KNOWLEDGE, ATTITUDES AND PRACTICES ABOUT ANTIBIOTIC USE AMONG THE GENERAL PUBLIC IN MALAYSIA

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Abstract. Antibiotic resistance is a major problem globally. Awareness of the impact and significance of antibiotic resistance is a first step in hindering its progression. We conducted this survey to evaluate knowledge, attitudes and practices regarding antibiotic use in Malaysia. A total of 373 respondents were surveyed, 219 (58.1%) were female and 312 (83%) were Malay ethnicity. Eighty-four point two percent (314) had used antibiotics more than once (>1) during the previous year. We found respondents who were less likely to take antibiotics (≤1) during the previous year were more likely to agree that antibiotic resistance was a serious public health issue compared to those that took antibiotic more than once during the previous year (p<0.0001). A significantly greater number of patients (67.2%) who took antibiotics more than once during the previous year did not complete the full course than those who took antibiotics no more than once (55.9%) during the previous year (p<0.01). We found the frequency of antibiotic use was related to knowledge about antibiotics among the study population. It is essential to develop educational interventions to correct the misuse and misunderstanding of antibiotics.

Keywords: antibiotics, knowledge, attitude, practices, general public, Malaysia

INTRODUCTION

Antibiotic resistance is a global issue (Morgan *et al*, 2011). Infectious diseases caused by resistant bacteria are often difficult to treat and may lead to greater morbidity and mortality among patients (Ntagiopoulos *et al*, 2007). A major cause of antibiotic resistance is inappropriate use of antibiotics, which commonly occurs due to lack of prudent antibiotic use and the ease at which medicine can be obtained by patients without a prescription (McNulty *et al*, 2007). There is also an increasing trend in taking antibiotics for viral indications, such as the common cold (Saradamma *et al*, 2000). This inappropriate behavior had consequences, one is using an antimicrobial without a perceived benefit (Morgan *et al*, 2011). The lack of a new class of antibiotics within the past decade has also contributed to the high risk for resistant strains (Chan *et al*, 2012).

The lack of knowledge regarding antibiotic use among the public could lead to inappropriate antibiotic use and ultimately antibiotic resistance (Chan *et al*, 2012). One study found the public took antibiotics without knowing the exact indication for treatment (Chan *et al*, 2012).

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The public tend not to finish a course of antibiotics because they were unaware of the importance of finishing a course of antibiotics (Duong *et al*, 1997). The impact of the knowledge, attitudes and practices of the general public on antibiotic use is important to prevent misuse of antibiotics and antibiotic resistance (Chan *et al*, 2012).

Education can improve understanding of antibiotic use among the public to potentially reduce resistance (Morgan *et al*, 2011). An understanding of the current knowledge, attitudes and practices of the public in regard to antibiotic use is important to inform intervention development plans.

MATERIALS AND METHODS

Study design

This study was performed as a cross sectional, prospective study. Respondents were recruited conveniently among the general public in Kuantan and Kuala Lumpur, Malaysia. Volunteers from shopping malls around the Kuantan and Kuala Lumpur area were recruited with informed consent. Inclusion criteria for the study were: ≥18 years, ability to read and understand both English and Malay, and understanding the term 'antibiotic'. Respondents unable to complete the questionnaire were excluded. The data were collected from August 2013 to November 2013. Ethical approval was obtained from the National University Hospital Ethics Committee (UKM 1.5.3.5/244/NF-050-2013).

Demographic data

Gender, race, date of birth, age and level of education were collected for each patient using a standardized form. Each respondent was asked to answer questions regarding frequency of antibiotic use. The frequency of antibiotic use was categorized into two groups: those having used antibiotics no more than once during the previous year (≤1), and those who used antibiotics more than once (>1) during the previous year.

Knowledge, attitudes and practices questionnaire

The knowledge, attitudes and practices regarding antibiotic use were collected using a questionnaire (Khan *et al*, 2013). The knowledge, attitudes and practices questions are found in Tables 1-6.

