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Original Article

Public Knowledge and Attitudes Towards Antibiotics Usage in Perlis: A Cross-Sectional Study

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ABSTRACT

Introduction: Antibiotic resistance is increasing worldwide. The prevalence of bacterial resistance varies in different geographical areas, and it was correlated with the utilisation of antibiotics in the general population. **Objective:** This study was conducted to assess public knowledge and attitudes towards antibiotic usage in Perlis, Malaysia. **Method:** A validated self-administered questionnaire survey was distributed among the public in three main parliament areas of Perlis using the quota sampling method from August to October 2017. The questionnaire from a previous study by Lim et al. was used and the data were analysed using SPSS version 20.0. **Result:** About half of the respondents (51%) were found to have good knowledge (score ≥6 out of 12), and 45.1% have a good attitude (score ≥6 out of 8). The mean knowledge score was 5.0±2.19 and the mean attitude score was 5.6±3.00. As for knowledge, most respondents still perceived those antibiotics would work on viral infections in the common cold and cough. In terms of attitude, almost three-quarters of the study population (74%) expected antibiotics to treat cough and cold while two-thirds of the respondents (65.1%) expected that taking antibiotics would improve recovery. Half of the respondents (53.6%) will stop taking antibiotics when they start feeling better. Age, education level, and employment sector were found to be significantly associated with knowledge and attitude. There was a positive correlation (r=0.581) between knowledge and attitude scores. **Conclusion:** This study has identified people with better knowledge would have an appropriate attitude regarding the use of antibiotics. Hence, educational programmes targeting the young generation and public who do not work in the healthcare field are significant to promote the appropriate utilisation of antibiotics among the public in Perlis.

INTRODUCTION

Antibiotics are medicines that destroy or inhibit the growth of microorganisms. Whenever a patient has been identified with bacterial infections, doctors will prescribe specific antibiotics to treat them. If the infection is suspected, but its responsible pathogen for the illness has not been identified, an empirical antibiotic therapy will be given. For empirical treatment using antibiotic, it involves the administration of broad-spectrum antibiotics that covers a wide range of microorganisms.

Antibiotic resistance has become a significant issue in the 20th century and persists until now [1]. The accumulation and spread of antibiotic resistance threaten to limit the effectiveness of antibiotics [2]. There are a lot of factors that lead to antibiotic resistance. Lack of information about the knowledge of the complete course of antibiotics, their side effects, standard acceptable dosage limits is the potential reason that leads to microbial resistance issues and increased morbidity [3]. For example, patients may not know that the antibiotic regime must be completed even though the patient might feel healthy before the course is completed. Patients

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who did not complete the antibiotic regime might lead to an increase in antibiotic resistance. Thus, it is crucial to ensure patient's compliance in finishing their antibiotic regime at all costs. The lack of newly approved antibiotics in recent times may pose more problems as previous antibiotics have reduced efficacy to treat infection [4].

The prevalence of bacterial resistance varies in different geographic areas, and it is correlated with the consumption of antibiotics in the general population [5]. Thus, it is essential to assess public knowledge and attitude towards antibiotics according to their respective geographic areas. This study aims to assess the understanding and attitude towards antibiotic usage among the general population in Perlis.

METHOD

A cross-sectional survey involving a community that lived in Perlis was conducted from September to November 2017 using a validated questionnaire [6]. The sample size was determined using the Raosoft sample size calculator for the estimated 253,600 people in Perlis [7]. The minimum sample size of 384 is required to provide a confidence level of 95% with an assumption of 50% response distribution and a 5% margin of error. A quota sampling method was used according to three parliamentary constituencies in Perlis which are Kangar (156 respondents), Arau (151 respondents) and Padang Besar (97 respondents). Each of the samples was determined by using a ratio from the total population number of each constituency. The subjects from each constituency were selected using a convenient sampling method. The inclusion criteria for the subjects were: (i) Aged 18 years old and above; (ii) understood English or Malay language and; (iii) aware of the term 'antibiotics'. The self-administered questionnaire used in the study was adopted from a study done by Lim & Teh [6].

Data were analyzed using SPSS® 20.0. Demographic characteristics, recent use of antibiotics, knowledge and attitude scores will be summarized using descriptive statistics. The difference between mean scores was examined by using a t-test or ANOVA, where appropriate. Demographic characteristics which contributed significantly to knowledge and attitude were identified using multivariable logistic regression. Pearson's correlation was used to examine the relationship between antibiotic knowledge and attitude score. Association between knowledge score and appropriateness of attitude of antibiotics use were determined using the chi-square test. In all statistical analyses, a p-value of < 0.05 will be considered to be statistically significant.

