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Knowledge, Attitude, and Practice Towards Antibiotic Use Among the Public in the City of Kuantan, Pahang State, Malaysia.

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ABSTRACT

Background: Public knowledge and attitudes towards antibiotic use play a vital role in the success of controlling antibiotic resistance. This study aimed to assess the public's knowledge, attitudes, and practice (KAP) towards antibiotic use in Kuantan, Malaysia.

Methods: This cross-sectional study was conducted among the general public above 18 years old. The data was collected in public places using a pre-validated questionnaire. Software Statistical Package for Social Sciences (SPSS) was used for statistical analyses.

Results: Out of 410 participants who answered the questionnaire, 229 (55.9%) of them were female and 288 (70.3%) had a college/university degree. It was found that 258 participants (62.9%) have good knowledge and 306 of them (74.6%) have positive attitude towards antibiotic use. However, 160 respondents (39%) believe that antibiotics can kill viruses and 183 respondents (44.6%) stated that they would ask the doctor to give them antibiotics in case they have common cold symptoms. Having a good knowledge was significantly related to the age ($P=0.005$), employment status ($P<0.001$), education level ($P<0.001$), and the field of work or study ($P<0.001$). Furthermore, 313 of the sample (76.3%) had an overall good practice. However, 162 participants (39.5%) do not complete their antibiotic course. Additionally, 57 participants (13.9%) share and 69 of them (16.8%) use the leftover antibiotics. Showing a good practice correlated to the field of work/study ($P = 0.04$), level of knowledge (Spearman's rho = 0.373; $P<0.001$) and attitude (Spearman's rho = 0.55; $P<0.001$).

Conclusion: Although the majority of the public showed good KAP, there are still important gaps that need to be filled. Therefore, a public educational campaign is needed to improve the knowledge, attitude and practice towards antibiotic use.

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Introduction

Antibiotics are the mainstay treatment of bacterial infections. However, as antibiotic resistance has escalated rapidly, healthcare professionals are facing a problem of prescribing an effective antibiotic even for common bacterial infections. At the same time, the development of new antibiotics constantly declined (López Romo & Quirós, 2019). Antibiotic resistance happens naturally as part of microbial evolution, but it can be spread up by human activities (Sartelli et al., 2017). Such activities include overuse of antibiotics, improper prescribing of antibiotics and self-medication with antibiotics. Furthermore, the antibiotic agents that have been utilized unnecessarily and extensively can increase the antibiotic resistance (Michael, Dominey-Howes, & Labbate, 2014). In many developing countries, antibiotics can be obtained as over the counter drugs. Moreover, antibiotics can also be purchased through online marketing platforms (like, AliExpress and Lazada). All these situations increase the accessibility towards antibiotics hence promote their overuse (Ventola, 2015).

Apart from that, another contributing factor in the arising of antibiotic resistance is inappropriate prescribing of antibiotics and this practice can affect the therapeutic outcome as well as can cause undesirable side effects to the patient. If antibiotics are prescribed at subtherapeutic amounts, then this practice can lead towards the advancement of the microbial resistance mechanism by genetic alteration (Ventola, 2015). This suggests that antibiotics are widely misused and health-care professionals especially doctors, can play a vital role regarding this issue. This situation is confirmed by the data from the Centers for Disease Control and Prevention (CDC). It was reported that prescribing antibiotics to the outpatient is declined by 5% in the United States of America (USA) from 2011 to 2014 but according to CDC about 30% of these prescriptions were not needed to be done (Center for Disease Control and Prevention, 2017). On the other hand, a study that was carried out in primary care clinics within Malaysia showed that the rate of antibiotic prescribing was 21.1% with evidence of improper and excessive use of antibiotics for conditions that were self-limiting (Ab Rahman et al., 2016).

Inadequate knowledge of the proper use of antibiotics was reported in various developing countries. For example, a moderate knowledge and behavior score and a low belief score of the were observed in Oman (Jose et al., 2013). Likewise, Chen et al reported incorrect knowledge among residents of Changhua County in Taiwan (Chen et al., 2005). The inadequate knowledge has contributed to the high increase in self-medications with these agents (C O Omolase et al., 2007; Ekambi et al., 2019). For instance, antibiotic users believed that antibiotics are always necessary for the treatment of flu or flu-like symptoms. Also, people usually stop taking antibiotics when symptoms improve (Chen et al., 2005; Jifar & Ayele, 2018; Vanden

Eng et al., 2003). In a study conducted by the World Health Organization (WHO) among publics in 12 different countries it showed that 64% of them believed that cold and flu can be resolved when antibiotics are given. Moreover, the survey also showed that 34% of the participants thought that antibiotic should be stopped when they feel better (WHO Media centre, 2016). Malaysia is not an exception. A couple of studies showed poor to moderate levels of knowledge the public in some Malaysian states (Choo et al., 2018; Chow & Nor Liana, 2020; Ka Keat & Chew Charn, 2012). However, there was no study focused on Pahang state, the largest state in the Malaysian peninsula. The current study aims to examine the knowledge, attitude, and practice regarding antibiotics use focusing among the public in Kuantan, Pahang state, Malaysia.

