

# A SURVEY OF ANTIBIOTIC SELF-MEDICATION AND OVER THE COUNTER DRUG USE AMONG UNDERGRADUATE MEDICAL STUDENTS IN YOGYAKARTA, INDONESIA

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**Abstract.** The purpose of this study was to determine the prevalence of and reasons for antibiotic self-medication and of over the counter (OTC) drug use among medical students in Yogyakarta, Indonesia. We conducted a cross sectional study among 96 undergraduate medical students attending Gadjah Mada University using a pre-validated, self-administered questionnaire. The students were chosen by systematic sampling. The questionnaire asked about demographics, the types of antibiotics used, and reasons for this and other OTC drug use. All 96 students completed the questionnaire. Of these, 49% self-medicated with antibiotics during the previous year. Forty-seven percent self-medicated with both antibiotics and OTC drugs and 2% used OTC drugs only. Family members were the main source of information about the drugs that students self-medicated with (64%). Pharmacies were the main place sought to obtain these drugs (70%). Headache was the main condition treated (79%). Amoxicillin (62%) and paracetamol (94%) were the main antibiotic type and OTC drug used, respectively. The main reason given for self-medication was convenience (62%). Of the students who self-medicated with antibiotics, 40% do not intend to stop this practice in future. Significant associations were found between self-medication and having health insurance ( $p=0.034$ ) and having knowledge about antibiotic use and year of study ( $p=0.000$ ). Self-medication was common among the studied medical students. It is important to educate medical students about the hazards of irrational drug use. There is also a need for better control of drugs sold by retail in the study area.

**Keywords:** self-medication, antibiotics, medical students, Indonesia

## INTRODUCTION

There have been numerous studies of the irrational prescription of antibiotics among physicians worldwide (Basu

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*et al*, 2008; Jiang *et al*, 2012; Graber, 2013). Despite years of medical knowledge, even the best of physicians may make this error. In addition to inappropriate prescription of antibiotics by physicians, there is a problem of antibiotic self-medication and excessive and inappropriate over-the-counter (OTC) drug use, especially in countries where drug sales and distribution are not tightly regulated (Cars and Norberg, 2005).

Besides self-medication being common in the general population, the problem also exists among healthcare workers and medical students (Bamgboye *et al*, 2006; Sawalha, 2008; Klemenc-Ketis *et al*, 2010; El ezz and Ez-elarab, 2011; Fadare and Tamuno, 2011). This is unfortunate, since this population should be more aware of the risks associated with self-medication than the general population.

This study investigated the prevalence of and reasons for self-medication, common conditions treated by self-medication, knowledge and attitudes about self-medication, and knowledge about antibiotic function and resistance.

## MATERIALS AND METHODS

### Study site

This study was carried out at the Faculty of Medicine, Gadjah Mada University located in Yogyakarta, Indonesia during November 2014 to December 2014.

### Participants

A total of 96 undergraduate medical students from 1<sup>st</sup> - 4<sup>th</sup> year were selected for this study. This number was calculated according to the Institute for Health and Care Research (2014) whereby a minimal sample size of more than 50 for questionnaire-based researches was recommended. Systematic sampling was used to select participants from the Regular and International Programs of the Faculty of Medicine, Gadjah Mada University.

### Research instrument

The questionnaire contained 58 questions which were divided into three sections: 1) general information such as the student's socio-demographic status, self-medication with antibiotics and OTC drugs in the past one year; 2) the practice of self-medication, *eg*, reasons as to why

the students are inclined to do so; sources of information for the drugs they consume; common conditions faced by these students in which they seek self-medication for; and drugs most frequently used by them when they self-medicate; 3) the students' habits on antibiotic storage and utilization patterns, the students' awareness on antibiotic resistance, and their general knowledge on antibiotic function.

The reliability of the questionnaire was tested on a pilot group of 5 undergraduate medical students at Gadjah Mada University, to ensure the clarity of the questions. Validity of the questionnaire was performed by medical experts. After amendments were made, the questionnaire was further validated and approved by the Medical and Health Research Ethics Committee (MHREC), Faculty of Medicine, Gadjah Mada University Dr Sardjito General Hospital.