The study was registered with the National Medical Research Register (NMRR) and approved by the Medical Research Ethics Committee (MREC), Ministry of Health Malaysia (NMRR-17-2853-38768).

RESULT

A total of 404 questionnaires were distributed during this study. The respondents were enrolled at three main parliamentary constituencies: Kangar, Padang Besar and Arau. However, only 384 questionnaires were being analysed, as 20 incomplete questionnaires were excluded (95.1% usable response). Table I shows the summary of respondents' demographic characteristics. The majority of the respondents falls within the age of 18 to 30 years old age (37.0%), Malay (93.2%), female (65.9%), undertaken tertiary education (53.1%) and wage-earners (62.5%). Most of the respondents (72.4%) went to government healthcare facilities to seek treatment.

The mean knowledge score obtained was 5.0±2.19, and the mean attitude score was 5.6±3.00. This study showed 51% of the total respondents had good knowledge, while less than half of the respondents (45.1%) had a good attitude towards antibiotics usage.

Table I shows that gender, education level, employment status, and health -related occupation significantly contribute to mean knowledge and attitude scores ($p<0.05$). Additionally, family members' occupations related to healthcare had a significant association with the mean knowledge score, while age was found to contribute significantly to the mean attitude.

Respondents considered as having good knowledge of antibiotics were more likely to have a positive attitude towards the use of antibiotics. A significant positive correlation was noted between respondents' antibiotics knowledge score and their attitude score ($r = 0.581$, $p<0.001$).

Based on the statements given to assess antibiotics knowledge, 75.8% of respondents knew that antibiotics are medicines to kill bacteria. However, 81.5% and 78.6% of respondents still perceived those antibiotics could treat viral infections and work on most colds and coughs respectively. 54.7% of respondents perceived wrongly that antibiotics use could be discontinued when symptoms are improving. However, 56.5% of respondents knew overuse of antibiotics could cause lead to antibiotics resistance.

In terms of attitude, 74% of the study population presumed the use antibiotics to treat cough and cold, while 65.1% of the respondents expected that taking antibiotics would improve

Table I. Respondents' demographic characteristics

Characteristic	n (%) (n=384)		Knowledge Mean (SD)	p-value	p-value	Attitudes Mean (SD)		p-value
Age								
18-30	142	(37.0)	5.2	(0.277)	0.132	4.30	(0.195)	<0.001
31-45	122	(31.8)	5.8	(0.253)		5.48	(0.180)	
46+	120	(31.3)	5.9	(0.257)		5.36	(0.183)	
Gender								
Male	131	(34.1)	4.9	(0.261)	<0.001	4.25	(0.190)	<0.001
Female	253	(65.9)	6.0	(0.186)		5.4	(0.132)	
Races								
Malay	358	(93.2)	5.6	(0.157)	0.363	5.02	(0.115)	0.57
Non-malay	26	(6.8)	6.2	(0.670)		4.77	(0.455)	
Education level								
No formal education	12	(3.1)	5.9	(0.981)	<0.001	4.42	(0.570)	<0.001
Primary school	15	(3.9)	4.5	(0.524)		4.13	(0.456)	
Secondary school	153	(39.8)	4.6	(0.220)		4.31	(0.167)	
College/University	204	(53.1)	6.4	(0.210)		5.62	(0.150)	
Employment status								
Employed for wages	240	(62.5)	6.1	(0.196)	<0.001	5.53	(0.132)	<0.001
Self Employed	54	(14.1)	4.5	(0.365)		3.80	(0.258)	
Student	34	(8.9)	4.7	(0.467)		3.71	(0.381)	
Housewives	39	(10.2)	4.9	(0.479)		4.51	(0.376)	
Retired	17	(4.4)	6.1	(0.661)		5.24	(0.466)	
Healthcare related occupation								
Yes	82	(21.4)	7.6	(0.362)	<0.001	6.02	(0.235)	<0.001
No	302	(78.6)	5.1	(0.156)		4.72	(0.123)	
Family member's occupation related to healthcare								
Yes	85	(22.1)	7.1	(0.303)	<0.001	5.32	(0.245)	0.136
No	299	(77.9)	5.2	(0.169)		4.92	(0.125)	
Common location seeking healthcare								
Government	278	(72.4)	5.6	(0.184)	0.922	4.98	(0.132)	0.737
Non-Government	133	(27.6)	5.6	(0.279)		5.07	(0.210)	

Table II. Association between the appropriateness of antibiotic use and knowledge level