Methodology

Design and setting of a study

A cross-sectional study was conducted over two months from October to December 2019 among the general public in Kuantan, Pahang, Malaysia. The data was collected through a validated structured questionnaire using the convenience sampling technique. The inclusion criteria were: (1) Adults aged 18 years and over; (2) able to read and understand Malay language and (3) aware of the term 'Antibiotics' (individuals were asked if they know the meaning of antibiotic agent). Individuals filled out the questionnaire in the presence of a researcher to explain the questions and to make sure that individuals' answers were based on their current knowledge.

Study Population and sample size

The participants included in this study were the general public adults. The sample size was calculated by the Raosoft® online sample size calculator. Based on the Census Malaysia, there were approximately 529600 people in Kuantan city in 2019 and population size was also confirmed from the office of Kuantan Municipal Council (MPK). The estimated sample size was 384 individuals with a margin error of 5% and confidence 95% and 50% distribution. However, the collected sample size was 410 participants.

Development and validation of the study instrument

The questionnaire used in this study was developed from previous studies (Ab Rahman et al., 2016; Ka Keat & Chew Charn, 2012; Oh et al., 2011; Zahreddine et al., 2018) performed among different nations. The questionnaire was initially developed in English language and translated into Bahasa Melayu language. The questionnaire has been translated into Bahasa Melayu and subjected to a process of forward and backward translation. The accuracy and meaning of the translated versions both forward and backward were checked, and recommended adjustments were discussed

before being finalized. Then, the questionnaire was validated by five academic staff from the faculty of pharmacy at International Islamic University Malaysia (IIUM). The feedback received from them was collected to refine the questionnaire conformity and amendments are made to the questionnaire. Furthermore, the questionnaire was tested with a pilot study which was conducted by distributing the modified questionnaire to 30 individuals from the public in Kuantan. The internal consistency for the questionnaire was assessed using Cronbach's α test. The Cronbach's α values for knowledge, attitude and practice sections were 0.791, 0.762 and 0.784, respectively.

The final questionnaire comprised of four different sections, section A consists of eight demographic features such as (age, gender, ethnicity, marital status, education...etc.). Meanwhile, section B recorded participants' knowledge on antibiotic use and it consists of nine statements concerning fundamental knowledge of antibiotics including functions of antibiotics, indications of antibiotics, identification of antibiotics, course of antibiotics, and antibiotic resistance. Participants were required to respond with either "Yes", "No", or "Not Sure". Section C constituted seven attitude statements and participants were asked to answer using a 5-point Likert scale (1=Strongly agree; 2=Agree; 3=Not sure; 4=Disagree and 5=Strongly disagree). Section D documented participants' practice of antibiotic use, which comprised of 8 questions.

Regarding the scoring system, incorrect answers or "Not sure" answers were given 0 points meanwhile correct answers were given 1 point in Part B (knowledge section) with a maximum score of 9 points. In Part C and Part D, negative attitude and bad practice were given 0 points meanwhile positive attitudes and good practice were given 1 point. Scores for each section were summed up and good knowledge, positive attitude and good practice were considered when a participant scored more than half of the total points.

Statistical Analysis

Software Statistical Package for Social Sciences (SPSS) was used. Descriptive statistics were used in data analysis and results were presented in forms of frequency and percentage. Frequency tables were drawn based on the data analysis. The relationship between demographic characteristics and knowledge, attitude, and practice were analyzed using Pearson's Chi-squared or Fisher's Tests. Spearman's correlation coefficient was used to test for correlation between the scores of the different sections.

Results

Participants' characteristics

Out of 410 participants, about half of the participants (55.9%) were female. About half of the participants (52.9%) aged between 18-30 years old, followed by 31-45 years old (22%). Approximately half of the participants were married and most of them 240 (55.4%) were Malay. Also, three-quarters of participants (70.3%) had a college or university degree. The majority of the respondents (82.6%) were working or studying in a non-healthcare related field. All details regarding demographic characteristics are shown in Table 1.

