Knowledge of and attitude towards self-medication with antibiotics among general public in Kathmandu valley, Nepal: a cross-sectional survey

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Abstract

Purpose - The inappropriate use of antibiotics has led to development and spread of bacterial resistance globally resulting in thousands of deaths every year. This study was designed to study the knowledge, attitude and practice of self-medication with antibiotics among the general public in Kathmandu.

Design/methodology/approach - A cross-sectional survey was conducted during the month of May, 2018 among general public of Ward number 16, Kathmandu Metropolitan City, Nepal by random sampling. Chi-square test was performed to determine the association between general characteristics and level of knowledge, attitude and practice. Bivariate logistic regression was also used to determine associated factors.

Findings - Out of 437 participants, 31.1% had poor knowledge on antibiotics, and 16.2% had poor attitude. Gender, education, employment status, occupation, and income were associated with level of knowledge. Education, employment status, and occupation were associated with level of attitude at 95% confidence interval. Being male, education of high school or lower, being self-employed and low income were statistically significant with poor knowledge (p-value < 0.05). Educational accomplishment of high school or lower, with employment, and being self-employed were found to be independently associated with poor attitude (p-value < 0.05).

Originality/value - The study provides a baseline information on the knowledge of and attitude towards antibiotics and serves as a basis for designing intervention program as well as conducting future research.

Keywords Antibiotics, Self-medication, Antibiotic resistance, Nepal

Paper type Research paper

Introduction

Antibiotic resistance is a situation that occurs when bacteria evolve or change in such a way that make drugs used to treat the infections they cause ineffective [1]. The emergence and spread of bacterial resistance is a growing global public health concern as the rapid development of resistance in bacteria has the potential to kill, spread globally, and impose huge costs to individuals and society [1, 2]. Antibiotic resistance has reached to an alarming level in most of the countries rendering only few treatments applicable for treatment of most of the common infections [3]. In the US alone, antibiotic resistance causes more than two million illnesses each year of which around 23,000 patients die from the lack of treatment options and further complications caused by antibiotic resistant microbes that are difficult to diagnose. It has been estimated that by 2050, antibiotic resistance will lead to 10 million deaths across the world [4].

Self-medication which involves the use of medicines by oneself or on some other person's suggestion without consultation of a medical doctor has been recognized as one of the cardinal reason contributing to the development of antibiotic resistance [5] and thus has accelerated the process of development of resistance globally [6]. Furthermore, following the success of use of antibiotics in humans, antibiotics have also been increasingly and indiscriminately used in the treatment and prevention of

diseases in animals, fish and plants. The spread of resistance in humans is further aggravated by travel of people across the countries, facilitating spread of resistant bacteria to a greater number of people and from one location to another [7].

Self-medication with antibiotics leads to its inappropriate and excessive use [8], and is highly prevalent in developing countries due to lack of proper knowledge and awareness regarding the use of antibiotics as well as in the absence of proper regulatory system [9-12]. In addition, patient's knowledge, attitude towards antibiotics use, and patient's experience with the antibiotics also contribute to the practice of self-medication [2, 13-15].

Studies conducted in various countries have reported different varying rates of self-medication with antibiotics ranging from 2.6% in Netherlands to 62.4% percent in Lithuania [16]. Likewise, the prevalence is higher in Nepal which is attributed to reasons such as over-the-counter availability of medicines including antibiotics, lax monitoring and regulation, unnecessary dispensing of antibiotics by retailers among others. Studies conducted in the two major valleys of Nepal, Pokhara and Kathmandu, have found high prevalence of self-medication, 59% and 56%, respectively [17, 18].

Understanding patterns of use of antibiotics use and factors affecting knowledge, attitude and practice of self- medication with antibiotics are critical in controlling the inappropriate practices, especially in low income countries to lower the burden of antibiotic resistance. However, only few studies have been conducted regarding antibiotic misuse in Nepal. Studies that have been conducted are amongst medical, dentistry, pharmacy and nursing students in universities in Nepal and reported self-medication with antibiotics at higher levels up to 46.2% [19-22].

Thus, this study is aimed at studying the knowledge of and attitude towards self-medication with antibiotics among the general public in Kathmandu valley.

Materials and methods

Study design and population

A cross-sectional face-to-face survey was conducted in Ward number 16 of Kathmandu Metropolitan City (KMC), Nepal in May 2018. According to the Census of 2011, total number of individuals who were of age 18 years and older in Ward number 16 was found to be 84,441 and comprised the study population [23]. The sample size was calculated using Yamane formula with a confidence interval of 95%. Taking into account of dropout rate and missing information (10%), a total of 437 participants were recruited in the study.