Data analyses

All analysis was performed using the statistical package SPSS version 17.0 (IBM; Armonk, NY). Descriptive statistics, such as means, standard deviations and frequencies were used to analyze continuous and categorical data, such as respondent demographic factors and their knowledge level. A chi-square test was used to make comparisons and evaluate possible associations regarding their knowledge, attitudes and practices.

RESULTS

Demographics

A total of 373 subjects were included in the study. The majority of the respondents were female (*n*=219, 58.1%), aged 21 to 60 years old. Most of the subjects were Malay (*n*=224, 78.9 %), followed by Indians (*n*=30, 7.9%), Chinese (*n*=25, 6.7%) and other races (*n*=9, 2.4%). A majority of subjects were non-professionals (*n*=167, 44.8%) or unemployed (*n*=156, 41.8%). A total of 299 subjects (79.3%) had a tertiary education. Most of the subjects (*n*=314, 84.2%) had taken antibiotics more than once during the previous year.

Knowledge about antibiotics

The knowledge section evaluated two key areas: antibiotic use and antibiotic resistance (Table 1). Most subjects

Table 1
Knowledge about antibiotics (N=373).

Knowledge statements	True (n)	False (n)	p-value[a]
Indiscriminate use of antibiotics can lead to:			
Ineffective treatment	313	60	0.0001
Increased adverse effects	311	62	0.0001
Exacerbation or prolongation of illness	276	94	0.0001
Emergence of bacterial resistance	292	81	0.0001
Additional cost to the patient	286	87	0.0001
If taken too often, antibiotics are less likely to work in the future	296	77	0.0001
Bacteria are germs that cause the common cold and flu	314	59	0.0001
	Agree (n)	Uncertain (n)	Disagree (n)	p-value[a]
Antibiotic resistance is an important public health issue:				
Facing the world	220	144	9	0.0001
In our country	180	176	17	0.0001
In our hospital	181	178	14	0.0001

Chi-square test.

were aware that inappropriate antibiotic use had harmful effects (Table 1). Most subjects found antibiotic resistance was a problem (Table 1).

No significant association was seen between the frequency of antibiotic use and knowledge about antibiotics and between the frequency of antibiotic use during the previous year and knowledge about antibiotic resistance (Table 2). Subjects who took antibiotics ≤1 time during the previous year were more likely to agree that antibiotic resistance was a serious public health problem (Table 2).

Attitudes about antibiotic use

Attitudes about antibiotic use varied among subjects (Table 3). In the attitudes section, subjects were asked about antibiotic use, resistance and safety. The majority of subjects believed fever and colds should be treated with antibiotics (Table 3). The majority of subjects were uncertain if taking an antibiotic could contribute to antibiotic resistance. A significantly large number of subjects were uncertain if antibiotics were safe or not. No association was seen between attitudes about antibiotic use and the frequency of antibiotic use (Table 4).

Practices regarding antibiotic use

Practices regarding antibiotic use varied (Table 5). Many subjects stated that they stopped taking antibiotics once they felt better, prior to finishing the course. Many subjects seldom finished the complete antibiotic course. Most subjects did not give their remaining unused antibiotics to others or saved their antibiotics for future use once they felt better. Most subjects consulted a doctor before starting antibiotics and checked expiry dates prior to using antibiotics (Table 5).

Subjects who took ≤1 courses of antibiotics during the previous year were significantly more likely to finish the course of antibiotics (Table 6).

Table 2
Antibiotic knowledge and frequency of antibiotic use (*N*=373).

