

Self-medication practice among preclinical university students in a medical school from the city of Pokhara, Nepal

Indrajit Banerjee^{1,2}, Brijesh Sathian³, Rajesh Kumar Gupta⁴, Annavarapu Amarendra⁵, Bedanta Roy⁶, Pugazhandhi Bakthavatchalam⁷, Archana Saha⁸, Indraneel Banerjee⁹

Abstract:

Introduction: In developing countries like Nepal medicines can be acquired from the chemist's without of a prescription which sometime may have many drawbacks due to intake of excessive drugs without a proper diagnosis. The primary objective of the study was to find out the pattern of self-medication practice among the preclinical medical students at Manipal College of Medical Sciences.

Materials and Methods: This was a cross sectional study carried out using structured questionnaire at Manipal College of Medical Sciences, Pokhara, Nepal between November 2012- July 2014.

Results: The overall response rate of this study was 95.31%. 81.35% of the students were practicing self-medication in this institution. Most common group of drugs that were consumed were antipyretics 31%, antibiotics 26.2%, analgesics 18.89%, antihistaminics 10.1% respectively. Paracetamol was the most common drug used for self-medication 31%, followed by Azithromycin 17.6% and combination of Paracetamol and Ibuprofen 15.6%, Cetirizine 8.6%, Amoxicillin 6.5%, Omeprazole 6.3%, Albendazole 3.3%, Mefenemic acid 2.8%, Cefpodoxime 2% respectively.

Conclusion: Medical student should be educated through awareness programme regarding pros and cons of self-medication practice and they should be motivated regarding the rationale use of antibiotics.

Keywords: Self-medication practice, Medical students, Nepal.

Correspondence: Dr. Indrajit Banerjee, Assistant Professor, Department of Pharmacology, Sir Seewoosagur Ramgoolam Medical College, Belle Rive, Mautitius.

Email: indrajit18@gmail.com

Received 27 August 2015/**Revised** 25 January 2016/**Accepted** 29 January 2016

Citation: Banerjee I, Sathian B, Gupta RK, Amarendra A, Roy B, Bakthavatchalam P, Saha A, Banerjee I. Self-medication practice among preclinical university students in a medical school from the city of Pokhara, Nepal. Nepal J Epidemiol. 2016;6(2); 574-581.

This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

Background

Self-medication practice can be defined as the consumption of medicinal unsupervised or not prescribed by a physician it is also known as over the counter' (OTC) drugs [1]. Due to easy availability of medicines and lack of governing control over the selling of the drugs non doctor prescription and self-medication is a common problem in Nepal [2]. In developing countries like Nepal medicines can be acquired from the chemist's without of a prescription which sometime may have many drawbacks due to intake of excessive drugs without a proper diagnosis. In a study conducted by Shankar PR conducted in Nepal in 2002 concluded, apart from allopathic drugs, herbal preparations were used for self-medication. The duration of the antimicrobial drugs therapy was not also taken adequately by the residents of Pokhara valley, Nepal [3].

Many studies have been reported across the world which has shown that irrational self-medication of antibiotics were consumed in self-limiting diseases viz. upper respiratory infections and allergic rhinitis [4]. It is well recognized that irrational self-medication of antibiotics without a diagnosis may contribute to antibiotic resistance. The adverse effects of self-medication cannot be over looked [5]. However, due to illiteracy, unawareness, poverty and death of health care facilities individuals may participate in self-medication practice in Nepal [6].

At Manipal College of Medical sciences, preclinical medical students at are exposed to subjects viz. Anatomy, Physiology, Biochemistry, Microbiology, Pathology, Pharmacology and Community Medicine. They remain unauthorized to prescribe drugs [7, 8]. The self-medication practice has both pros and cons [9]. The necessity of the research arises from the circumstances that information related to self-medication practice among medical students is lacking in Nepal in general and Western Developmental region of Nepal in particular. Banerjee et al. presented a paper on the preliminary data on Self Medication practice at an International conference of Research Methodology and Scientific Writing at ICRMSW 2013 in Kerala, India and the abstract of the paper was published in Nepal Journal of Epidemiology [10]. This paper is the full paper with more extensive study population for a period of 1 year and 9 months with more sample size. The primary objective of the study was to find out the pattern of self-medication practice among the preclinical medical students at Manipal College of Medical Sciences.