Sampling process in this study is divided into two sections. Section one involves multi-stage sampling and the second is random walk sampling. In the multi-stage sampling, firstly a simple random sampling using lottery method was employed to select one of the three districts of Kathmandu valley and therefore, Kathmandu district was selected. Again simple random sampling using lottery method was used and KMC was selected. Lottery method was used for the last time to select one of the Wards of KMC and as a result Ward number 16 was selected. Random walk sampling technique was then used in Ward number of 16 to select households and then individuals.

Measurement tools

Detailed study of various literatures on similar previous researches was performed to identify potential items for the study instrument. The questionnaire thus prepared had a total of 54 questions and was sub divided into 4 sections: general characteristics, knowledge of antibiotics, attitude towards antibiotics, and practice of antibiotics use.

Section I of the questionnaire comprised of general characteristics (socio-demographic, socio-economic and distance from nearest health facility) and consists of 8 questions: age, gender, marital status, ethnicity, educational level, occupation, monthly income and distance from nearest health facility.

Section II consisted of 21 items to assess the knowledge of participants about antibiotics on: (1) General Knowledge on Antibiotics, (2) Action and use of antibiotics, (3) Side effects, and (4) Antibiotic resistance. The respondent's knowledge was tested based on three responses - "Yes, No and Don't Know". A common grading system was employed for each statements in this section. The answers were graded as 'Right' or 'Wrong' for single answer statements. The 'Right' answers were assigned a score of 1 while the 'Wrong' answers to the statement/question were scored 0. Reverse scoring was performed for negative statements. Bloom's cut off point was used to classify respondent's knowledge as poor (<13 score), moderate (13-17 score) and good (>17 score).

Section III consisted of 14 statements (positive and negative) on attitude towards antibiotics. A five point Likert scale categorized as "Strongly Disagree", "Disagree", "Neutral", "Agree" and "Strongly Disagree" was used to evaluate the study participant's responses. Reverse scoring was performed for negative statements. The level of attitude was measured based on mean and standard deviation.

The section on practice of antibiotic consisted of two sub-sections and 15 questions in total. The first sub-section had 7 closed ended questions and second sub-section with 8 questions measured on a 5-pont Likert Scale ranging from "Never", "Rarely", "Sometimes", "Often" and "Always". The level of practice was measured based on mean and standard deviation.

The questionnaire was validated by three experts (two academic and a medical doctor based in Kathmandu) and revised according to their suggestions. A pilot-study was then conducted among 30 participants in a nearby district to test the reliability and quality of the questionnaire. The reliability of knowledge scale (KR-20) was 0.704 whereas Cronbach's alpha value for attitude scale was 0.728 and that for practice was 0.731. Data collection was done through face to face interview. Three research assistants were recruited for the purpose who were given a one-day training on the overall purpose and objectives of the study.

Ethical approval for this study was obtained from Nepal Health Research Council (NHRC), Kathmandu, Nepal, Ref. No.: 2675.

Data analysis

The data was cleaned, entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 22 (licensed by Chulalongkorn University). Descriptive statistics was used to describe the independent variables - general characteristics (socio-demographic, socio-economic and distance from nearest health facility). Chi-square test was performed to identify variables that were associated with the dependent variables - knowledge of, attitude towards and practice of self-medication with antibiotics. All the variables that were found to be statistically significant at p-value < 0.05 were analyzed using bivariate logistic regression to identify variables that were independently associated with the level of knowledge of, attitude towards, and practice of self-medication with antibiotics.

Results

A total of 437 individuals participated in the study. Around 28.6% of the participants were between the age group of 21-29 years, 57.2% were males, 56.5%

had completed high school, 57.0% had monthly income over NRs. 30,000 and more than 95.0% resided less than 10 minutes to the nearest health facility (Table 1).

Knowledge of antibiotics

The knowledge on antibiotics was measured on general knowledge on antibiotics, its action and use, side effects, and antibiotic resistance. A greater percentage of study participants (31.1%) had poor level of knowledge with a median score of 14 out of 21 (Table 2).