Knowledge regarding antibiotic use

Knowledge regarding antibiotic utilization was evaluated by using nine statements. About two-thirds of the participants (62.9%) showed good knowledge with median and mean \pm SD scores of 5 and 5.23 \pm 2.22, respectively. The majority of respondents (81%) knew that antibiotic can kill bacteria. However, 39% of them answered "yes" or "not sure" when asked if antibiotic can kill viruses. On the other hand, (85.4%) were aware that not completing the antibiotic course can reduce its effectiveness.

Table 1 shows the comparison of knowledge score between different groups whereby the total knowledge score of the participants towards antibiotic use was found to be significantly affected by the age ($P=0.005$), ethnicity ($P=0.014$), employment status ($P<0.001$), education level ($P=7.2857$) and the field of work or study ($P=<0.001$). A high knowledge level was noted among 18-30 years old participants (69%) followed by other age groups. Malay participants (69%) showed a significantly higher knowledge level as compared to other ethnicities. Students (74%) portrayed significantly higher knowledge scores compared to other people. Also, high education was associated with higher level of knowledge. On the other hand, no statistical difference was found based on the gender or the area of residency.

Attitude towards antibiotics use

Most of respondents (74.6%) showed a positive attitude towards a rational use of antibiotics with a median of 5. More than 75% of the participants disagreed to self-medicate with antibiotics, to keep stocks of antibiotics at home, or to consume unfinished antibiotics from previous use. Also, 55.4 % of the respondents disagreed with asking the healthcare professional to give them antibiotics for common cold. On the other hand, about half of the participants (51.7%) tend to stop the antibiotics when their condition gets better. Table 3.

Table 1: Patients' characteristics and their correlation with the knowledge, attitude and practice. (N: 410)

Patients' characteristics	N (%)	Good Knowledge (%)	P value	Positive attitude (%)	P value	Good Practice (%)	P value
Gender							
Female	229 (55.9)	61	0.422	66.9	0.001	72.4	0.102
Male	181 (44.1)	65		80.8		79.5	
Age							
18-30 years old	217 (52.9)	69	0.005	71.4	0.460	72.8	0.060
31-45 years old	90 (22)	63		78.9		86.7	
46-60 years old	69 (16.8)	54		76.8		79.7	
>60 years old	34 (8.3)	41		79.4		64.7	
Highest education							
College or university	287 (70)	0	<0.001 (Fisher's Exact Test)	50	0.024 (Fisher's Exact Test)	50	0.519 (Fisher's Exact Test)
Secondary education	102 (24.9)	32		68.4		73.7	
Primary education	19 (4.6)	40		73.5		73.5	
No formal education	2 (0.5)	74		75.6		77.7	
Employment status							
Employed	181 (44.1)	69	<0.001 (Fisher's Exact Test)	79.6	0.170 (Fisher's Exact Test)	80.7	0.153 (Fisher's Exact Test)
Student	94 (22.9)	46		68.5		68.5	
Self-employed	92 (22.4)	45		64.5		74.2	
Unemployed	31 (7.6)	74		73.4		74.5	
Retiree	12 (2.9)	67		83.3		91.7	
Field of work or study (Occupation)							
Non-healthcare related	336 (82.6)	85	<0.001	87.3	0.004	88.7	0.004
Healthcare related	71 (17.4)	58		72		73.7	

Table 2: Knowledge about antibiotic use (N:410)

Questions	Correct answer N (%)	Incorrect answer N (%)
Do you think antibiotics can be used to kill bacteria?	332 (81)	78 (19)
Do you think antibiotics can be used to kill viruses?	250 (61)	160 (39)
Do you think antibiotics are used to relieve cough and colds?	254 (62)	156 (38)
Do you think antibiotics are consumed to cure inflammation?	283 (69)	127 (31)
Do you think penicillin is one of the antibiotics?	206 (50.2)	204 (49.8)
Do you think paracetamol is an antibiotic?	311 (75.9)	99 (24.1)
The incomplete course of antibiotics can reduce treatment effectiveness.	350 (85.4)	60 (14.6)
The consumption of antibiotics needlessly can cause bacteria to be resistant against antibiotics.	270 (65.9)	140 (34.1)
Antibiotic resistance is considered as a global problem.	234 (57.1)	176 (42.9)

Table 3. Participants' response towards attitude questions (N: 410)

Statement	Positive Attitude		Negative Attitude		
	Strongly disagree N(%)	Disagree N(%)	Not sure N(%)	Agree N(%)	Strongly agree N(%)
I prefer getting antibiotics from a private clinic or a pharmacy without having to see a doctor.	267 (65.1)	62 (15.1)	42 (10.2)	8 (2.0)	31 (7.6)
I will ask doctors or pharmacists to give me antibiotics if I suffer from common cold symptoms	170 (41.5)	57 (13.9)	69 (16.8)	44 (10.7)	70 (17.1)