Material and Methods

Study design and the participants:

This was a cross sectional study carried out using questionnaire at Manipal College of Medical Sciences, Pokhara, Nepal between November 2012- July 2014.

Data collection:

The data collected includes demographic details such as gender (male and female), Nationality (Indian, Srilankan, Maldivian and Nepali students). Questionnaire validation tests showed that the Alpha Cronbach was 0.68.

Inclusion criteria: Out of 512 preclinical medical students participated in the study 488 students completed the questionnaire completely and their responses were assessed which gives a response rate of the research 95.31%.

Exclusion criteria: 12 questionnaires were rejected based on the incomplete filling of the form and absence of the students from the class.

Sample size calculation:

95% confidence interval and significance level $\alpha = 5\%$, $P = 70\%$, $Q = 30\%$, allowable error = 10% of P. P is the proportion or % of the students were taking analgesics as self-medication practice. [Outcome measure of main variable]. Q is the complement of P. [$Q = 100 - P$]. The prerequisite sample size was 428. Prior to the study a pilot study was done with 100 students and it was found that 70% of the students were taking analgesics as self-medication practice. An adequate sample size of 488 [11] was achieved.

Outcome Variable:

The primary outcome variable was the group of drugs consumed by the medical students as self-medication practice. viz. antiulcer, analgesics, antihistaminics, antibiotics, antipyretics, antiemetics and the drug which was consumed viz. Pheneramine, Metoclopramide, Ebastine, Ibuprofen, Fexofenadine, Pantoprazole, Domperidone, Ranitidine, Cefpodoxime, Mefenemic acid, Albendazole, Omeprazole, Amoxicillin, Cetirizine, Paracetamol+ Ibuprofen, Azithromycin, Paracetamol.

Explanatory variables:

Age, gender (male and Nationality (Indian, Srilankan, Maldivian and Nepali) and the categories of student (self-financed and scholarship) were the explanatory variables.

Ethical committee approval:

Preceding the study, ethical committee approval was taken from the institutional ethical committee, Manipal Teaching hospital, Pokhara, Nepal. The Research was conducted in accordance to 64th World Medical Association, General Assembly, Fortaleza, Brazil, October 2013, Helsinki - Ethical Principles for Medical Research involving Human Subjects guidelines.

Data management and statistical analysis:

The data were managed and analysed by Statistical Package for the Social Sciences (SPSS) for Windows Version 20.0 (SPSS Inc; Chicago, IL, USA). Percentage, 95% Confidence Interval and Chi square test was used to establish the statistical association between between explanatory variables and outcome variables. $p < 0.05$ was considered as statistically significant. [12, 13].

Results

Out of 488 students completed the questionnaire completely 397 (81.35%) were practicing self-medication. Table 1 depicts that 60.2% of the students were male, 42.1% Indian, 35.5%

Nepalese, 20.4% Srilankan and 2% were Maldivian. 62% of the students were self-financed who were undergoing self medication practice.

Table 1: Socio demographic factors

Socio demographic factors Factors (n=397)			95% CI
Gender	Female	158(39.8)	(34.98, 44.61)
	Male	239(60.2)	(55.39, 65.02)
Nationality	Maldivian	8(2)	(0.63, 3.40)
	Srilankan	81(20.4)	(16.44, 24.37)
	Nepalese	141(35.5)	(30.81, 40.22)
Category of students	Indian	167(42.1)	(37.21, 46.92)
	Scholarship	151(38)	(33.26, 42.81)
	Self financed	246(62)	(57.19, 66.74)

