ORIGINAL SCIENTIFIC ARTICLE

SELF-MEDICATION WITH ANTIBIOTICS AMONG NURSING STUDENTS IN SERBIA: PILOT STUDY

Dragana Terzic[1], Ivana Tadic[2], Dragana Lakic[2] and Marina Odalovic[2]

[1]*Health School of Professional Studies, Belgrade, Serbia*
[2]*University of Belgrade, Faculty of Pharmacy, Department of Social Pharmacy and Pharmaceutical Legislation, Belgrade, Serbia*

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Corresponding author:

Marina Odalovic

University of Belgrade, Faculty of Pharmacy, Department of Social Pharmacy and Pharmaceutical Legislation, Belgrade, Serbia

Phone: +381 11 3951 206
+381643137936

E-mail: marina.odalovic@pharmacy.bg.ac.rs

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ABSTRACT

Healthcare professionals should serve as promoters of rational antibiotic use in attempt to decrease antibiotics misuse within the process of self-medication. Current pilot study was undertaken with the aim to identify potential predictors of self-medication with antibiotics (SMA) and to describe SMA practice among nursing students in Serbia. Data have been collected during the period March-May, 2016 in Medical school of bachelor degree, in Belgrade. Self-reported questionnaire served as a data source. Descriptive statistic was used to analyse study sample characteristics. Chi-square test was used to test differences between groups. Study sample have included 138 participants. Almost half of them, 43.8%, practice SMA. Life style (smoking, alcohol consumption, sleeping habits and physical activity) and socio-demographic characteristics (excepted school grade) were not shown as SMA determinants. Time & money savings were stated as the most frequent reason for SMA, while common cold, sore throat and cough were the most common conditions cured through SMA. Pharmacists' recommendations and previous positive experience were specified as the most important in the process of antibiotics selection, indicated by 50.0% and 37.5% participants, respectively. Amoxicillin was the most frequently used antibiotic in SMA, used by 50% of participants who practice SMA. High proportion of SMA and observed practice among nursing students in Serbia call for efforts with regards to relevant education about rational antibiotic use, actual clinical guidelines and potential consequences of misuse.

Keywords: *Self-medication, antibiotics, predictors, nursing students.*

INTRODUCTION

The World Health Organization (WHO) has defined drug misuse as the use of a substance for the purpose that is not consistent with legal or medical guidelines and has suggested prescription drug use in self-medication as a typical example of drug misuse (1). Such misuse brings over use and non-rational use of antimicrobials which are among the main reasons for development of antimicrobial resistance recognized as one of the highest threats to individual and public health. The WHO reported alarming levels of resistance to antimicrobials presented in humans, animals, food and environment (2). Moreover, the resistance is of high spreading potential and, accordingly, became a global concern. Therefore, coordinated actions have been purposed to minimize the emergence and spreading, while isolated interventions have limited impact, but still are very important (2, 3).

The prevalence of self-medication with antibiotics (SMA) is very different over the world, being the most studied in WHO Southeast Asian Region and Africa. Previously published systematic review studies and meta-analysis have reported the range of SMA from 1% to 100% with overall prevalence between 38.8% and 42.6% (4-6). Studies in Europe have reported the highest prevalence rates for actual SMA in eastern, followed by southern Europe, while the lowest rates were observed in northern and Western Europe (7, 8). Young population was recognized as particularly endangered since overall 50% of adolescents and 96% of students population use to take drugs without consulting a physician, where antibiotics were among the most frequently used drugs (9, 10). Studies among healthcare students' population have shown overall trend of SMA between 39% in Sri Lanka (11), and 66.9% in India (12). There are also reports on differences in SMA practice between medical and non-medical students, but the results are not consistent. While significantly higher prevalence of SMA among medical vs. non-medical students was found in Jordan, 55% vs. 33%, respectively (10), it was not the case in Libya, 43% and 46%, respectively (13). In line with high prevalence of SMA among healthcare students, and their upcoming professional roles and responsibilities related to rational antibiotics use, it is of particular importance to increase the awareness of antibiotics' misuse consequences and, accordingly, decrease the SMA practice.