Knowledge statements	True (*n*)	False (*n*)	*p*-value[a]
Indiscriminate use of antibiotics can lead to :			
Ineffective treatment			
≤1	46	13	0.18
>1	267	47	
Increased adverse effects			
≤1	45	14	0.11
>1	266	48	
Exacerbation or prolongation of illness			
≤1	49	10	0.10
>1	227	87	
Emergence of bacterial resistance			
≤1	47	12	0.78
>1	245	69	
Additional cost to the patient			
≤1	44	15	0.68
>1	242	72	
If taken too often, antibiotics are less likely to work in the future			
≤1	43	16	0.18
>1	253	61	
Bacteria are germs that cause the common cold and flu			
≤1	49	10	0.79
>1	265	49	

	Agree (*n*)	Uncertain (*n*)	Disagree (*n*)	*p*-value[a]
Antibiotic resistance is an important and serious public health issue:				
Facing the world				
≤1	57	1	1	0.0001
>1	163	143	8	
In our country				
≤1	56	2	1	0.0001
>1	124	174	16	
In our hospital				
≤1	57	1	1	0.0001
>1	124	177	13	

≤1 = took antibiotics no more than once during the previous year.
>1 = took antibiotics more than once during the previous year.
[a]Chi-square test.

DISCUSSION

Antibiotic use by the general public is common practice worldwide (Kardas *et al,* 2005). Antibiotics easily available to the general public can contribute to antibiotic resistance (Pomoni, 2010). With the rise in antibiotic resistance over the past decade (Ntagiopoulos *et al,* 2007), methods to curb inappropriate antibiotic use need to

Table 3
Attitude about antibiotic use.

Attitude statements	Agree	Uncertain	Disagree	*p*-value[a]
When I have a cold, I should take antibiotics to prevent getting a more serious illness.	199	70	104	0.0001
When I get fever, antibiotics help me to get better more quickly.	214	87	72	0.0001
When I take antibiotics, I contribute to the development of antibiotic resistance.	118	210	45	0.0001
Skipping one or two doses of antibiotics does not contribute to the development of resistance.	97	210	66	0.0001
Antibiotics are safe and can be used commonly.	74	144	155	0.0001

[a]Chi-square test.

be improved. In our study a large number of subjects stated they took antibiotics more than once during the previous year. This finding is similar to another study (Kardas *et al*, 2005), and demonstrates the need to better understand the reasons for injudicious use of antibiotics among the general public.

Interestingly, knowledge about antibiotic use among the subjects in our study was good, with approximately 80% of respondents stating indiscriminate use of antibiotics could lead to poor outcomes. Our results are similar to a previous study from Malaysia who found 76% of respondents at an outpatient pharmacy were able to correctly identify the proper use of antibiotics (Oh *et al*, 2011). In a study from Jordan the respondents were also aware of the problems caused by misusing antibiotics (Shehadeh *et al*, 2012). Despite understanding that misuse of antibiotics could lead to antibiotic resistance, adverse reactions and increase the economic burden on the national health system (Gyssen 2001), many respondents in our study took antibiotics more than once during the previous year.

In our study, an association was observed between the frequency of antibiotic use and knowledge about antibiotic resistance. Respondents were less likely to have taken antibiotics during the previous year if they were aware of the problem of resistance, similar to other studies (Eng *et al*, 2003; Shehadeh *et al*, 2012). This demonstrates the impact of knowledge about antibiotic resistance on preventing injudicious use of antibiotics. Further studies of the effect of patient education about correct antibiotic use on antibiotic resistance need to be conducted.

Approximately half of our study subjects agreed that antibiotics may be used to treat common cold and fever. Public attitudes about antibiotic use play an important role in treatment outcomes (Oh *et al*, 2011). A casual attitude about antibiotic use can lead to increased risk of antibiotic resistance (Chan *et al*, 2012). In our study, a fairly large number of subjects were uncertain about what attitudes were associated with antibiotic resistance. This finding was also reported by a previous study (Oh *et al*, 2011).

The poor understanding of the importance of completing the full course of antibiotics seen in our study was seen in a

Table 4
Association between attitudes about antibiotic use and frequency of antibiotic use.