Table 2: Self medications

Socio demographic factors Factors (n=397)			95% CI
Group of Drugs	Antiemetics	7(1.8)	(0.47, 3.06)
	Anthelmintics	13(3.3)	(1.52, 5.03)
	Antiulcer	35(8.8)	(6.03, 11.61)
	Antihistaminics	40(10.1)	(7.11, 13.04)
	Analgesics	75(18.9)	(15.04, 22.74)
	Antibiotics	104(26.2)	(21.87, 30.52)
	Antipyretics	123(31)	(26.43, 35.53)
Name of drugs	Pheneramine	1(0.3)	(0, 0.74)
	Metoclopramide	1(0.3)	(0, 0.74)
	Ebastine	2(0.5)	(0.19, 1.20)
	Ibuprofen	2(0.5)	(0.19, 1.20)
	Fexofenadine	3(0.8)	(0, 1.61)
	Pantoprazole	3(0.8)	(0, 1.61)
	Domperidone	6(1.5)	(0.31, 2.71)
	Ranitidine	7(1.8)	(0.47, 3.06)
	Cefpodoxime	8(2.0)	(0.63, 3.40)
	Mefenemic acid	11(2.8)	(1.16,4.39)
	Albendazole	13(3.3)	(1.52, 5.03)
	Omeprazole	25(6.3)	(3.91, 8.69)
	Amoxicillin	26(6.5)	(4.12, 8.98)
	Cetirizine	34(8.6)	(5.81, 11.32)
	Paracetamol + Ibuprofen	62(15.6)	(12.05, 19.19)
	Azithromycin	70(17.6)	(13.88, 21.38)
	Paracetamol	123(31.0)	(26.43, 35.53)

Table 2 depicts that the most common group of drugs that were consumed were antipyretics 31%, antibiotics 26.2%, analgesics 18.89%, antihistaminics 10.1% respectively. Among the drugs Paracetamol was the most common drug used for self-medication 31%, trailed by Azithromycin 17.6% and a combination of Paracetamol and Ibuprofen 15.6%, Cetirizine 8.6%, Amoxicillin 6.5%, Omeprazole 6.3% respectively.

Table 3 shows that there were an association between the group of drugs consumed as self-medication and the gender of

the student. Among the females analgesics were commonly consumed 26.6%, followed by antibiotics 25.3%, antipyretics 24.1%, antihistaminics 10.1% respectively. Among the males antipyretics 35.6% was the most common drug consumed, followed by antibiotics 26.8%, analgesics 13.8%, respectively was established to be statistically significant ($p < 0.05$). Among the self-financed 30.9% of the students preferred antibiotics and antipyretic drugs for self-medication. Among the scholarship students it was analgesics 31.1%, which was used as self medication.

Table 3: Self medications and Socio demographic factors

		Group of Drugs						
		Antihelm inthics	Antiulcer	Analgesics	Antihistaminics	Antibiotics	Antipyretics	Antiemetics
Gender	Female	6(3.8)	11(7)	42(26.6)	16(10.1)	40(25.3)	38(24.1)	5(3.2)
	Male	7(2.9)	24(10)	33(13.8)	24(10)	64(26.8)	85(35.6)	2(0.8)
	P value	0.011†						
Nationality	Srilankan	1(1.2)	4(4.9)	16(19.8)	12(14.8)	24(29.6)	24(29.6)	0(0)
	Nepali	6(4.3)	17(12.1)	27(19.1)	10(7.1)	42(29.8)	36(25.5)	3(2.1)
	Indian	6(3.6)	13(7.8)	31(18.6)	18(10.8)	36(21.6)	59(35.3)	4(2.4)
	Maldivian	0(0)	1(12.5)	(12.5)	0(0)	2(25)	4(50)	0(0)
	P value	0.513×						
Category of students	Self financed	6(2.4)	20(8.1)	39(15.9)	24(9.8)	76(30.9)	76(30.9)	5(2)
	Scholarship	7(4.6)	15(9.9)	36(23.8)	16(10.6)	28(18.5)	47(31.1)	2(1.3)
	P value	0.099×						