Attitude	Inappropriateness	Knowledge score n (%) Poor (n=188)		Good (n=196)		X^2(p)
When I get a cold, I will take antibiotics to help me get better more quickly.	Inappropriate	156	(82.9)	94	(47.9)	51.79
	Appropriate	32	(17.1)	102	(51.1)	<0.001
I expect antibiotics to be prescribed by my doctor if I suffer from common cold symptoms.	Inappropriate	167	(88.8)	117	(59.7)	42.29
	Appropriate	21	(11.2)	79	(40.3)	<0.001
I usually stop taking an antibiotic when I start feeling better.	Inappropriate	146	(77.6)	60	(30.6)	85.41
	Appropriate	42	(22.4)	136	(69.4)	<0.001
If my family member is sick, I usually will give my antibiotic to them.	Inappropriate	86	(45.7)	38	(19.4)	30.48
	Appropriate	102	(54.3)	158	(80.6)	<0.001
I usually keep antibiotic stock at home in case of emergency.	Inappropriate	63	(33.5)	33	(16.8)	14.22
	Appropriate	125	(66.5)	163	(83.2)	<0.001
I will use leftover antibiotics for a respiratory illness (runny nose/ sore throat / flu).	Inappropriate	66	(35.1)	23	(11.7)	29.43
	Appropriate	122	(64.9)	173	(88.3)	<0.001
I will take antibiotics according to the instruction on the label.	Inappropriate	32	(17.0)	14	(7.1)	8.88
	Appropriate	156	(83.0)	182	(92.9)	0.004
I usually will look at the expiry date of the antibiotic before taking it.	Inappropriate	37	(19.7)	18	(9.2)	8.61
	Appropriate	151	(80.3)	178	(90.8)	0.004

Chi-square; significant when p <0.05

recovery. 53.6% of the respondents would stop taking antibiotics when they start feeling better.

Table II shows the association between the appropriateness of antibiotics use and knowledge level. The majority of the respondents with poor knowledge tend to think antibiotics help them to get better (82.0%) and stop taking antibiotics when they feel better (77.6%). Even though most of the respondents with poor and good knowledge scores responded inappropriately to the attitude statement 'I expect antibiotic to be prescribed by my doctor if I suffer from common cold symptoms', the number of the poor knowledge score respondents outstand the number of respondents of good knowledge which was 167 (88.8%) compared to 117 (59.7%) respectively. Interestingly, most of the Perlis respondents realised antibiotics should not be kept for an emergency; leftover antibiotics are not supposed to be used, antibiotics should be taken with instructions and expiration date must be observed before taking them.

The demographic variables were initially analysed using simple logistic regression. Based on Table III, three variables showed a significant association with the respondents' knowledge regarding antibiotics use which was age ($p<0.047$), healthcare-related workers ($p<0.001$) and having family member's occupations related to healthcare ($p<0.001$). These three variables were shown to be significant predictors for good knowledge of antibiotics when further analysed using forward, backward and stepwise multiple logistic regression.

Respondents in the older age group, aged 31 to 45 years old with an adjusted odds ratio of 2.15; 95% CI: 1.26-3.65) and aged 46 years old and above (adjusted OR 1.80; 95% CI: 1.50-4.47) were found to have higher odds of better knowledge in antibiotics when compared to respondents aged 18 to 30 years old.

Respondents who had career-related to healthcare were 4.28 higher odd (95% CI: 2.38-7.71) more likely of having a better knowledge of antibiotics compared to non-healthcare workers.

Table III. Demographic factors associated with public knowledge of antibiotic use

Factors	Simple Logistic Regression			Multiple Logistic Regression		
	Crude OR	95% CI	p-value	Adj. OR	95% CI	p-value
Gender						
Male	1	(ref.)	0.14			
Female	2.395	(0.90 , 2.10)				
Age						
18-30	1	(ref.)	0.047	1	(ref.)	0.001
31-45	1.565	(0.96 , 2.55)		2.146	(1.26 , 3.65)	
46+	1.797	(1.09 , 2.94)		1.797	(1.50 , 4.47)	
Race						
Malay	1	(ref.)	0.767			
Non-malay	1.128	(0.51 , 2.51)				
Highest Education Level						
No formal education	1	(ref.)				
Primary School	0.5	(0.11 , 2.38)	<0.001			
Secondary School	0.628	(0.19 , 2.04)				
College/ University	0.615	(0.50 , 5.19)				
Employment Status						
Employed for wages	1	(ref.)				
Self-employed	0.458	(0.25 , 0.84)	0.029			
Student	0.544	(0.26 , 1.13)				
Housewife/Househusband	0.541	(0.27 , 1.08)				
Retired/ Unemployed	1.426	(0.51 , 3.98)				
Healthcare related worker						
No	1	(ref.)	<0.001	1	(ref.)	<0.001
Yes	3.62	(2.09 , 6.25)		4.28	(2.38 , 7.71)	
Family member's occupation related to healthcare						
No	1	(ref.)	<0.001	1	(ref.)	<0.001
Yes	2.876	(1.71 , 4.83)		2.738	(1.59 , 4.72)	
Common location seeking healthcare						
Private	1	(ref.)	0.981			
Government	1.005	(0.64 , 1.57)				