Among individual determinants of SMA, level of education, age, gender, past successful use, severity of illness and income were reported (5). Additionally, storing antibiotics at home, poor access to healthcare, and SMA intention were also recorded as predictors of SMA (14). Dispensing antibiotics in whole packages and lack of relevant medicine regulations were revealed as healthcare system related determinants (14). Interestingly, healthcare professionals were recognized as contributors to SMA practice when serving for demanding and socially vulnerable patients (14). Revealing of prevalence and determinants of SMA is very useful in creation of well-targeted interventions and prevention of such addictive practice with serious consequences for individual and public health.

Current pilot study was done with the aim to identify practice and predictors of SMA among nursing students in Serbia.

PATIENTS AND METHODS

This was cross-sectional study. Data have been collected during the period March-May, 2016. Study participants were nursing students of bachelor degree, enrolled at of Medical school of bachelor studies in Belgrade, Serbia. The study was carried out after the study protocol was approved by the school management team. All participants have received detailed information related to study aims and study protocol. Participation in the study was anonymous and voluntary.

Self-reported questionnaire specially designed in line with the aims of the study was used as a data source. Socio-demographic (gender, school grade, weekly allowance, living conditions) and life style characteristics (smoking, alcohol consumption, sleeping habits, physical activity) have been collected along with data related to SMA practice (reasons for SMA, conditions threated by SMA, antibiotic selection and dose related items, side effects, type of antibiotics used within SMA, attitudes related to SMA). SMA was presented to the study participants as use of antibiotics without doctors' prescription, i.e. buying antibiotics in pharmacy without doctors' prescription, use antibiotics from home pharmacy, use antibiotics of somebody else, etc.

Statistical analysis

Descriptive statistic was used to analyse study sample characteristics. Chi-square test analysis was used to test potential differences between two groups, those who did and who did not practice SMA, with regards to socio-demographic and life style characteristics.

Statistical significance in all analyses was deemed likely if the computed probability value was <0.05. Data analysis was performed by using Statistical Package for Social Sciences (SPSS) software (SPSS 18.0 for Windows, SPSS Inc., Chicago, IL, USA).

RESULTS

There were 138 nursing students who participated in the study. Although 84.5% of participants have indicated that SMA is not acceptable practice, almost half of them, 43.8%, stated that practice SMA. There were no statistical differences between those who did and did not practice SMA with regards to socio-demographic characteristics, excepted school grade (Table 1).

Table 1. Students' socio-demographic characteristics with regards to self-medication practice (N=138)

Variable	Total	SMA users, %	SMA nonusers, %	p-value
Gender				
Male	8.7	33.3	66.7	>0.05
Female	91.3	44.8	55.2	
School grade				
The first, the second	60.1	34.1	65.9	<0.05
The third, the forth	39.9	58.2	41.8	
Weekly allowance				
≤ 2500 RSD	70.1	43.0	57.0	>0.05
> 2500 RSD	29.9	42.5	57.5	
Live with …				
Parents	32.6	36.4	63.6	>0.05
Friends, cousins, in marriage	50.0	46.4	53.6	
Alone	17.4	50.0	50.0	

Abbreviation: SMA-self-medication with antibiotics

Life style characteristics (smoking, alcohol consumption, sleeping habits and physical activity) were not shown as determinants of SMA (Table 2).