### Data collection and analysis

The participants were asked to complete the questionnaire. Data was analyzed using a coding system with Stata version 13 (StataCorp, College Station, TX). *p*-values were obtained through the chi-square test and the Fisher's exact test. A *p*-value <0.05 was considered statistically significant.

### Ethical considerations

Ethical clearance for this study was obtained from the Medical and Health Research Ethics Committee (MHREC), Faculty of Medicine, Gadjah Mada University, Dr Sardjito General Hospital (Reference number: KE/FK/1211/EC).

## RESULTS

### Sociodemographic characteristics of study population

Of the 96 participants recruited into the study, all completed the questionnaire. Forty-seven participants (49%) had

Table 1  
Sociodemographic characteristics of study participants.

Characteristic	Number (%) (N=96)	Number not self-medicating (%) (N=49)	Number self-medicating (%) (N=47)	p-value <sup>a</sup>
Gender				
Male	40 (41.7)	19 (38.8)	21 (44.7)	0.557
Female	56 (58.3)	30 (61.2)	26 (55.3)	
Ethnicity				
Javanese	55 (57.3)	28 (57.1)	27 (57.4)	0.974
Chinese	13 (13.5)	7 (14.3)	6 (12.8)	
Others	28 (29.2)	14 (28.6)	14 (29.8)	
Religion				
Islam	65 (67.7)	32 (65.3)	33 (70.2)	0.853
Christian	14 (14.6)	8 (16.3)	6 (12.8)	
Others	17 (17.7)	9 (18.4)	8 (17.0)	
Year of study				
1	24 (25.0)	17 (34.7)	7 (14.9)	0.091
2	24 (25.0)	13 (26.5)	11 (23.4)	
3	24 (25.0)	10 (20.4)	14 (29.8)	
4	24 (25.0)	9 (18.4)	15 (31.9)	
Residence				
Lives with family	31 (32.3)	18 (36.7)	13 (27.7)	0.342
Lives away from family	65 (67.7)	31 (63.3)	34 (72.3)	
Financial status (monthly)				
Above average (>USD200)	16 (16.7)	6 (12.24)	10 (21.3)	0.409
Average (USD100-200)	67 (69.8)	35 (71.43)	32 (68.1)	
Below average (<USD100)	13 (13.5)	8 (16.33)	5 (10.6)	
Health insurance				
Yes	75 (78.1)	34 (69.4)	41 (87.2)	0.034
No	21 (21.9)	15 (30.6)	6 (12.8)	
Lives near medical facility				
Yes	94 (97.9)	49 (100.00)	45 (47.9)	0.237
No	2 (2.1)	0 (0.00)	2 (100.0)	

<sup>a</sup> p-value was calculated using chi-square test or Fisher's exact test.

self-medicated with antibiotics or OTC medications during the previous 1 year. Of the 47 participants who self-medicated, 2 (4%) used only OTC drugs, not antibiotics. There was no significant association between self-medication and: gender, ethnicity, religion, year of study, living away or with family, financial status, and living far from or near a medical facility ( $p>0.05$ ).

However, a significant association was seen between self-medication and having health insurance ( $p=0.034$ ) (Table 1).

#### Attitudes and practices of students who self-medicated

Of the 47 students who self-medicated with antibiotics and OTC drugs, 23 (49%) did so within the previous month indicat-

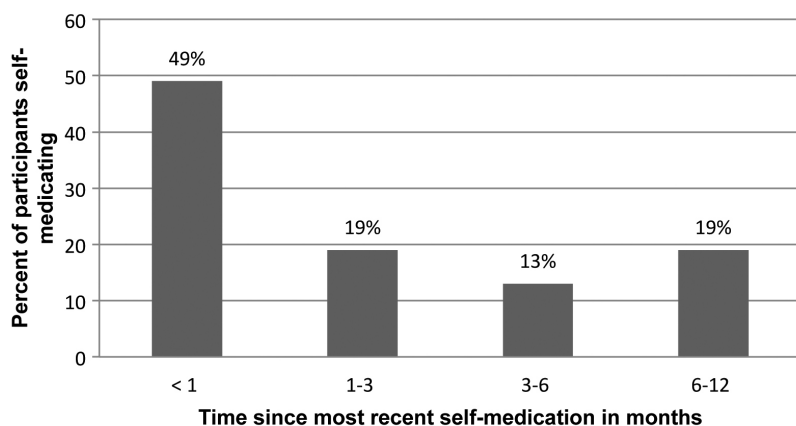


Fig 1–Prevalences of self-medication among participants by time since most recent self-medication.