Note: aMultiple logistic regression analysis using the Forward Stepwise (Likelihood Ratio) method; OR = odds ratio; 95% CI= 95% confidence interval

Respondents who had family members who have healthcare-related work have 2.74-fold (95% CI: 1.59-4.72) more likely to have adequate knowledge in antibiotics than respondents who had not. Respondents in the older age group, having a career or family members related to healthcare, were found to have higher odds of better knowledge in antibiotics.

Table IV. Demographic factors associated with the public attitude toward antibiotic use

Factors	Simple Logistic Regression			Multiple Logistic Regression		
	Crude OR	95% CI	p-value	Adj. OR	95% CI	p-value
Gender						
Male	1	(ref.)	<0.001	1	(ref.)	0.002
Female	1.375	(1.54 , 3.73)		2.105	(1.32 , 3.37)	
Age						
18-30	1	(ref.)	0.001	1	(ref.)	<0.001
31-45	2.460	(1.49 , 4.06)		3.394	(1.94 , 5.95)	
46+	2.158	(1.31 , 3.56)		3.228	(1.83 , 5.68)	
Race						
Malay	1	(ref.)	0.485			
Non-malay	0.748	(0.33 , 1.69)				
Highest Education Level						
No formal education	1	(ref.)				
Primary School	0.350	(0.06 , 1.93)	<0.001			
Secondary School	0.513	(0.15 , 1.71)				
College/ University	2.170	(0.67 , 7.07)				
Employment Status						
Employed for wages	1	(ref.)				
Self-employed	1.688	(0.62 , 4.58)	<0.001			
Student	0.408	(0.13 , 1.30)				
Housewife/Husbehusband	0.514	(0.15 , 1.76)				
Retired/ Unemployed	0.893	(0.28 , 2.85)				
Healthcare related worker						
No	1	(ref.)	<0.001	1	(ref.)	<0.001
Yes	3.406	(2.03 , 5.73)		4.626	(2.57 , 8.31)	
Family member's occupation related to healthcare						
No	1	(ref.)	0.16			
Yes	1.414	(0.87 , 2.29)				
Common location seeking healthcare						
Private	1	(ref.)	0.457			
Government	0.843	(0.54 , 1.32)				

Note: aMultiple logistic regression analysis using the Forward Stepwise (Likelihood Ratio) method; OR = odds ratio; 95% CI= 95% confidence interval

In Table IV, for attitude, female, older age class respondents and respondents with occupation related to healthcare were found to have a significant association with the respondents' attitude towards antibiotics use using forward stepwise multiple logistic regression. Female (adjusted OR 2.11; 95% CI: 1.32-3.37) and healthcare-related workers (adjusted OR 4.63; 95% CI: 2.57-8.31) were independently associated with good attitudes. Respondents in the older age group, those aged 31 to 45 years old (adjusted OR 3.394; 95% CI: 1.94-5.95) and aged 46 years old and above (adjusted OR 3.228; 95% CI: 1.83-5.68), were found to have higher odds of better attitude in antibiotics when compared to respondents aged 18 to 30 years old. For attitude, female, older age class respondents and respondents with occupation related to healthcare were found to have a better attitude than male, younger class respondent and non-related health occupation respondents. Age and the employment sector were found to be significantly associated with both knowledge and attitude.

DISCUSSION

This study was done among the public in one of the states with the lowest urbanisation level in Malaysia, which is Perlis [7]. The previous studies in Malaysia were all done in states with a high level of urbanisation which was Penang, Putrajaya and Selangor. The findings in this study may give a better understanding of public knowledge and attitudes towards antibiotics usage among the community in a rural state, in addition to findings from the studies done before in urban states. The compilation of these findings could give clearer insight for the authorities to manage issues of inappropriate antibiotics use in Malaysia.