Table 2. Students' life style characteristics with regards to self-medication practice (N=138)

Variable	Total	SMA users, %	SMA nonusers, %	p-value
Smoking				
Yes	34.8	42.6	57.4	>0.05
No	65.2	44.4	55.6	
Number of cigarettes a day				
≤ 10	66.7	51.7	48.3	>0.05
> 10	33.3	33.3	66.7	
Alcohol consumption				
No	58.4	50.0	50.0	>0.05
Yes	41.6	35.7	64.3	
Sleeping per night				
< 8 h	52.9	51.4	48.6	>0.05
≥ 8 h	47.1	35.4	64.6	
Frequency of physical activity				
≥ 2 times a week	50.7	46.4	53.6	>0.05
< 1 times a week	49.3	39.4	60.6	

Abbreviation: SMA-self-medication with antibiotics

Participants have stated time and money savings as the most frequent reason for SMA. Common cold, sore throat and cough were indicated as the most common conditions treated by SMA. Pharmacists' recommendation and previous positive experience were specified as the most important in the process of antibiotics selection, indicated by 50.0% and 37.5% participants, respectively. Additionally, majority of participants, 76%, stated that they consider antibiotic indication in the process of antibiotic selection. Patient information leaflet (PIL), pharmacists and physicians were mostly used sources of information related to relevant antibiotic dose and dosing regimen. However, even one fifth of the SMA users, 21.6%, stated that only partially understand PIL information (Table 3).

Table 3. Practice of self-medication with antibiotics among nursing students (N=60)

Variable	Total
Reason for SMA	
Time & money savings	91.4
Other	8.6
Conditions threated by SMA (multiple options available)	
Common cold	52.1
Sore throat	52.1
Cough	37.0
High temperature/Fever	26.0
Nasal congestion	23.3
Headache	19.2
Toothache	15.1
Vomiting / diarrhoea	11.0
Stomach pain	9.6
Skeen Injuries/wounds	4.1
Eye infection	2.7
Other	2.2
Antibiotics for self-medication are most often purchased according to ... (multiple options available)	
Pharmacist' recommendation	50.0
Previous positive experience	37.5
Family member recommendation	25.0
Previous physician proscription	28.2
Friends' recommendation	2.8
Positive experiences announces at forums/internet	0.0
What do you consider when purchasing antibiotic? (multiple options available)	
Antibiotic indication	76.7
Type of antibiotic	45.6
Antibiotic price	17.8
Profile of adverse reactions	17.8
Antibiotic producer	6.7
Other	28.2
Antibiotic dose and dosage regime selection (multiple options available)	
By the patient information leaflet	44.9
Consultation with pharmacist	43.6
Consultation with physician	35.9
Previous experience	16.7
Consultation with family/friends	7.7
Journals/books	2.6
Alone	2.6
Internet	0.0
Experience of side effects during SMA	
Yes	5.4
No	94.6
The main source of antibiotics	
State/city owned pharmacy pharmacy	44.6
Private owned pharmacy	33.9
Home pharmacy (the rest from the previous use)	7.4
From friends	0.8
Do you read antibiotic patient information leaflet?	
Yes, always	41.8
Yes, occasionally	52.2
No	6.0
How much do you understand patient information leaflet?	

Variable	Total
I understand completely	77.6
I understand partially	21.6
I don't understand	0.8

Abbreviation: SMA-self-medication with antibiotics

Among antibiotics which were used in SMA, amoxicillin dominated. Even 50% of participants who practice SME reported usage of amoxicillin (Table 4). The list of antibiotics used in SMA also contains antibiotics which are recommended as alternative therapy in treatment of some conditions, like amoxicillin/clavulanic acid and azithromycin.

Table 4. The list of antibiotics used in self-medication (N=60)

ATC code	INN	Percentage, %
J01AA02	Doxycycline	3.3
J01CA01	Ampicillin	3.3
J01CA04	Amoxicillin	50.0
J01CR02	Amoxicillin/clavulanic acid	8.3
J01DB01	Cephalexin	13.3
J01EE01	Trimethoprim/Sulfamethoxazole	1.7
J01FA10	Azithromycin	8.3
J01FA01	Erythromycin	5.0
J01XD01	Metronidazole	1.7
J01XX01	Fosfomycin	1.7
S01AA01	Chloramphenicol	1.7

Abbreviations: ATC- anatomical-therapeutic-chemical; INN- International Nonproprietary Name

DISCUSSION

This is one of the first studies which investigated SMA among students population in Serbia. The results are in line with previously published study among Serbian population where SMA has been studied through obtaining an in house inventory of drugs. Amoxicillin was confirmed as the most commonly used antibiotic for self-medication in both studies, while similar indications (common cold, cough) were reported as most commonly treated with SMA (15). However, although antibiotics were encountered in 49.1% of households, only a quarter of packages were used for self-medication, purchased at pharmacy without prescription, 20.65%, or obtained through friends or family member, 6.52%. This indicated lower prevalence of SMA among general population than among medical students in Serbia, 43.8% (15).