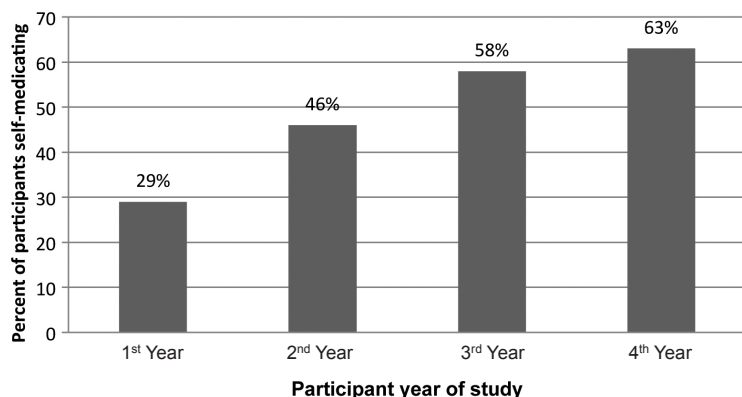


Fig 2–Prevalence of self-medication among participants by year of study.

ing frequent self-medication (Fig 1).

The prevalence of self-medication among participants by year of study is shown in Fig 2. Although the number of fourth year students who self-medicated was higher than the number of first year students who self-medicated, this difference was not significant ( $p = 0.091$ ).

Most participants spent less than 200,000 Indonesian rupiah (~USD 15) per year on self-medication purchases; one

student stated the drugs were given out free. Of the participants who self-medicated, 43% stated they purchased drugs previously prescribed by their physicians. The majority of participants (51%) obtained these drugs on their own accord. Pharmacies were the main location to obtain non-prescribed drugs (70%); other locations mentioned included family members, relatives, supermarkets and stores. The leading source mentioned by participants for obtaining information about these drugs was family and friends (64%). Other sources mentioned included the internet, media, information from the university curriculum and from physicians (mentioned by 2 respondents). When participants were asked about cure rates when using antibiotics for self-

medication, 53% stated they were always cured. Eighty-one percent of participants who self-medicated, reported no drug adverse events. Of the participants who self-medicated, 70% felt they had a good or excellent knowledge of the drugs they used. The most common reason given for self-medication was convenience (62%) (Table 2). The most common conditions treated with self-medication were headache (78%), running nose (77%), fever (70%), and cough (68%) (data not

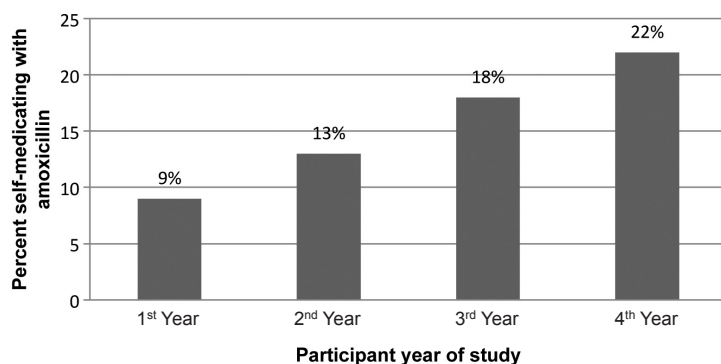


Fig 3—Percent of participants self-medicating with amoxicillin by year of study.