† $p < 0.05$, statistically significant, × $p > 0.05$, statistically not significant

Table 4 illustrates Paracetamol was consumed by 24.1%, the combination of Paracetamol and Ibuprofen 19%, Azithromycin 12.7% Amoxicillin 9.5%, cetirizine 8.8% was among the top 5 among the list. Among the male it was Paracetamol 35.6%, Azithromycin 20.9%, combination of Paracetamol and Ibuprofen 13.4%, Cetirizine 8.4%, Omeprazole 7.9% was among the top 5 drugs consumed by the medical students which was established to be statistically significant $p < 0.05$. As per nationality is concerned

Paracetamol was preferred for self medication among 29.6% srilankan students, 25.5% Nepali, 35.5% Indian and 50% Maldivian students. Among the self financed students Paracetamol 30.9% and Azithromycin 21.1% were the primary medications commonly used for self medication practice, whereas in the case of scholarship students Paracetamol 31.1%, trailed by a combination of Paracetamol and Ibuprofen 19.2% was used for self-medication practice.

Table4: Name of drugs and Socio demographic factors

Name of drugs	Gender		P value	Nationality				P value	Category of students		
	Female	Male		Srilankan	Nepali	Indian	Maldivian		Self financed	Scholarship	P value
Pheneramine	0 (0)	1 (0.4)		0 (0)	1 (0.7)	0 (0)	0 (0)		1 (0.4)	0 (0)	
Metoclopramide	1 (0.6)	0 (0)		0 (0)	1 (0.7)	0 (0)	0 (0)		1 (0.4)	0 (0)	
Ebastine	1 (0.6)	1 (0.4)		1 (1.2)	0 (0)	1 (0.6)	0 (0)		1 (0.4)	1 (0.7)	
Ibuprofen	1 (0.6)	1 (0.4)		0 (0)	0 (0)	2 (1.2)	0 (0)		1 (0.4)	1 (0.7)	
Fexofenadine	1 (0.6)	2 (0.8)		2 (2.5)	0 (0)	1 (0.6)	0 (0)		1 (0.4)	2 (1.3)	
Pantoprazole	1 (0.6)	2 (0.8)		2 (2.5)	1 (0.7)	0 (0)	0 (0)		1 (0.4)	2 (1.3)	
Domperidone	4 (2.5)	2 (0.8)		0 (0)	2 (1.4)	4 (2.4)	0 (0)		4 (1.6)	2 (1.3)	
Ranitidine	4 (2.5)	3 (1.3)		0 (0)	2 (1.4)	4 (2.4)	1 (12.5)		3 (1.2)	4 (2.6)	
Cefpodoxime	5 (3.2)	3 (1.3)	0.001†	1 (1.2)	6 (4.3)	1 (0.6)	0 (0)	0.274×	5 (2)	3 (2)	0.504×
Mefenemic acid	11 (7)	0 (0)		5 (6.2)	2 (1.4)	4 (2.4)	0 (0)		5 (2)	6 (4)	
Albendazole	6 (3.8)	7 (2.9)		1 (1.2)	6 (4.3)	6 (3.6)	0 (0)		6 (2.4)	7 (4.6)	
Omeprazole	6 (3.8)	19 (7.9)		2 (2.5)	14 (9.9)	9 (5.4)	0 (0)		16 (6.5)	9 (6)	
Amoxicillin	15 (9.5)	11 (4.6)		5 (6.2)	12 (8.5)	9 (5.4)	0 (0)		19 (7.7)	7 (4.6)	
Cetirizine	14 (8.9)	20 (8.4)		9 (11.1)	9 (6.4)	16 (9.6)	0 (0)		21 (8.5)	13 (8.6)	
Paracetamol+ Ibuprofen	30 (19.0)	32 (13.4)		11 (13.6)	25 (17.7)	25 (15)	1 (12.5)		33 (13.4)	29 (19.2)	
Azithromycin	20 (12.7)	50 (20.9)		18 (22.2)	24 (17)	26 (15.6)	2 (25)		52 (21.1)	18 (11.9)	
Paracetamol	38 (24.1)	85 (35.6)		24 (29.6)	36 (25.5)	59 (35.5)	4 (50)		76 (30.9)	47 (31.1)	