Attitude statements	Agree	Uncertain	Disagree	*p*-value[a]
When I have a cold, I should take antibiotics to prevent getting a more serious illness.				
≤1	28	12	19	0.60
>1	171	58	85	
When I get fever, antibiotics help me to get better more quickly.				
≤1	34	13	12	0.96
>1	180	74	60	
When I take antibiotics, I contribute to the development of antibiotic resistance.				
≤1	25	30	4	0.10
>1	93	180	41	
Skipping one or two doses of antibiotics does not contribute to the development of resistance.				
≤1	19	30	10	0.49
>1	78	180	56	
Antibiotics are safe and can be used commonly.				
≤1	10	30	19	0.11
>1	64	114	136	

≤1 = took antibiotics no more than once the previous year.
>1 = took antibiotics more than once the previous year.
[a]Chi-square test.

Table 5
Practices regarding antibiotic use.

Practice statements	Always	Sometimes	Seldom /never	*p*-value[a]
The doctor prescribes a course of antibiotic for you. After taking 2-3 doses you start feeling better.				
Do you stop taking the antibiotics?	119	153	101	0.0036
Do you save the remaining antibiotics for the next time you get sick?	88	106	179	0.0001
Do you discard the remaining antibiotics?	115	124	134	0.48
Do you give the leftover antibiotics to someone else who is sick?	44	107	222	0.0001
Do you complete the full course of antibiotics?	115	164	94	<0.0001
Do you consult a doctor before starting antibiotics?	205	120	48	0.0001
Do you check the expiry date of the antibiotic before using it?	246	90	37	0.0001
Do you prefer to take antibiotics when you have a cough or sore throat?	95	165	113	<0.0001

[a]Chi-square test.

Table 6
Practices regarding antibiotic use by frequency of antibiotic use.

Practice statements	Always	Sometimes	Seldom /never	*p*-value[a]
The doctor prescribes a course of antibiotic for you.				
After taking 2-3 doses you start feeling better.				
Do you stop taking the antibiotics?				
≤1	17	21	21	0.28
>1	102	132	80	
Do you save the remaining antibiotics for the next time you get sick?				
≤1	16	18	25	0.63
>1	72	88	154	
Do you discard the remaining antibiotics?				
≤1	15	20	24	0.57
>1	100	104	110	
Do you give the leftover antibiotics to someone else who is sick?				
≤1	8	16	35	0.76
>1	36	101	187	
Do you complete the full course of antibiotics?				
≤1	26	10	23	<0.01
>1	103	140	71	
Do you consult a doctor before starting antibiotics?				
≤1	35	16	8	0.66
>1	170	104	40	
Do you check the expiry date of the antibiotic before using it?				
≤1	42	11	6	0.56
>1	204	79	31	
Do you prefer to take antibiotics when you have a cough or sore throat?				
≤1	19	24	16	0.43
>1	76	141	97	

≤1 = took antibiotics no more than once the previous year.
>1 = took antibiotics more than once the previous year.
[a]Chi-square test.

similar study (Shehadeh *et al*, 2012). Only 55% of the subjects in our study consulted a doctor prior to taking antibiotics. This demonstrates the ease which antibiotics can be obtained by the general public in Malaysia. Other studies have also found purchasing antibiotics without a prescription is common practice (Llor *et al,* 2009). Directly purchasing antibiotics may have been done to avoid the cost of consulting a doctor (Dameh *et al,* 2012).

Seventy percent of those who used antibiotics more than once during the previous year in our study failed to complete the course of antibiotics; this can lead to insufficient eradication of the infection (McNulty *et al*, 2007). Factors such as feeling better after a few days of treatment or believing the antibiotics were not working are common reasons for not completing

treatment (McNulty *et al*, 2007). Failing to complete the course of treatment could be a reason why antibiotics were used more than once during the previous year in our study.

The lack of knowledge about correct antibiotic use in our studied population poses a problem. The association between frequent use of antibiotics and lack of knowledge and poor practices demonstrates a lack of knowledge about correct use of antibiotics in the study population.