I tend to stop taking antibiotics when my health condition improves.	154 (37.6)	48 (11.7)	53 (12.9)	51 (12.4)	104 (25.4)
I will consume my unfinished antibiotics from previous use.	270 (65.9)	49 (12)	47 (11.5)	19 (4.6)	25 (6.1)
I will keep stocks of antibiotics at home for future use.	277 (67.6)	54 (13.2)	33 (8.0)	23 (5.6)	23 (5.6)
Negative Attitude			Positive Attitude		
I will consume the antibiotics as instructed on the label.	112 (.7)	4 (1.0)	20 (4.9)	71 (17.3)	304 (74.1)

Table 4. Practice of the study participants regarding antibiotic use (N:410)

	YES N(%)	NO/Sometimes N(%)
I check for the expiry date of the antibiotics before consuming them.	78 (19)	332 (81)
Do you usually complete the course of antibiotics prescribed?	248 (60.5)	162 (39.5)
Have you ever shared antibiotics with other sick patients?	57 (13.9)	353 (86.1)
Do you usually consume the leftover antibiotics from previous course of illness?	69 (16.8)	341 (83.2)

Table 5: Correlation between the different domains of the survey (N:410).

Section score	Spearman's rho	Knowledge	Attitude	Practice
Knowledge Median (IQR): 5 (3) Mean (SD): 5.3 (2.2)	Correlation Coefficient	1.00	0.385*	0.373*
	P Value	-	< 0.001	< 0.001
Attitude Median (IQR): 5 (2) Mean (SD): 4.2 (1.5)	Correlation Coefficient	0.385*	1.00	0.550*
	P Value	< 0.001	-	< 0.001
Practice Median (IQR): 3 (1) Mean (SD): 3.1 (0/9)	Correlation Coefficient	0.373*	0.550*	1.00
	P Value	< 0.001	< 0.001	-
*Correlation is significant at the 0.01 level (2-tailed).				

The data analysis demonstrated that gender ($P=0.001$), level of education ($P = 0.024$) and the field of work or study ($P=0.004$) of the participants significantly affect their attitude toward the antibiotic use. On the other hand, no association was found between the attitude towards antibiotic use and age, ethnicity, employment status, area of residency and the education level. Table 1.

Practice regarding antibiotics use

Most of the respondents (62.5%) reported that they get their antibiotics from hospitals or governmental clinics. A respiratory tract infection was the most common reason of getting antibiotic prescription (69.5%). Four out of the eight questions in the practice section were used to evaluate the participant's practice (table 4). The majority of the participants (76.3%) had good practice with a median of 3. Only 13.9% of the respondents reported sharing their antibiotics with other people before. Also, a comparable percentage of participants (16.8%) use their leftover antibiotics. Remarkably, about two-fifth of the respondents do not complete the course of a prescribed antibiotic. Table 4.

Table 1 shows the comparison of practice scores between different groups. Respondents who worked in a health-related field had higher practice score compared to their counterparts ($P=0.04$). Nevertheless, no statistical significance was found between the practice of antibiotic use and gender, age, ethnicity, employment status or education level.

Correlation between the three domains

It was found that the scores of knowledge, attitude and practice sections are significantly correlated. Table 5. The same applied to the status of each domain. Good knowledge, positive attitude and good practice were correlated to each other ($P < 0.001$).

Discussion

The current study evaluated the knowledge, attitude and practice of the general public lives in Kuantan city the capital of Pahang state, the largest state in the Malaysian peninsula. Overall, the general public had a good knowledge about antibiotic use as the majority of the participants answered more than half of the questions correctly. Also, most of the participants (74.6%) showed positive attitude towards antibiotic use. These findings contradict the results reported from studies conducted in Malaysia (Chow & Nor Liana, 2020; Oh et al., 2011) and other countries (Jifar & Ayele, 2018; Mouhieddine et al., 2015), where the participants showed low to moderate knowledge as well as negative attitude related to antibiotic use. This discrepancy could be attributed to the differences in the participants' characteristics and the scoring systems used. For instance, most of the participants in the above-mentioned studies (Chow & Nor Liana, 2020; Jifar & Ayele, 2018; Oh et al., 2011) had primary or secondary education compared to 74% having high education in our study. Also, the above studies categorized the knowledge into poor, moderate and good levels. About one-third of the participants thought that antibiotic can kill viruses and be relieve common cold symptoms. However, this percentage was higher in previous Malaysian studies (Choo et al., 2018; Ka Keat & Chew Charn, 2012; Oh et al., 2011). Related to this issue, about one-quarter of the respondents stated that they would ask doctors or pharmacists to give them antibiotics if they suffer from common cold symptoms. Likewise, this percentage was much higher in other studies from Malaysia (Chow & Nor Liana, 2020; Ka Keat & Chew Charn, 2012; Oh et al., 2011) and the USA (Vanden Eng et al., 2003). Patients' expectation of having an antibiotic prescription when visiting a doctor was reported as one of the contributing factors for inappropriate antibiotic prescribing (Teixeira Rodrigues et al., 2013).