†p<0.05, statistically significant, × p>0.05, statistically not significant

Discussion

Sociodemographic details

It is evident from this research that self-medication was extensively practiced by most of the medical students 81.35%. This result is quite parallel to a study done by Zafar SN et al. at Karachi, Pakistan founded that the prevalence of self-medication is high 76% among medical students [14]. In a study conducted by Patil SB in Karnataka, India has shown that the frequency of self-medication was 88.18%, which is similar to our finding [15] whereas in a study conducted in West Bengal, India it has showed a frequency of 57.05% [9]. According to this research it was evident that self-medication was practiced mostly among the male students. It is parallel to the finding of Patil SB et al.[15] Most of the students were Indian and Nepalese who were taking self-medication followed by Srilankan and Maldivian. This could be due to the fact that the number of Indian and Nepalese students are more in the institution as compared to Srilankan and Maldivian students in this institution.

Group of drugs for self-medication

As far as the group of drugs are concerned antipyretics 31%, antibiotics 26.2%, analgesics 18.89%, antihistaminics 10.1% were commonly taken by the medical students at this institution. This research finding is parallel to the study conducted by Zafar SN has revealed medicines were analgesics 88.3%, antipyretics 65.1% and antibiotics 35.2% were used for self medication [14].

In a research conducted in James H et al in Bahrain has showed that analgesics were commonly used by medical students, which is quite similar to our finding [16]. According to Lukovic JA analgesics were commonly used by the medical students at Serbia as self-medication practice 55.4% [17]. In various researches it has shown that antibiotics are also commonly used as self-medication practice [18,19]. Irrational use of antibiotics without proper diagnosis may lead to serious adverse effects, camouflaging of symptoms and there is a chances super infection is there [20]. Chances of antibiotic resistance can occur due to irrational use of antibiotics [21].

Drugs used for self-medication practice

According to this research finding Paracetamol was the most common drug used for self-medication 31%, followed by Azithromycin 17.6% and a combination of Paracetamol and Ibuprofen 15.6%, Cetirizine 8.6%, Amoxicillin 6.5%, Omeprazole 6.3% respectively. Paracetamol was most common drug preferred for self-medication could be due to the fact of easy availability at a cheaper price. In a study conducted in 2014 in Bangladesh by Biswas M reported that among the Metronidazole 50.43%, followed by Azithromycin 20.75%, Ciprofloxacin 11.53%, Amoxicillin 10.37% and Tetracycline 7.49% respectively was used as self-medication by the medical students [20]. Inappropriate self-medication

practice may lead to serious adverse effects and antibiotic resistance.

Conclusion

Medical students should be educated through awareness programme regarding pros and cons of self-medication practice and they should be motivated regarding the rationale use of antibiotics.

Limitation of the study

This research is conducted among preclinical university students in a private medical school from the city of Pokhara, Nepal. A multi centric study with higher sample size targeting the medical students and the general population will be valuable to evaluate the self-medication practice all over Nepal.

Future scope of the study:

The finding of the research can be used as a baseline data. Similar study can be performed in the general population of Nepal in the future.

What is known on this topic:

Self medication practice among residents of Pokhara Valley is known on this topic.

What the study adds:

This research provides an idea about the pattern of self-medication practice among the preclinical university students in a medical school from the western development region of Nepal.

Authors' affiliations:

¹Assistant Professor, Department of Pharmacology, SSR Medical College, Belle Rive, Mautitius,

²Assistant Professor, Department of Pharmacology, Manipal College of Medical Sciences, Pokhara, Nepal.

³Assistant Professor, Department of Community Medicine, Manipal College of Medical Sciences, Pokhara, Nepal.