Table 1. General characteristics (n = 437)

Characteristics	n	%
I. Socio-demographic		
Age group (years)		
Up to 20	48	11.0
21 - 29	125	28.6
30 -39	107	24.5
40 - 49	90	20.6
50 - 59	45	10.3
60 and above	22	5.0
Mean ± SD	35.39 ± 12.63	
Range	18 - 73 Years	
Gender		
Male	250	57.2
Female	187	42.8
Marital status		
Single*	157	35.9
Married	280	64.1
Ethnicity		
Brahmin	133	30.4
Chhetri	59	13.5
Newar	196	44.9
Others**	49	11.2
II. Socio-economic		
Education (436)		
Up to grade 8	39	8.9
High School (Grade 9 -12)	247	56.7
Undergraduate and above	150	34.3
Employment status (434)		
With employment	345	79.5
Without employment	89	20.5
Occupation (434)		
Employed (includes labor)	99	22.8
Self-employed	246	56.7
Unemployed (includes retired)	89	20.5
Income (272)		
< NRs. 30,000	117	43.0
≥NRs 30,000	155	57.0
III. Distance from nearest health facility (433)		
Less than 10 minutes	414	95.6
10 to 29 minutes	19	4.4

Note: includes unmarried, separated, widowed and divorced; **includes hill/mountain janajati, tarai janajati, tarai/madhesi, muslim, dalit, etc.

Table 2. Study participant by knowledge of antibiotics

Statement	n = 437	
	Incorrect	Correct
General knowledge on antibiotics		
Antibiotics and pain killer medicine are the same*	115 (26.3)	322 (73.7)
You can stop taking antibiotics as soon as the symptoms have disappeared*	123 (28.1)	314 (71.9)
You can take many types of antibiotics at the same time during the course of a single illness *	67 (15.3)	370 (84.7)
The efficacy is better if the antibiotics are newer *	178 (40.7)	259 (59.3)
The efficacy is better if the price of antibiotics are higher *	104 (23.8)	333 (76.2)
Antibiotics should only be purchased with prescription at a pharmacy	40 (9.2)	397 (90.8)
Which of the following are antibiotics?		
Amoxicillin	254 (58.1)	183 (41.9)
Azithromycin	310 (70.9)	127 (29.1)
Ampicillin and Cloxacillin	307 (70.3)	130 (29.7)
Ciprofloxacin	365 (83.5)	72 (16.5)
Which of the following medicine is used in treatment of fever?		
Paracetamol	9 (2.1)	428 (97.9)
Antibiotics*	87 (20.0)	350 (80.0)
Action and use		
Antibiotics are effective against bacteria	80 (18.3)	357 (81.7)
Antibiotics work on coughs and colds*	228 (52.2)	209 (47.8)
Antibiotics are effective against viruses*	293 (67.0)	144 (33.0)
Side effects		
If you get side effects (skin rash, swelling of face and tongue, difficulty breathing, etc.) during a course of antibiotics treatment you should stop taking them as soon as possible	23 (5.3)	414 (94.7)
If you get some skin reaction when using an antibiotic, you should not use the same antibiotic again	52 (11.9)	385 (88.1)
Antibiotic resistance		
Antibiotic resistance is a situation where antibiotics become ineffective in controlling or killing bacteria	121 (27.7)	316 (72.3)
Incompletion of the course of antibiotic treatment leads to the development of resistance	69 (15.8)	368 (84.2)
Antibiotic overuse can result in antibiotic resistance	64 (14.6)	373 (85.4)
The frequent use of antibiotics will decrease effectiveness of the treatment when using the antibiotic again	72 (16.5)	365 (83.5)

Note: * Negative statement

About one-third (26.3%) of the participants incorrectly answered that antibiotics and pain killer medicines are the same. Over 90.0% knew that antibiotics should be purchased with a medical prescription. Most didn't know the names of antibiotics even when the most commonly marketed brands of antibiotics were provided. A majority of participants (81.7%) had knowledge that antibiotics are effective against bacteria however, 67.0% incorrectly answered that antibiotics are effective against virus. Surprisingly, around three-fourth (72.3%) knew that antibiotic resistance is a situation in which antibiotics become ineffective in killing bacteria. In addition, 84.2% correctly answered that incompletion of the course of antibiotic treatment would lead to development of resistance, and 85.4% correctly answered that antibiotic overuse can result in antibiotic resistance (Table 2).