The most common negative attitude was the tendency to stop antibiotic when the condition improves which was reported by more than one-third of the participants. Similar finding was previously reported from Malaysia (Ka Keat & Chew Charn, 2012; Oh et al., 2011), Lebanon (Mouhieddine et al., 2015) and Ethiopia (Jifar & Ayele, 2018). Previous studies reported an association between the participants' knowledge and their demographics (Ka Keat & Chew Charn, 2012; Mouhieddine et al., 2015; Oh et al., 2011). Likewise, our study found that age, ethnicity, employment, education level and occupation significantly affect the knowledge level. However, only gender, level of education and occupation affected the participants' attitude.

Regarding the practice of antibiotic use, the majority of respondents had good overall practice. However, in alignment to the attitude of stopping antibiotic when the condition improves, 39.5% of them do not complete the prescribed antibiotic course. This is a common practice that frequently reported in the literature (Chen et al., 2005; Chow & Nor Liana, 2020; Islahudin et al., 2014). Although, not finishing antibiotic course is widely thought to increase bacterial resistance, modern evidence does not support this belief (Langford & Morris, 2017). However, completing the antibiotic course is essential to ensure eradication of the pathogens (Michael, Dominey-Howes, Labbate, et al., 2014). A fewer participants showed kinds of self-medication practice with antibiotics. They share their antibiotic with sick patients (13.9%) and use the leftover antibiotic from previous course (16.8%). These findings are similar to what have been reported from Malaysia before (Ka Keat & Chew Charn, 2012; Oh et al., 2011) and other countries in the far east (Chen et al., 2005; You et al., 2008). Nevertheless, they are much lower than those reported from some other countries in the middle east (Jose et al., 2013; Langford & Morris, 2017). This could be attributed to less strict legislations of selling antibiotics in community pharmacies in the middle east countries. Good practice regarding antibiotic use was significantly associated with the occupation and employment status. Other demographic characteristics like gender and education level were reported as influencing factors on practice in another Malaysian study conducted in Perak state (Choo et al., 2018). Level of knowledge, attitude and practice regarding antibiotic use were correlated to each other's. Participants who had good knowledge were more likely to have positive attitude and consequently good practice. It is logical that people who have higher knowledge regarding antibiotic to be wiser while using such kind of medications.

Conclusion

This study identified the knowledge, attitude and practice towards antibiotics use among public in Kuantan. The study found that most of the participants showed an overall good knowledge coupled with positive attitude and good practice. However, significant percent of the

participants showed inadequate knowledge about the role of antibiotics in viral infections which resulted in requesting antibiotic when they have common cold symptoms. Although only a small portion of respondents use and share the leftover antibiotics, this would translate into the practice of about 75000 people live in Kuantan. Therefore, a public educational campaign is needed to improve the knowledge, attitude and practice towards antibiotic use.

Strengths and Limitations

The current study evaluated the three aspects (knowledge, attitude and practice) related to antibiotic use using an updated questionnaire based on a comprehensive literature review. The sample involved in the study was big enough to represent the city of Kuantan. However, this study has some limitations. First, the majority of the participants had college/university degree which could underestimate the problem of irrational use of antibiotics among laymen population. Second, the study was conducted in several public places in the downtown of Kuantan city which may not reflect the actual KAP of people living in rural areas.

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Conflict of Interest

The authors declare no conflict of interest related to this study.

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Ethical Considerations

Ethical approval was gotten from the International Islamic University Malaysia Research Ethics committee (IREC) (ref: IIUM/504/14/11/2/ IREC-2019 231). Written informed consent was obtained from respondents who agreed to participate in the study.

Authorship Statement

AMA, NAA conceptualized and designed the study and revised the manuscript, AAAA collected the data and wrote the draft manuscript, MEA analyzed the data and revised the manuscript, YMA designed the study and revised the manuscript.

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