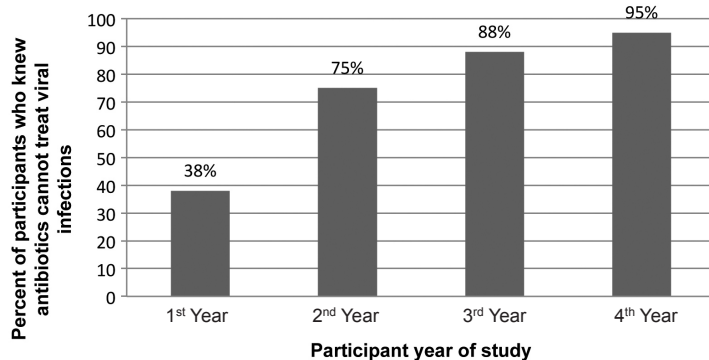


Fig 4—Percent of participants who correctly knew antibiotics cannot treat viral infections by year of study.

shown). Table 3 displays the most common self-medication OTC drugs used was Paracetamol (acetaminophen) (94%). Amoxicillin was found to be the most frequent antibiotic used (62%) (Table 4).

#### Attitudes and practices of participants regarding general drug use

Fifty-eight percent of participants reported they finished their entire drug regimen. Twenty-four percent of participants sometimes retained their unfinished antibiotics for future use and 18% always did. Ninety-two percent of participants stated they never consumed expired drugs. Forty-four percent of participants never checked for drug interactions with

polypharmacy. Eighty-two percent of participants stated the rate of self-medication would decrease if health services improved (data not shown).

#### Knowledge on antibiotic function and resistance

Twenty-six percent of participants believed antibiotics can treat both bacterial and viral infections. The percent of participants who correctly knew that antibiotics cannot treat viral infections improved significantly from the first year of training to the fourth year of training ( $p=0.000$ ) (Fig 4).

Eighty-one percent of participants knew what antibiotic resistance is. Sixty-four percent of participants first heard about antibiotic resistance in their university study curriculum; 7% had never heard about it. Other sources mentioned for hearing about antibiotic resistance included the internet, family, and high school study curriculum. Ninety-two percent of those who had heard about resistance knew not finishing their antibiotic regimen could lead to an increase in antibiotic resistance rates (data not shown).

#### DISCUSSION

Self-medication was a common practice among participants. Much higher rates of self-medication have been seen among medical students (45%) than in

Table 2  
Reasons stated by participants for self-medicating.

Reasons give for self-medicating	Number (%) (n=47)
Convenience	29 (62)
Too lazy to consult a physician	26 (55)
Previous successful use of the same medication	21 (45)
Avoid a long queue at the health facility	15 (32)
Avoid physician consultation costs	12 (26)
Not enough time	11 (23)
Student competent enough to self-medicate	9 (19)
Health facility located too far from residence	2 (4)
Unsatisfied with services at health facility	1 (2)

Multiple answers were allowed for this question.

Table 3  
Most common over-the-counter drugs used by participants for self-medication.

Over-the-counter drugs	Number (%) (n=47)
Paracetamol	44 (94)
Cough and cold remedies	30 (64)
Anti-diarrhea medications	26 (55)
Non-steroidal anti-inflammatory drugs	21 (45)
Anti-allergy medications	18 (38)
Oral ulcer and cold sore medications	18 (38)
Topical medications	17 (36)
Herbal remedies	12 (26)
Mild sedatives	5 (11)
Laxatives	4 (9)
Others	2 (4)
Do not remember	1 (2)

Multiple answers were allowed for this question.

the general population in Yogyakarta, Indonesia (7.3%) (Widayati *et al*, 2011).

There may be several reasons why the percentage of medical students who self-medicate is higher than the general population. The first is the belief that as medical students, they have greater knowledge about the drugs they self-medicate with. A second reason is that many medical stu-

dents come from families where there are healthcare workers who tell them which medications they should choose. This may be the reason why our participants listed the most common source for drug information was family members, similar to a study from Yogyakarta (Widayati *et al*, 2011). Family and relatives were also the second most popular source for obtaining



Table 4  
Most common antibiotics used by participants for self-medication.