⁴Professor and Head of the Department, Department of Pharmacology, SSR Medical College, Belle Rive, Mautitius

⁵Lecturer, Department of Pharmacology, SSR Medical College, Belle Rive, Mautitius

⁶Assistant Professor, Department of Physiology, Manipal College of Medical Sciences, Pokhara, Nepal.

⁷Lecturer, Faculty of medicine, Quest International University, Perek, Malaysia

⁸Professor and Head of the Department, Department of Pharmacology, Manipal College of Medical Sciences, Pokhara, Nepal.

⁹Post Doctorate Trainee, M.Ch Urology, SMS Medical

Authors' contributions:

IB designed the study, deduced the data, drafted the manuscript, and revised it. IB2, BR, and AS planned the study with IB, acquired the data, conducted the data analysis, interpreted the data, and revised the manuscript. IB2, RKG and AA has also participated in the language editing along with IB. BS participated in statistical analysis, interpreted the data, and revised the manuscript. AS, RKG, AA and PB critically revised the manuscript. All the authors approved the final document.

Acknowledgments:

We are obliged to Prof. Dr. B. M. Nagpal, Dean and CEO, MCOMS, Nepal and Prof. Dr. Shishir Gokhale, Director of Basic Sciences, MCOMS, Nepal. We prolong our deepest and warm gratitude to Late Prof. Dr Akhilesh Chandra Jauhari, Professor, Department of Pharmacology, Manipal College of Medical sciences, Nepal for constant encouragement and support to conduct various research activities in the Department of Pharmacology, MCOMS, Nepal.

Competing Interests:

None

Source of Support:

Nil

References :

1. Sontakke SD, Bajait CS, Pimpalkhute SA, Jaiswal KM, Jaiswal SR. Comparative study of evaluation of self-medication practices in first and third year medical students. *Int J Biol Med Res.* 2011;2:561–64.
2. Biswas M, Roy MN, Manik MI, Hossain MS, Tapu SM, Moniruzzaman M, Sultana S. Self medicated antibiotics in Bangladesh: a cross-sectional health survey conducted in the Rajshahi City. *BMC Public Health.* 2014 Aug 14;14:847. doi: 10.1186/1471-2458-14-847. <http://dx.doi.org/10.1186/1471-2458-14-847>
3. Shankar PR, Partha P, Shenoy N. Self-medication and non-doctor prescription practices in Pokhara valley, Western Nepal: a questionnaire-based study. *BMC Fam Pract.* 2002 Sep 17;3:17. <http://dx.doi.org/10.1186/1471-2296-3-17> PMID:12236905 PMCID:PMC130019
4. Togoobaatar G, Ikeda N, Ali M, Sonomjants M, Dashdemberel S, Mori R, Shibuya K. Survey of non-prescribed use of antibiotics for children in an urban community in Mongolia. *Bull World Health Organ.* 2010 Dec 1;88(12):930-6. doi: 10.2471/BLT.10.079004. Epub 2010 Sep

3.