Attitude towards antibiotics

Fourteen statements were used to assess the attitude of participants. Majority of the participants were found to have fair attitude towards antibiotics (73.2%) with a median score of 54 out of 70. A larger proportion (81.9%) had positive attitude towards completing the course of antibiotic treatment even if they felt better while

Table 3. Factors associated with poor level of knowledge

Factor	Categories	Poor antibiotic knowledge (N =136)		
		AOR	AOR (95% CI)	*p*-value
Gender	Male	0.465	0.283 - 0.765	0.003*
	Female	1.000		
Education	Up to Grade 8	50.447	11.001 - 231.332	<0.001*
	High School (Grade 9 -12)	6.275	3.410 - 11.547	<0.001*
	Undergraduate and above	1.000		
Employment status	With employment	1.649	0.923 – 2.943	0.091
	Without employment	1.000		
Occupation	Employed (includes labor)	0.601	0.292 - 1.239	0.168
	Self-employed	2.821	1.507 - 5.278	0.001*
	Unemployed (includes retired)	1.000		
Income	< NRs. 30,000	5.221	2.626 - 10.380	<0.001*
	≥ NRs. 30,000	1.000		

Note: * Significance at *p*-value < 0.05; Reference category is: Good Knowledge

75.8% agreed that self-medication with antibiotic played an important role in increasing antibiotic resistance and 88.8% of the participants had positive attitude towards decrease in effectiveness of treatment if the full course of antibiotic treatment was not completed.

Similarly, almost all (97.0%) disagreed on preferring to obtain antibiotics from relatives or friends while 84.6% didn't agree to self-medicate with antibiotics rather in case of minor illness, 90.6% had positive attitude towards not using antibiotics in case of cough, 86.3% had positive attitude towards not using antibiotics for sore throat and 85.8% didn't agree to use antibiotics for common cold.

Association between general characteristics and level of knowledge and attitude towards antibiotics

The Chi-square test showed significant difference between gender (*p*-value = 0.004), education (*p*-value < 0.001), occupation (*p*-value = 0.011) and income (*p*-value < 0.001) and level of knowledge while education (*p*-value = 0.027), employment status (*p*-value = 0.028) and occupation (*p*-value = 0.040) were found to be associated with level of attitude towards antibiotics.

Factors associated with level of knowledge and attitude towards antibiotics

The variables that were significantly associated using Chi-square test were analyzed for independent association with the poor level of knowledge and poor attitude towards antibiotics. Three factors were found to be independently associated with poor level of knowledge - gender, education and income level. Male participants were less likely of having poor knowledge than good knowledge on antibiotics than females (OR: 0.465, CI: 0.283 - 0.765, *p*-value = 0.003). Participants who had completed grade 8 or lower were more likely to have poor knowledge than good knowledge (OR: 50.44, CI: 11.001 - 231.332, *p*-value = < 0.001) than those with at least undergraduate. Likewise, those who completed high school compared to those who have completed at least undergraduate level were 6.275 times more likely to have poor knowledge than good knowledge (OR: 6.275, CI: 3.410 - 11.547, *p*-value = < 0.001). Similarly, the odds of people with income below NRs. 30,000 were more likely to have poor level of knowledge than good knowledge compared to those with income higher income (OR: 5.221, CI: 2.626 - 0.380, *p*-value = < 0.001) (Table 3).

On the other hand, educational level, employment status and occupation were found to be independently associated with poor attitude. Individuals who had

Table 4. Factors associated with poor level of attitude

Factor	Categories	Poor antibiotic attitude (N = 71)		
		AOR	AOR (95% CI)	*p*-value
Education	Up to Grade 8	6.000	1.125 - 31.989	0.036*
	High School (Grade 9 -12)	3.450	1.516 - 7.849	0.003*
	Undergraduate and above	1.000		
Employment status	With employment	3.714	1.350 - 10.219	0.011*
	Without employment	1.000		
Occupation	Employed (includes labor)	1.143	0.320 - 4.081	0.837
	Self-employed	5.474	1.904 - 15.735	0.002*
	Unemployed (includes retired)	1.000		

Note: * Significance at *p*-value < 0.05; Reference category is: Good attitude

completed grade 8 or lower had greater odds of having poor attitude than good attitude compared to those who completed at least undergraduate level (OR: 6.000, CI: 1.125 - 31.989, *p*-value = 0.036). High school completed individuals compared to those who completed at least undergraduate level had greater odds of having poor attitude than good attitude (OR: 3.450, CI: 1.516 - 7.849, *p*-value = 0.003). Study participants who were employed were more likely to have poor attitude than good attitude compared to those who were unemployed (OR: 3.714, CI: 1.350- 10.219, *p*-value = 0.011) (Table 4).

Discussion

In this study, 31.1% were found to have poor level of knowledge on antibiotics which was consistent with a study from Malaysia [24]. Around 26.1% of the participants incorrectly answered that antibiotics and pain killer medicines are same. This could be possibly due to belief among people that antibiotics are actually used in relieving pain, same as the ones used in symptomatic relief produced by using non-steroidal anti-inflammatory medicines such as in case of sore throat and common colds [25]. This finding was in concurrence with the study conducted in western China where similar percentage of students had misconception that antibiotics are pain killer medicines [8]. In contrast, study conducted in Lithuania found that only 5.3% of study participants confused antibiotics with other medicines such as pain killers [26]. In this study more than half of the participants didn't know the names of most commonly prescribed and self-medicated antibiotics. The participants were not able to identify the names of the antibiotics even when the commonly prescribed brand names were provided. This indicates a lack of knowledge and awareness regarding antibiotics among general public.