Antibiotics	Number (%) (n=45)
Amoxicillin	28 (62)
Do not know the name of the drug	12 (27)
Ciprofloxacin	10 (22)
Chloramphenicol	4 (9)
Gentamicin	4 (9)
Others	4 (9)
Tetracycline	3 (7)
Ampicillin	3 (7)
Erythromycin	1 (2)
Metronidazole	1 (2)
Trimetoprim/sulfamethoxazole	1 (2)

Multiple answers were allowed for this question.

these drugs (after pharmacies), indicating self-medicating occurs in participant families as well.

It is interesting to note the positive significant association found in our study between having health insurance and practicing self-medication since it would seem those who have health insurance would be more likely to see a physician to obtain more expensive prescribed medication. This suggests the primary reasons for self-medication in the study participants were not financial. Cost is a common reason mentioned in several studies for self-medication (Sawalha, 2008; Widayati *et al*, 2011).

Forty percent of our study participants stated that they did not intend to stop self-medication, suggesting this will continue in the future.

Gender and year of study were not significantly associated with self-medication among participants in our study similar to other studies (Sawalha, 2008; Fadare and Tamuno, 2011; Meauri *et al*, 2011).

In our study, headache was the most

common symptom treated with self medication, similar to a study among students in Papua New Guinea and Palestine (Sawalha, 2008; Fadare and Tamuno, 2011). Treating the symptoms of a common cold is another reason for self-medication. Headaches and common colds are probably more likely to occur in participants due to the stress from studying.

In our study, many of the participants self-medicated with previously prescribed drugs. This has been seen in Europe (Grigoryan *et al*, 2006) and Mongolia where mothers wrote down the names of drugs prescribed previously and purchased them for their children when they had similar symptoms (Togoobaatar *et al*, 2010).

Some of the participants in our study who self-medicated with antibiotics stated they always improved with treatment and some stated they only improved sometimes. This suggests our participants were using antibiotics to treat viral conditions. The use of antibiotics to treat viral infections and allergies has been reported world-wide in both medical and

non-medical students (Buke *et al*, 2005; Grigoyan *et al*, 2006; Sawalha, 2008; To-goobaatar *et al*, 2010; Widayati *et al*, 2011; Shehadeh *et al*, 2012).

This irrational practice is likely contributing to the problem of antibiotic resistance. It has been reported in Yogyakarta, Indonesia that *E.coli* have become resistant to ampicillin (Lestari *et al*, 2008).

The growing resistance is against the same groups of antibiotics used for self-medication practices in Yogyakarta and Papua New Guinea (Meauri *et al*, 2011). Resistance against antibiotics is likely due to irrational use of these drugs (Ready *et al*, 2004).

The penicillin group of antibiotics is commonly used for self-medication due to its safety profile, broad spectrum of activity, low cost and ease of accessibility where drug sales are not strictly controlled (Fadre and Tamuno, 2011; Nambatya *et al*, 2011). This popular use continues possibly because of word of mouth recommendations.

Among our study participants, many did not complete their antibiotic course because they felt better, many kept their antibiotics for future use and used expired drugs. These factors probably contribute to the growing problem of antibiotics resistance and was also found in the general population in Yogyakarta (Widayati *et al*, 2012).

Many of our participants did not check for drug interactions when practicing polypharmacy. Although adverse events due to polypharmacy may not be recognized, our participants who are medical students should be aware of potential negative consequences of polypharmacy.

Some of our participants did not even know the names of the antibiotics they had self-medicated with. This suggests

these students may have been given these drugs by their family members or friends when they were sick and they took them without asking what they were or checking for drug interactions.

The level of knowledge about how antibiotics work was higher among our participants, who were medical students, than seen in the general population in studies from Yogyakarta and Malaysia (Ling *et al*, 2011; Widayati *et al*, 2012). In our study, the higher the level of education in medical school, the greater the knowledge about antibiotics, probably because they learned about them in their medical school courses. However, it is concerning that nearly a quarter of participants in our study believed antibiotics can treat viral infections; the reason for this lack of knowledge requires further exploration.

A higher awareness of antibiotic resistance was seen in our participants than in the general population from (Widayati *et al*, 2012).

The most common source mentioned by our study participants for hearing about antibiotics resistance was in their university courses indicating the university is an important source for providing information to these participants.

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#### CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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