antibiotics.

The total of 221 students participated in the study out of total 300 undergraduate medical students giving a response rate of 73.67%. The mean age of the respondents was 19.73 ± 1.59 years. Similarly, the mean age of the respondents was 20.3 ± 1.5 years in the study of antibiotics self-medication among medical students in coastal South India by Kumar et al. In a study on antibiotic self-medication among university medical undergraduates in Northern Nigeria by Fadare and Tamuno, a response rate of 83.2% was found and the mean age of all respondents was 23.2 ± 2.5 years.

The prevalence of self-medication with antibiotics during 1 year prior to the study was 84.6%. This prevalence was comparable with a study on self-medication patterns among undergraduate medical students of a private medical college in Islamabad by Azad et al., where the prevalence of antibiotic self-medication was 88% and a study on evaluation of antibiotic self-medication pattern among undergraduate students in Zaria by Olajemimi et al., where the prevalence was 80.36%. Similarly, the prevalence of self-medication among the study participants was 78.6% in the study conducted by Kumar et al. among medical students. While only 38.8% of undergraduate medical students admitted to self-medication practice with antibiotics in the study by Fadare and Tamuno conducted in Northern Nigeria.
In our study, more male students (85.59%) were involved in self-medication as compared to 83.49% female students, but this difference was not statistically significant ($P > 0.05$). Similarly, males dominated in antibiotic self-medication over females with no statistically significant association in the study by Fadare and Tamuno\textsuperscript{12} and also in the study by Azad et al.\textsuperscript{13} Around 94.7% male participants practiced self-medication as compared to 90.9% female participants in the study conducted by Badiger et al.\textsuperscript{14} and Tamuno among medical students in South India.\textsuperscript{8} In contrast, females (81.2%) outnumbered males (75.3%) in antibiotic self-medication in the study among medical students in coastal South India by Kumar et al.\textsuperscript{11}

Self-medication was proportionately commoner in the 1\textsuperscript{st} year of MBBS as compared to others in our study, similar to the study by Azad et al.\textsuperscript{13} However, in both these studies, this association was not statistically significant ($P > 0.05$). 1\textsuperscript{st} year medical students are a learner, and they are exposed to lots of medical information regarding antimicrobial drug usage, but they have a very limited applied medical knowledge. They are at a risk of mislaid self-assurance and ignorance that may perhaps lead to inappropriate antimicrobial self-medication and exposed to all the risks associated with this. In contrast, self-medication was proportionately commoner in the 3\textsuperscript{rd} year of MBBS in the study by Kumar et al.\textsuperscript{11}

In our study, the prevalence of self-medication was highest among those aged between 17 and 19 years and was found to be inversely proportional to age, but this association was not statistically significant ($P > 0.05$). In the study by Azad et al.,\textsuperscript{13} self-medication was highest in the age group of 20-25 years as compared to those aged <20 years and >25 years, but this association was also not statistically significant ($P > 0.05$).

Most of the students (32.1%) self-medicated only once in the previous 1 year. The frequency of self-medication was significantly associated with gender and year of MBBS of the undergraduate medical students ($P < 0.05$) but the association of frequency of self-medication with the age group of the medical students was not a statistically significant one ($P > 0.05$). No other study could be found which showed any such association between frequency of self-medication and age, gender, and year of MBBS of the undergraduate medical students.

Azithromycin (a macrolide) was the most popular (34.4%) antibiotic for self-medication besides amoxicillin (a penicillin) (29.4%) and fluoroquinolones/ofloxacin (18.6%). Similarly, Indu et al.\textsuperscript{15} in their study on self-medication of antibiotics among undergraduate medical students of South India, found out that the common antimicrobials self-medicated was macrolides (38%) followed by beta-lactams (25%), fluoroquinolones (23%), and tinidazole (14%). In all other studies, for example by Kumar et al.\textsuperscript{11} (59.6%), Fadare and Tamuno\textsuperscript{12} (44.10%), Olayemi et al.\textsuperscript{16} (43.11%), and Bala et al.,\textsuperscript{17} Penicillin group were the most common class of antibiotics frequently self-medicated.