There were some limitations with our study. The accuracy of the survey depends on the honesty of the subjects. The subjects were chosen by convenience sampling, thus the results are subject to bias and cannot be applied to other populations. Our results suggest education programs for the public regarding correct antibiotic use need to be developed to reduce the risk of antibiotic resistance. Educational interventions for practitioners and the general public can significantly improve knowledge regarding antibiotic indications and resistance (Trepka *et al*, 2001). This study provides valuable information about the knowledge regarding correct antibiotic use in the studied population.

REFERENCES

Chan YH, Mandy M, Fok CM, *et al*. Antibiotic nonadherence and knowledge in a community with the world's leading prevalence of antibiotics resistance: Implications for public health intervention. *Am J Infect Control* 2012; 40: 113-7.

Dameh M, Norris P, Green J. New Zealand pharmacists' experiences, practices and views regarding antibiotic use without prescription. *J Prim Health Care* 2012; 4: 131-40.

Duong DV, Binns CW, Le TV. Availability of antibiotics as over-the counter drugs in pharmacies: a threat to public health in Vietnam. *Trop Med Int Health* 1997; 2: 1133-9.

Eng JV, Marcus R, Hadler JL, *et al.* Consumer attitudes and use of antibiotics. *Emerg Infect Dis* 2003; 9: 1128-35.

Gyssens IC. Quality measures of antimicrobial drug use. *Int J Antimicrobial Agents* 2001; 17: 9-19.

Kardas P, Devine S, Golembesky A, Roberts C. A systemic review and meta analysis of misuse of antibiotic therapies in the community. *Int J Antimicrobial Agents* 2005; 106-13.

Khan A, Banu G, Reshma K. Antibiotic resistance and usage: A survey on the knowledge, attitude, perceptions and practices among the medical students of a southern Indian teaching hospital. *J Clin Diagn Res* 2013; 7: 1613-6.

Llor C, Sierra N, Hernandez S, *et al*. The higher the number of daily doses of antibiotic treatment in lower respiratory tract infection the worse the compliance. *J Antimicrobial Chemother* 2009; 63: 396-9.

McNulty CA, Boyle P, Nicholas T, Clappison P, Davey P. Don't wear me out: The public's knowledge of and attitudes to antibiotics use. *J Antimicrob Chemother* 2007; 59: 727-38.

Morgan DJ, Okeke IN, Laxminarayan R, Perencevich EN, Weisenberg S. Non-prescription antimicrobial use worldwide: a systematic review. *Lancet Infect Dis* 2011; 11: 692-701.

Ntagiopoulos PG, Paramythiotou E, Antoniadou A, Giamarellou H, Karabinis A. Impact of an antibiotic restriction policy on the antibiotic resistance patterns of Gram-negative microorganisms in an intensive care unit in Greece. *Int J Antimicrobial Agents* 2007; 30: 360-65.

Oh AL, Hassali MA, Al-Haddad MS, Syed Sulaimain SA, Shafie AS, Awaisu A. Public knowledge and attitudes towards antibiotic usage: a cross-sectional study among the general public in the state of Penang,

Malaysia. *J Infect Dev Ctries* 2011; 5: 338-47.

Pomoni C. Differences in urban and suburban schools. (2010, Jul 11), Andover: Helium, 2010. [Cited 2014 Jun 15]. Available from URL: http://www.helium.com/items/1888099-differences-in-urban-and-suburban-schools 2010 April 11

Saradamma RD, Higginbotham N, Nichter M. Social factors influencing the acquisition of antibiotics without prescription in Kerala State, South India. *Soc Sci Med* 2000; 50: 891-903.

Shehadeh M, Suaifan G, Darwish RM, Wazaify M, Zaru L, Alja'fari S. Knowledge, attitudes and behavior regarding antibiotics use and misuse among adults in the community of Jordan. A pilot study. *Saudi Pharm J* 2012; 20: 125-33.

Trepka MJ, Belongia EA, Chyou PH, Davis JP, Schwartz B. The effect of the community intervention trial on parental knowledge and awareness of antibiotic resistance and appropriate antibiotic use in children. *Pediatr* 2001; 107: E6.