Amoxicillin was revealed as most commonly used antibiotic in SMA not only in Serbia, but also wider (16, 17). Such practice could be described as expected since the amoxicillin is recommended as the first line therapy for many infective conditions (18). However, high usage of antibiotics as amoxicillin in combination with clavulanic acid and azithromycin in self-medication is of particular concern. Amoxicillin in combination with clavulanic acid is recommended in some cases (i.e. Sinusitis Acuta and Pharyngitis Acuta in children) as alternative therapy after the first line therapy does not improve health outcomes. Concurrently, it is recommended caution in usage of azithromycin in Serbia, because of recorded increased resistance to Streptococcus Pneumoniae (18). Accordingly, along with high prevalence of SMA practice among nursing students, types of antibiotics recorded in self-medication practice are of additional worry. Accurate education about rational antibiotic use, compliance with guidelines and recommendations related to the first and alternative antibiotics selection have to be the imperative in attempts against the antibiotic resistance.

SMA practice among nursing students was recorded as more prevalent in males 49 (62%), while satisfaction with previous antibiotic use, saving time and money and advises received in drug stores were recognized in the literature as factors with the most influence to starting SMA (19-21). However, more data are necessary on SMA contributing factor in order to create well targeted public health actions to decrease such undesirable practice.

Previous studies reported lack of awareness of the negative implications of self-medication among nursing students (22). Moreover, it was revealed that 50% of nursing students were not familiar with the term „antibiotic resistance“ (17). Soroush at al. suggested that having a relative awareness

about various diseases and medications, which is sometimes associated with taking a few educational courses with an internship, creates a false confidence in nursing student for self-medication and suggesting drugs to others (23). Accordingly, it was suggested as beneficial if the education system and associated tutors could inform the students about the possible consequences of this issue (22).

Pharmacies have been confirmed as the most used sources of antibiotics within the process of SMA, while pharmacists' recommendations were observed among the most important for antibiotic selection. Accordingly, continuing education of pharmacy personal with regards to accurate recommendation about rational antibiotic use and actual data about antibiotic resistance and its' consequences is of very high importance. Additionally, inclusion of well-educated pharmacists in public health actions aimed to decrease of SMA practice could have very good impact at such actions success outcomes.

This is the pilot study which reported results on SMA practice within relatively small study sample that could be considered as limitation. Study with representative sample of nursing students for the whole county is recommended for more relevant and accurate results. This study has been conducted in March-May, 2016, at the beginning of the national campaign directed to increase of rational antibiotic use in Serbia. It will be of particular importance to conduct similar study in the up-coming period, after the National guideline of good clinical practice for the rational antibiotic use is issued, as well as after the national program for bacterial resistance control is adopted by the Serbian government (24).

CONCLUSION

Accurate education of nursing students about rational antibiotic use in line with clinical guidelines recommendations and misuse consequences have to be the imperative in attempts to decrease SMA. However, more data are necessary on SMA contributing factor in order to create well targeted public health actions to decrease such undesirable practice among nursing students. Additionally, continuing education of pharmacy personal with regards to accurate recommendation, antibiotic resistance and its' consequences is of very high importance. Inclusion of well-educated pharmacists in public health actions aimed to decrease SMA practice could have very desirable impact at such actions outcomes.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was conducted in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national) and the Helsinki Declaration of 1975, as revised in 2013. Voluntary written and informed consent was obtained from each participant prior to enrollment in the study

CONFLICT OF INTEREST

No potential conflict of interest was reported by the authors.

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