Original Research Article

Awareness of Rational Medication Use and Antibiotic Self-Medication Practices among Undergraduate Students in a University in Sri Lanka

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Abstract

Purpose: To evaluate the practice of self-medication and evaluate the knowledge of rational use of antibiotics among undergraduate students of University of Peradeniya, Sri Lanka.
Method: A cross-sectional, recall study was conducted among the university student population who practice self-medication in the study location. Stratified, random sampling technique was used to distribute 246 questionnaires in eight faculties of the institution. The response rate was 71%, and 175 completed questionnaires were analyzed to determine significant differences and correlation with different variables.
Results: A majority of the study sample were females (54%), aged 23 - 25 years (46.9%). The most frequently used antibiotic was amoxicillin (95.4%). Common cold with fever was the disease condition treated by a large majority (84.9%). Knowledge on dose, frequency, duration and side-effects of antibiotics among students was moderate, with a mean value of 58.3%. There was a significant difference in knowledge on antibiotics between health science and non-health science students although no significant difference was observed in knowledge with respect to gender, academic year and family income.
Conclusion: Antibiotic consumption was associated with students' academic background. This study highlights the need for interventions to assure rational use of antibiotics.

Keywords: Antibiotics, Self-medication, Rational use, Undergraduate students, Awareness

INTRODUCTION

Self-medication implies rapid and direct access to treatment as well as self-involvement of an individual in relieving minor ailments [1]. However, practice of self-medication for prescription only medicine such as antibiotics becomes a real issue in the aspects of safe and efficacious use of medicines. Overuse and misuse of antibiotics, including practice of self-medication, is particularly a serious issue worldwide due to development of resistance for antimicrobials which is largely associated with consumption patterns of antimicrobials [2-4]. Antibiotic resistance is considered a global threat due to reasons such as increased morbidity and mortality rates due to uncontrolled infectious diseases as the standard treatments become ineffective [5-8].

Knowledge about treatment options, availability, affordability and accessibility to treatments are

common determinants of features and extent of antibiotic self-medication practice in developing countries [9,10]. Several published reports highlight the self- medication practice of antibiotics agents among students involved in higher education [11-16]. Global tendency is observed to use antibiotics without a proper prescription such that it is estimated that more than 50 % of antibiotics are purchased without a proper prescription [17]. It has been evident with a study conducted by Wolffers in 1987 that practice of self-medication exists in Sri Lankan community for a long time, irrespective of the legal framework which prohibits dispensing antibiotics without prescription [18,19].A previous report from University of Peradeniya in 2012 highlights the self-medication practices among 250 undergraduate students in Medicine, Pharmacy, Nursing, Dental Sciences, and Veterinary Science [20]. In the same report, it was revealed that 78.8 % of the study sample practice self-medication and antibiotics account for 13 % of frequently used drugs and the study highly recommended further investigations on antibiotic self-medication practice among university student population in Sri Lanka. The objective of the present study was to evaluate pattern of antibiotic self-medication practice and to determine the extent of awareness of rational use of antibiotics among undergraduates in University of Peradeniya.

EXPERIMENTAL

Location of the present study is: University of Peradeniya situated in Kandy district of the Central Province, Sri Lanka. More than 10170 students were studying in the year 2011, in eight faculties of different disciplines namely, Agriculture, Allied- Health Sciences (AHS), Art, Dental Sciences, Engineering, Medicine, Science and Veterinary Science [21]. Allied- Health Sciences (AHS), Dental Sciences, Medicine and Veterinary Science are regarded as health science faculties and the other faculties are regarded as non-health science faculties. Pharmacy, Nursing, Medical Laboratory Sciences, Physiotherapy and Radiography degree programs are conducted in the Faculty of AHS.

Study design

The population of this study was defined as the undergraduates who were practicing self-medication of antibiotics, in the University of Peradeniya. The study was a descriptive, cross-sectional study which used a questionnaire as the tool of data collection. It was a recall study so that the participants had answered the questions on consumption of antibiotics with their experience in the past six months before commence of the study. Stratified, proportionate, random samples were selected from the target population which was estimated as 13 % of the total number of students in the university, based on the results of a previous study [20]. Selected sample size was 246 and 175 questionnaires were analyzed as mentioned in Table 1.