<http://dx.doi.org/10.2471/BLT.10.079004>

5. Sontakke SD, Bajait CS, Pimpalkhute SA, Jaiswal KM, Jaiswal SR. Comparative study of evaluation of self-medication practices in first and third year medical students. *Int J Biol Med Res.* 2011;2:561–64.
6. Awad AI, Eltayeb IB. Self-medication practices with antibiotics and antimalarials among Sudanese undergraduate university students. *Ann Pharmacother.* 2007 Jul;41(7):1249-55. Epub 2007 Jun 12 <http://dx.doi.org/10.1345/aph.1K068> PMID:17565044
7. Banerjee I, Jauhari CA, Johorey CA, Gyawali S, Saha A. Student's Accreditation of integrated Medical Education in Nepal. *Asian Journal of Medical Sciences* 2011;2 (1): 49-52. <http://dx.doi.org/10.3126/ajms.v2i1.3592>
8. Banerjee I. Teaching Communication Skills: A five year experience from a private medical school of Nepal. *Medical Science* 2013;1(1): 12-14.
9. Banerjee I, T Bhadury. Self-medication practice among undergraduate medical students in a tertiary care medical college, West Bengal. *J Postgrad Med.* 2012 Apr-Jun;58(2):127-31. doi:10.4103/0022-3859.97175. <http://dx.doi.org/10.4103/0022-3859.97175>
10. Special Issue. ICRMSW2013. Open Papers. *Nepal Journal of Epidemiology* 2014;4(2).
11. Sathian B, Sreedharan J, Roy B, Banerjee I, Supram HS. Relevance of sampling techniques in medical research. *Journal of Biomedical Sciences.* 2015;2(1):3-6. <http://dx.doi.org/10.3126/jbs.v2i1.13031>
12. Sathian B, Sreedharan J, Banerjee I, Roy B. Simple sample size calculator for medical research: a necessary tool for the researchers. *Medical Science.* 2014;2(3):141-4
13. Sathian B, Sreedharan J, Banerjee I, Roy B. Simple sample size calculator for medical research: a necessary tool for the researchers. *Medical Science.* 2014;2(3):141-4
14. Zafar SN, Syed R, Waqar S, Zubairi AJ, Waqar T, Shaikh M, Yousaf W, Shahid S, Saleem S. Self-medication amongst university students of Karachi: prevalence, knowledge and attitudes. *J Pak Med Assoc.* 2008 Apr;58(4):214-7. PMID:18655436
15. Patil SB, S H V, B V P, Santoshkumar J, Binjawadgi AS, Kanaki AR. Self-medication practice and perceptions among undergraduate medical students: a cross-sectional study. *J Clin Diagn Res.* 2014 Dec;8(12):HC20-3. doi: 10.7860/JCDR/2014/10579.5313. Epub 2014 Dec 5. <http://dx.doi.org/10.7860/JCDR/2014/10579.5313>
16. James H, Handu SS, Al Khaja KA, Ootom S, Sequeira RP. Evaluation of the knowledge, attitude and practice of self-medication among first-year medical students. *Med Princ Pract.* 2006;15(4):270-5. <http://dx.doi.org/10.1159/000092989>

PMid:16763393

17. Lukovic JA, Miletic V, Pekmezovic T, Trajkovic G, Ratkovic N, Aleksic D, Grgurevic A. Self-medication practices and risk factors for self-medication among medical students in Belgrade, Serbia. *PLoS One*. 2014 Dec 11;9(12):e114644.

doi: 10.1371/journal.pone.0114644.eCollection2014.

<http://dx.doi.org/10.1371/journal.pone.0114644>

18. El Ezz NF, Ez-Elarab HS. Knowledge, attitude and practice of medical students towards self medication at Ain Shams University, Egypt. *J Prev Med Hyg* 52:196–200

PMid:22442925

19. Donkor ES, Patience B, Tetteh-Quarcoo L, Nartey P, Agyeman IO. Self-Medication Practices with Antibiotics among Tertiary Level Students in Accra, Ghana: A Cross-Sectional Study. *Int J Environ Res Public Health* 9:3519–29

<http://dx.doi.org/10.3390/ijerph9103519>

PMid:23202760 PMCID:PMC3509469

20. Biswas M, Roy MN, Manik MI, Hossain MS, Tapu SM, Moniruzzaman M, Sultana S. Self medicated antibiotics in Bangladesh: a cross-sectional health survey conducted in the Rajshahi City. *BMC Public Health*. 2014 Aug 14;14:847.

doi: 10.1186/1471-2458-14-847.

<http://dx.doi.org/10.1186/1471-2458-14-847>

21. Stratchounski LS, Andreeva IV, Ratchina SA, Galkin DV, Petrotchenkova NA, Demin AA. The inventory of antibiotics in Russian home medicine cabinets. *Clin Infect Dis*. 2003;37:498–505. doi:10.1086/376905.

<http://dx.doi.org/10.1086/376905>