In our study, the conditions prompting self-medication were common cold, cough, and sore throat (62.4%), fever (25.3%), and gastrointestinal tract infections (18.6%). A similar observation was found in studies by Kumar et al.\textsuperscript{11} (58.7%) and Fadare and Tamuno\textsuperscript{12} (34.8%). In contrast, gastrointestinal tract infections (42.08%) was the most common condition prompting antibiotic self-medication in the study by Olayemi et al.\textsuperscript{14}

The majority of the students in our study self-medicated because they found it easier to apply previous prescription (46.6%), followed by their convenience (21.7%) and their confidence about good knowledge of antibiotics (11.3%). In other studies, the reasons cited for self-medication were somewhat different. Badiger et al.,\textsuperscript{14} Kumar et al.,\textsuperscript{11} and Fadare and Tamuno\textsuperscript{12} in their studies found out the illness being too trivial to be the most common reason for self-medication. Pharmacies were the major source of antibiotics (51.6%) for self-medication in last 1 year hence recall bias cannot be ruled out. All the students were encouraged to fill the questionnaires independently, but mutual influence cannot be ruled out. Other

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**Table 2: Distribution of certain characteristics of undergraduate medical students according to frequency of self-medication**

<table>
<thead>
<tr>
<th>Categories</th>
<th>None</th>
<th>Once</th>
<th>Twice</th>
<th>Thrice</th>
<th>More than that</th>
<th>Total</th>
<th>Chi-square, df and $P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age group (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17-19</td>
<td>19 (6.6)</td>
<td>41 (18.5)</td>
<td>19 (8.6)</td>
<td>9 (4.0)</td>
<td>39 (17.6)</td>
<td>127 (57.5)</td>
<td>$\chi^2=8.172$, df (8), $P&gt;0.05$</td>
</tr>
<tr>
<td>20-22</td>
<td>10 (4.5)</td>
<td>25 (11.3)</td>
<td>17 (7.7)</td>
<td>8 (3.6)</td>
<td>15 (6.8)</td>
<td>75 (33.9)</td>
<td></td>
</tr>
<tr>
<td>23-25</td>
<td>5 (2.2)</td>
<td>5 (2.2)</td>
<td>3 (1.4)</td>
<td>3 (1.4)</td>
<td>3 (1.4)</td>
<td>19 (8.6)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>34 (15.3)</td>
<td>71 (32.0)</td>
<td>39 (17.7)</td>
<td>20 (9.0)</td>
<td>57 (25.8)</td>
<td>221 (100)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>17 (7.7)</td>
<td>31 (14.0)</td>
<td>17 (7.7)</td>
<td>11 (5.0)</td>
<td>42 (19.0)</td>
<td>118 (53.4)</td>
<td>$\chi^2=13.817$, df (4), $P&lt;0.05$</td>
</tr>
<tr>
<td>Female</td>
<td>17 (7.7)</td>
<td>40 (18.0)</td>
<td>22 (10.0)</td>
<td>9 (4.0)</td>
<td>15 (6.8)</td>
<td>103 (46.6)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>34 (15.3)</td>
<td>71 (32.0)</td>
<td>39 (17.7)</td>
<td>20 (9.0)</td>
<td>57 (25.8)</td>
<td>221 (100)</td>
<td></td>
</tr>
<tr>
<td>Year of MBBS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I MBBS</td>
<td>11 (5.0)</td>
<td>30 (13.6)</td>
<td>11 (5.0)</td>
<td>3 (1.4)</td>
<td>38 (18.2)</td>
<td>93 (42.1)</td>
<td>$\chi^2=27.571$, df (12), $P&lt;0.05$</td>
</tr>
<tr>
<td>II MBBS</td>
<td>13 (5.9)</td>
<td>25 (11.3)</td>
<td>17 (7.7)</td>
<td>11 (5.0)</td>
<td>14 (6.3)</td>
<td>80 (36.3)</td>
<td></td>
</tr>
<tr>
<td>III MBBS minor</td>
<td>5 (2.2)</td>
<td>10 (4.5)</td>
<td>5 (2.2)</td>
<td>3 (1.4)</td>
<td>1 (0.5)</td>
<td>24 (10.8)</td>
<td></td>
</tr>
<tr>
<td>III MBBS major</td>
<td>5 (2.2)</td>
<td>6 (2.7)</td>
<td>6 (2.7)</td>
<td>3 (1.4)</td>
<td>4 (1.8)</td>
<td>24 (10.8)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>34 (15.3)</td>
<td>71 (32.0)</td>
<td>39 (17.6)</td>
<td>20 (9.0)</td>
<td>57 (25.8)</td>
<td>221 (100)</td>
<td></td>
</tr>
</tbody>
</table>

df: Degree of freedom
CONCLUSION

This study revealed a higher rate of antibiotics self-medication among undergraduate medical students, which should drive the attention of the authorities to this problem. A need for the re-evaluation of the educational curricula is felt, especially, the teaching of clinical pharmacology. The students should be educated and made aware of the dangers and implications of self-medication. At the policy-making level, there is an urgent need to legislate and enforce laws restricting access to antibiotic. Policies prohibiting the supply of medicines without a valid prescription should be enforced. Steps should also be taken to educate pharmacists on the need to cross with the prescribing physician while dispensing such drugs. A robust monitoring system among the physicians and pharmacists is the need of this hour.

REFERENCES