Data collection tool

A structured questionnaire was prepared to collect data, covering demographic and socio-economic variables (part A) including age, gender, family income, course of study and academic year of study. It was also composed of questions covering different views on the practice of antibiotics self-medication (part B and C) such as types of antibiotic use, dose taken, duration of use and expected side effects. The questionnaire was translated into two languages: Sinhala and Tamil.

Table 1: Stratified sample of participants

Faculty	Total number of students (2011 statistics)*	13 % of the total number of students (target population)	20 % of the target population	Adjusted value of the sample	No of questionnaires used for analysis
Agriculture	925	120	24	25	23
Allied Health Sc.	685	89	18	20	20
Arts	3730	485	97	50	38
Dental Sc.	380	49	10	12	12
Engineering	1655	215	43	45	28
Medicine	1222	159	32	34	25
Science	1725	224	45	48	17
Veterinary	388	50	10	12	12
Total	10710	1391	279	246	175

Source: reference number 21

Ethical issues

Ethical clearance was granted before the study from the Evaluation Subcommittee of the Ethical Review Committee, Faculty of Medicine, University of Colombo. Permission was granted in writing also by the Vice Chancellor of the University of Peradeniya to collect data from the undergraduate student population. An information sheet and a consent form were attached to every questionnaire. The verbal consent was obtained from each participant before distributing the questionnaires.

Collection of data

Each faculty was personally visited by the researcher to collect data. Participants were selected from groups of 3-6 students spending the time leisurely in the faculty premises. Among the students those who mentioned that they practice self-medication with antibiotics within the past six months, every other student was selected into the study sample. The purpose of the survey and its scientific value was explained to each participant through a small discussion.

Inclusion criteria

Undergraduate students of University of Peradeniya those who practiced antibiotic self-medication.

Exclusion criteria

Clergymen and non-cooperative students

Assessment of knowledge on antibiotics

Participants were questioned on five aspects regarding antibiotics: use of antibiotics for a viral disease (common cold), dose (strength), and frequency, duration of the antibiotics and side-effects of the antibiotic written by participants. The answers were analyzed with respect to the facts given in Australian Medicine Handbook 2011 [22] and ranked as correct/partially correct/incorrect/not answered. Consequently, five variables were defined for five aspects of knowledge.

The variables were re-constructed into different variables to assess level of knowledge such that "correct" was equal to "good" and correspond for 3 marks, "partially correct" was equal to "moderate" and carried 2 marks, "incorrect" or "not answered" was equal to "poor" and corresponded for 1 mark. Then a single variable was computed covering knowledge on dose, frequency, duration and side effects and named

as total knowledge. The level of total knowledge on antibiotic consumption was considered "good" for score 10-12, "moderate" for score 7-9 and score 1-6 was considered as "poor". Means of scores on total knowledge were calculated. Significant differences in the level of knowledge among different student groups based on gender, course of study, academic year and family income level were statistically assessed by t-test.

Analysis of data

The overall response in data collection was 71.14 %. The SPSS (Statistical Package for Social Sciences) version 20 was used for data analysis. Chi-square test and t-test were used for statistical analysis.

RESULTS

Distribution of gender, age, academic year and family income in the sample

More than half of the study samples were females accounting for 54 %. Considering the overall population majority are female students and also in each faculty except Engineering [22]. This is reflected in results of the study as well.

Higher proportion of the participants belonged to the category 23 to 25 years of age accounting for 46.9 % while 37.7 % of the participants were lower than or equal to 22 years of age. Out of all the participants, 93.7 % had mentioned their age. Proportion of students belong to first year, second year, third year, fourth year and fifth year were 31.8%, 22.5%, 18.5%, 26.6% and 0.6% respectively. The total percentage of the students mentioned their academic year was 98.8 %.

Based on the information provided by the students approximate monthly income by their family members was Sri Lanka Rs. 36563.3 with a range of Rs. 2000 to Rs. 160 000. Only 150 students (85.7%) had mentioned their family income.

Knowledge on use of antibiotics for common cold and fever

Only a total of 13 students (7.4%) had mentioned that common cold and fever was not treated with antibiotics as it was viral in origin.