Regarding action and use of antibiotics, more than four-fifth of the study participants had knowledge that antibiotics are effective against bacteria, however, 36.6% of those who answered bacteria also answered that antibiotics are effective against virus. Moreover, more than half answered that antibiotics are effective against coughs and colds. These findings are in accordance with studies conducted in Kuwait, Lithuania, 12 European countries, and Lebanon, where participants were confused about the effectiveness of antibiotics and its use in the treatment of sore throat and cough and colds [2, 16, 26, 27]. One of the possible reasons for people answering incorrectly for effectiveness of antibiotics on viruses could be that the general public cannot differentiate between bacteria and viruses. In the same context, people are also not aware that most seasonal flus and common colds are caused by viruses. Surprisingly, majority of the study participants were found to have knowledge regarding antibiotic resistance. Similar findings from China, France,

Sweden and Lebanon also reported higher percentage of participants agreeing to development of resistance if antibiotics are misused, overused or used frequently [8, 27-30].

The results on attitude towards antibiotics indicated that over four-fifth of the study participants agreed on preferring completing the course of antibiotic treatment ever after feeling better. This finding is in contrast to the study from Kuwait where lower percentage of participants agreed to the statement [2]. Furthermore, over 85.0% expressed negative attitude towards getting antibiotics from family or friends without seeing a medical doctor, purchase without medical prescription, store antibiotics at home for future use, self-medicate with antibiotics rather than seeing a medical doctor in case of minor illness, and use antibiotics to treat sore throat. In contrast, these findings were quite high compared to the studies from Kuwait and China [2, 8].

Bivariate logistic regression showed that gender, education, occupation and income were statistically significant with poor level of knowledge. Females were more likely to have poor knowledge than good knowledge compared to males which is in concurrence to the findings from Sweden [31]. Participants with education below undergraduate level were found to have poor knowledge compared to those who have completed at least undergraduate level. Similar findings were reported in studies conducted in South Korea, Hong Kong, Malaysia, Italy, Sweden, Poland, Lithuania in which respondent's education was significantly associated with level of knowledge, specifically, those with lower than university or college level of education were less knowledgeable regarding antibiotics [24-26, 31-35]. Therefore, educational programs should be designed to target those with low educational attainment. Various studies have reported lower income being a predictor of poor antibiotic knowledge similar to this study [24, 32, 33, 36]. In contrast, studies conducted in China, Lebanon and Kuwait reported income not being a predictor of poor level of knowledge [2, 8, 27].

Individuals with education below undergraduate were more likely to have poor attitude than good attitude compared to those with at least undergraduate degree. This finding is in accordance with studies conducted in India, Hong Kong, Malaysia, Saudi Arabia and Kuwait where attitude were reported to be more positive with increase in educational level [2, 24, 30, 32, 37, 38]. Therefore, findings from multivariate analysis demonstrate the need of educational interventions on antibiotics especially among those with lower educational accomplishment and those with lower income.

The interpretation of the results of this study should take into consideration of certain limitations. Firstly, only one of the three districts of Kathmandu Valley was selected and only one ward was selected for the study due to resource constraints. Secondly, the use of multi-stage sampling technique can lead to large errors due to involvement of division and sub-divisions of various strata in each stage and due to unavailability of comprehensive household data from the Ward office, random walk sampling had to be used for selection of household. Therefore, the study findings cannot be generalized to the entire population of Kathmandu valley. There is also a possibility of recall bias in the study as the study participants were asked to answer questions related to past one year events.

Conclusion

The cross-sectional study conducted among 437 general public in Ward Number 16 of KMC provides a baseline data regarding the knowledge of and attitude towards antibiotic. This study highlighted that people had low level of knowledge regarding the action and use of antibiotics as many had misconception that antibiotics can be

used in the treatment of infections caused by viruses and in case of cough and colds. This underscores the urgent need of educational campaigns similar to the one done in Malaysia (Know Your Medicine Campaign) especially targeting individuals with low educational attainment, self-employed and those with lower income. Lastly, medical professionals have an important role to play an important role in disseminating knowledge and instilling positive attitude among people as they are the primary points of contact for a patient.

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