The overall results have shown that half of the study population in Perlis obtained scores more than the mean knowledge score, while a slightly lower percentage of them obtained scores more than the mean attitude score. A significant positive correlation was noted between respondents' antibiotic knowledge score and their attitude score. Our result was consistent with the study in Putrajaya [6], where adequate knowledge of antibiotics was shown to be a predictor for appropriate attitudes. On the other hand, the study in Penang [8] showed contrast results regarding our findings. The study in Penang suggested that better knowledge does not necessarily imply an appropriate attitude concerning antibiotics use. The findings, however, limited to the respondents who attended the hospital. In our view, these results offer compelling evidence that the different strategies to increase the public's awareness of antibiotic-related issues should be tailored according to different settings. Through our findings, healthcare professionals and authorities in Perlis need to give attention to antibiotics-related-educational programmes to ensure proper antibiotics-taking behaviors among the local community.

About 60% of the respondents answered incorrectly to identify penicillin as an antibiotic in this study and Putrajaya [6]. The previous studies were done among general public in Malaysia found out that the population are more familiar with the brand name instead of the generic name [9,10,11,12]. Besides that, the medications in Malaysia are sometimes not labelled with their name especially by private clinics and retail pharmacies [13], which might be the reason behind this finding. In contrast, our study shows most of the respondents were able to differentiate antibiotics from other common drugs such as paracetamol and aspirin. Both medications are also over the counter (OTC) medications [14] and more easily acquired than antibiotics which need prescription by a doctor.

The majority of the respondents in Perlis were unable to identify the role of antibiotics accurately. More than the third quarter of respondents still perceived those antibiotics would work on viral infections in common cold and cough which is comparable to previous local studies in Putrajaya (83.0%) and Penang (86.6%). The same issue happened worldwide [15]. This series of findings show where a vast majority of respondents throughout Malaysia still have the same misconception; hence healthcare providers must put extra effort into this issue. The information should outreach the community as various community education programmes are available in Malaysia such as Know Your Medicine and antibiotics awareness campaigns, for instance, World Antibiotic Awareness Week (WAAW).

Furthermore, it was found that most of the respondents would take antibiotics for cold, where the same findings were also present in Putrajaya's case study [6]. A possible explanation for the high rate of this inappropriate behavior corresponds to the findings that most of our respondents did not know antibiotics ineffective against viral infection and cold and cough. However, the proportion in our study was found higher than other studies done in Penang [8]and Shah Alam [16], where less than half of their respondent population would do the same. The misconception also may lead to the findings where three over four of the respondents anticipate antibiotics to be prescribed by the physician if they had a cold for faster recovery. Misuse of antibiotics can cause side effects and lead to antibiotic resistance [17].

In addition, more than half of respondents in Perlis thought that the consumption of antibiotics could be stopped when symptoms are improving. Similarly, in terms of attitude, they also usually stop taking antibiotics when they started feeling better, which was higher compared to previous studies in Penang [8], Putrajaya [6] and Shah Alam [16]. Above all, it would be expected to obtain such outcomes of inappropriate attitude regarding antibiotics usage as the inadequate knowledge of antibiotics was shown to be a predictor for poor attitudes in this study. Hence, each part of healthcare providers from doctors, medical assistants, nurses, pharmacists and others are responsible for reminding patients repetitively to finish their antibiotic course in order for patients to realize the importance of antibiotic compliance.

Respondents in the older age group, having a career or family member working in healthcare, were found to have a higher probability of better knowledge and antibiotic usage attitude. The study in Putrajaya also identified the same finding regarding better knowledge of antibiotics among the older age group [6]. Respondents with career or having family members working in the healthcare field has better knowledge as it may be easier for them to seek medical advice regarding health and medication compared to who do not. The same demographic factors also scored better in attitude as our study found a significant positive correlation between respondents' antibiotic knowledge score and their attitude score.

From these findings, the health care teams can identify the target groups that should be given more attention to improving public knowledge and attitude regarding antibiotic usage. These groups include the younger age group and the public who does not work in the healthcare field. The educational programmes should be held at strategic places that are easily accessible and can reach them such as schools, universities or malls, rather than at a hospital or other healthcare facilities.

Our study was done using a convenience sampling method to select the respondents at public places in three main parliaments area in Perlis; thus, the results are subject to bias

and may not be generalised to other population. Moreover, as the data for this study was collected through a self-administered questionnaire, the accuracy of the results was solely dependent on the honesty and understanding of the respondents. We are also unable to assess respondents who are illiterate (cannot understand Malay or the English language).

CONCLUSION

This study has identified people with better knowledge would have an appropriate attitude regarding antibiotics usage. Hence, educational programmes such as antibiotic awareness campaigns and patient counselling are very critical in promoting the appropriate utilisation of antibiotics among the public in Perlis. However, such programmes should be tailored to gain interest from the targeted groups which are the younger age group and the public who does not work in the healthcare field at Perlis

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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