More than two third of the students (85.1%) mentioned that they consumed antibiotics for

Table 2: Significant descriptive data on use of antibiotics for self- medication: Commonly used antibiotics, dosage forms and disease conditions treated

Description	Frequency	%
Commonly used antibiotics		
Amoxicillin	166	94.9
Erythromycin	29	16.6
Cephalexin	11	6.3
Cloxacillin	11	6.3
Commonly used dosage forms		
Capsules	137	80.1
Tablets	116	67.8
Creams	36	21.1
Other (solutions/lotions/syrups)	10	5.8
Commonly treated disease conditions		
Common cold and fever	146	84.9
Cough	86	50
Sore-throat	46	26.7
Diarrhoea and skin diseases	24	14

common cold and fever (Table 2). Response rate was 88%.

Higher percentage of health science students (18.84%), compared to non-health science students (0%) were knowledgeable that antibiotics are not consumed for common cold and fever, at 95% confidence interval (χ^2 = 21.574; df = 1; *p* < 0.001).

Knowledge on dose, frequency, duration of the course and side-effects

Out of 121 students who had answered the relevant question, 33.7% were able to provide the accurate dose for the antibiotic used by them. Among all the students, 4.6% were able to provide a partially correct value for dose of the antibiotic used by them when the answers were compared with facts in the Australian Medicines Handbook (Table 3).

Higher proportion (46.3%) of students had mentioned that duration of antibiotic course was supposed to be 3-4 days or 10 days while only 16.6 % believed that antibiotics should be taken

for 5 days (Table 3). It was the belief of 18.3%, out of 143, that the antibiotics should be taken for less than 3 days or until cured.

Total knowledge of antibiotics

It was found that almost one third of health science students (30.4%) had a "good" (score = 10-12) knowledge of antibiotics while only 4.7% of non-health science students had a good knowledge of antibiotics. The knowledge level was "moderate" (score = 7-9) in 47.8% of health science students and 40.6% of non-health science students. It was revealed that 54.7 % of non-health science students had "poor" (score = 1-6) knowledge while only 21.7% of health science students scored poorly.

Correlation of awareness with variables

Chi square test was performed to find out correlations with gender, course of study (i.e. health science or non-health science), year of study and income vs. different variables giving information on self-medication.

Table 3: Knowledge on use of antibiotics

Aspect of knowledge tested	Response (N, %)							
	Correct (%)		Partially correct (%)		Incorrect (%)		Not answered (%)	
Strength of the drug	59	(33.7)	8	(4.6)	54	(30.9)	54	(30.9)
Frequency of the drug	105	(60.0)	18	(10.3)	31	(17.7)	21	(12.0)
Duration of the course in days	29	(16.6)	81	(46.3)	32	(18.3)	33	(18.9)
Possible side -effects	20	(11.4)	8	(4.6)	27	(15.4)	120	(68.6)

Table 4: Summary of correlation with gender and study group

Description of variables on knowledge	Value	Level of Knowledge			Total	CI (95%)
		Poor	Moderate	Good		
Duration of antibiotic course						
Health-science	Frequency	14	36	19	69	χ^2=17.83 df=2
	Percentage	20.29%	52.17%	27.54%	100%	P<0.001*
Non health-science	Frequency	51	45	10	106	
	Percentage	48.11%	42.45%	9.43%	100%	
Strength of antibiotic used						
Health-science	Frequency	28	7	34	69	χ^2= 24.17
	Percentage	40.58%	10.14%	49.28%	100%	df=2 P<0.001*
Non-health science	Frequency	80	1	25	106	
	Percentage	75.47%	0.94%	23.58%	100%	
Side effects						
Health-science	Frequency	48	6	15	69	χ^2=17.66
	Percentage	69.57%	8.70%	21.74%	100%	df=2 P<0.001*
Non-health science	Frequency	99	2	5	106	
	Percentage	93.40%	1.89%	4.72%	100%	
Duration of course						
Male	Frequency	28	44	8	80	χ^2=6.44
	Percentage	35.00%	55.00%	10%	100%	df =2 P=0.040*
Female	Frequency	37	37	21	95	
	Percentage	38.90%	38.90%	22%	100%	

Table 5: Summary of statistical data on marks for knowledge on antibiotics

Criteria compared	N	Mean	Std. deviation	Std. error of Mean	t-value CI= 95%	df	P-value
Gender							
Male	80	7.08	2.04	0.22	0.022	173	0.983
Female	95	7.09	2.29	0.23			
Academic year							
First and second year	94	6.90	1.98	0.20	1.358	171	0.176
Third year or above	79	7.35	2.38	0.27			
Academic course							
Health science	69	8.12	2.20	0.26	5.432	173	0.000*
Non-health science	106	6.42	1.88	0.18			
Income level							
Low (< Rs 36500)	86	6.91	2.20	0.24	1.283	148	0.201
Moderate or high (> Rs 36500)	64	7.38	2.21	0.28			

* *Statistically significant*

The study revealed that at 95% confidence level, percentage of health science students with a good knowledge on duration of the antibiotic course, strength of the antibiotic used and possible side-effects was significantly higher than that of non-health science students as depicted in Table 4. It was revealed that more females (22%) were well-aware about the duration of antibiotic course than males (10 %) (Table 4).

Knowledge of antibiotics among different groups of students

Total knowledge on dose (strength), frequency, course duration and side-effects were tested to identify significance of differences with respect to gender, course of study (health vs non-health), academic year of study and income. It was revealed that the mean of total knowledge score of all participants was 7.09 with a minimum of 4 and maximum of 12. Standard deviation was 2.17. Overall, it is reasonable to mention that the knowledge on use of antibiotics among the students was "moderate" (score = 7/12) with a value of 58.3 %.

The knowledge on rational consumption of antibiotics was significantly different between health science students and non-health science students at 95 % confidence interval.

However, there was no significant difference in the knowledge on rational consumption of antibiotics based on gender or academic year of study or monthly family income level (Table 5).

DISCUSSION

Self-medication is an important determinant of improper use of antibiotics [2]. Nevertheless, it remains the first choice of treatment to many communities in the world [23,24]. However, it is essential to assure quality and safe drug use by regulating issues such as self-medication with risk associated drug categories similar to antibiotics.

Amoxicillin (95.4 %) was the most frequently consumed antibiotics by self- medication practices [17,20,25]. This creates a possible threatening situation for the development of resistance to Amoxicillin. This can be aggravated with the fact that common cold and fever, which are symptoms of viral diseases was mostly treated with antibiotics agents (84.9%), only 7.4% of the participants mentioned that common cold and fever was not supposed to be treated by antibiotics as these symptoms were due to viral infection. Further it was notified that only 12% of the participants could have completed full duration of antibiotic course. Cough was the second commonest symptom treated with antibiotics and it is also necessary to be treated with appropriate antibiotics only after proper diagnosis. This study indicates skin diseases and diarrhea were treated with antibiotics by 14% of the population studied. Consumption of antibiotics without a proper diagnosis for such diseases can sometimes be detrimental. It is also noticeable that 21% of students use antibacterial creams to treat skin diseases without being diagnosed by a physician.

The assessment of knowledge on antibiotic consumption reveals several risk factors associated with irrational use of antibiotics; consumption of antibiotics for common cold and fever, lack of knowledge on accurate dose and frequency and poor compliance to antibiotic therapy which is indirectly indicated by the lack of knowledge on duration of the antibiotic course. These factors are known to contribute for irrational use of antibiotics and development of resistance [2,3]. However, the results reveals that the health science students were more knowledgeable about rational use than non-health science students and it seems that health science students have a tendency to use antibiotics in a relatively accurate way when compared with non-health science students. This is similar to a finding from a study in Mangalore,

India, which revealed that antibiotics account for 34% of the drug used in self-medication among tertiary students and also found out the study population had sufficient knowledge on adverse effects as they were medical students [14]. Lack of knowledge on antibiotics was also identified in a study from Accra, Ghana which revealed that 49% of the students had poor knowledge about the medical implications of irrational use of antibiotics and 46% of the students did not comply with the full antibiotic course [11].

Based on risk factors identified from results the recommendations can be made for interventions on enhancing awareness about antibiotics and resistance and introducing standard therapeutic guidelines. A study from Thailand revealed a successful model to reduce irrational antibiotic consumption which was a multidisciplinary approach for the issue of antibiotic resistance development due to irrational use [26]. It is worth to consider adopting the same model to Sri Lanka where unnecessary antibiotic consumption is observed for common cold and fever.

Limitations of the study

Response rate of the study was limited to 71.1%. The descriptive, cross-sectional method was applied due to time constraints. The results are subjected to limitations associated with a self-administered questionnaire based survey.

CONCLUSION

Self-medication with antibiotic agents is prevalent among undergraduate students at University of Peradeniya. Thus, antibiotic resistance among studied population can increase due to the misuse or overuse of these medicines. This study highlights possible predisposing factors for development of resistance to antimicrobial medicines and the emerging need of interventions to enhance the awareness on rational usage of antibiotics.

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