

Knowledge, Attitude, Perception and Practice of Antibiotics Usage Among the Medical Students

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Abstract

Background: Globally, the emergence of antibiotic/ antimicrobial resistance became a tremendous public health concern. The inappropriate practices of antibiotic usage have a profound impact on antibiotic/ antimicrobial resistance. Medical students are the future prescriber who responsible for monitoring and counselling the patient on the antibiotic usage pattern. Hence, it is crucial to explore their knowledge, attitudes and perception pertaining to the use of antibiotics and AR. **Methods:** A cross-sectional study was conducted among the final year medical students at a private medical university. A total of 41 questions with varying responses such as true or false, specific answer type and Likert's scale (5-point responses) were used in this study. **Results:** Out of 130 questionnaires distributed, 113 responses were received, and the response rate was 86.92%. Among the respondents, 95% (101) had used antibiotics in the last year. Surprisingly, all the students know that the full course of antibiotics should be taken and finished as directed. Overall, the respondents demonstrated moderate to good knowledge, attitudes, and perception on the use of antibiotics and its resistance. Still, some of them are unaware of their roles and responsibilities as a prescriber on antibiotic practice. **Conclusion:** In the present study, medical students practice widespread use of antibiotics for various illness and some accesses antibiotics without prescription. There is an alarming situation as some medical students did not know the exact role of healthcare providers on antibiotics usage and the common terminologies used in routine practice. The study provides a clear implication that more comprehensive training and educations on antibiotics and its resistance need to include in the medical curriculum to minimise antibiotics related complications.

What is already known about this topic?

Most of the previously published studies claim that the knowledge of antibiotics among the medical students and practitioners are high.

What does this article add?

- This current study shown considerable number of medical students receive antibiotics without prescription and are not aware of the common medical terminologies used for antibiotics resistance.
- The knowledge, attitude, and practice of healthcare professional towards the antibiotics and its resistance are not well understood by the respondents.
- It alarms the need of inclusion of appropriate educational intervention of antibiotics in the curriculum to enlighten antibiotic awareness for the benefit of patient community.

1. Introduction

Antibiotics are known to be “wonder drug” with the characteristics of killing, inhibiting and slowing the growth of bacteria and some fungi but not viruses.¹ In 2008, the Malaysian National Medicine Use Survey (NMUS) revealed that apart from antihypertensive, anti-diabetic and lipid-lowering drugs, antibiotics were one of the top 10 most utilised drugs in Malaysia.²

In recent decades, the misuse and overuse of antibiotics had led to the rise of antibiotic resistance/ antimicrobial resistance (AR) with an alarming rate. Additionally, World Health Organization (WHO) reported that 80% of the antibiotics used among the public and 20-50% of them were inappropriate.³ Despite the devastating effect on human's welfare, AR is also causing tremendous impacts on economic growth.^{4,5}

Since AR cannot be eradicated, in order to minimize the widespread of AR a collaborative and comprehensive action has to be done among the public as well as the healthcare professionals.^{6,7} Few prior studies summarized that the understanding and behaviour towards the judicious use of antibiotics among the Malaysian are not up to appreciable level.^{8,9} Hence, it is pivotal for healthcare professionals especially the doctors to monitor the antibiotic usage pattern as they are authorised to prescribe antibiotics in Malaysia.¹⁰ Their decision in prescribing antibiotics are highly influenced by the knowledge, attitude, perception and or practices (KAP).¹¹ Therefore, more comprehensive education and training about the appropriate usage of antibiotics and awareness of AR should be implemented starting from their undergraduate level.¹²

To date, there is a paucity of data pertaining to the KAP towards the use of antibiotics and its resistance among the doctors and medical students.¹³⁻¹⁵ In consistent with these recommendations as well as inadequate evidence in Malaysia, this study was aimed to investigate the knowledge, attitude, perception, and practice on the usage of antibiotics and its resistance among the final year medical students in a private medical university which provide a platform for concise comprehension in terms of the behaviour in prescribing antibiotic.

2. Methodology

2.1 Study design and setting

A cross-sectional study with convenience sampling method was used in this research with duration of 4 months starting from June to October of 2019. The study was conducted among the final year medical students at a private medical university in Malaysia. There was a total of 167 final year medical students during the study period and by generating 95% of confidence level with a 5% margin of error, a sample size of 113 students was included in the study.

2.2 Study Instrument

The study instruments involved a structured validated questionnaire which consists of two major parts which are: Part-I recording a total of 4 demographic characteristics; Part-II consist of another 6 sub-sections and 37 questions mainly assessing the KAP on antibiotics usage and its resistance. A total of 41 questions with varying responses such as true or false, specific answer type and Likert's scale (5-point responses) were used in this study.

2.3 Ethical approval

The IMU Joint Committee of Research and Ethics had given the approval for this study to be carried out. Approval reference number BP I-01-2019(32). Along with a confidentiality statement and paragraph explaining the objectives of the study, the study consent forms from participants were collected before the inception of study.

2.4 Statistical analysis

The completed questionnaires were collected, and the data was tabulated and analyzed using Statistical Package for Social Sciences (SPSS) version 25.0. Chi-square (χ^2) test was implemented to determine the differences in KAP of antibiotics and its resistance among the final year medical students. A p-value of less than 0.05 was considered as statistically significant. Across all the items of the questionnaire, the mean value of Cronbach's alpha was found to be 0.773 with an acceptable range between 0.478 and 0.821. This indicates that the questionnaire used in our study possesses good internal consistency and reliability.

3. Results

3.1 Sociodemographic characteristics of the respondents

Out of 130 questionnaires distributed to the final year medical students, 113 were returned, and the response rate was found to be 86.92%. There were more female ($n = 61$, 53.98%) compared to male respondents ($n = 52$, 46.02%). The utmost age among the respondents was ranged from 19 to 24 years old ($n = 104$, 92.04%) and most of them were Chinese ($n = 80$, 70.80%), as shown in Table 1.

3.2 Use of antibiotics among the respondents

Regarding the antibiotic consumption, out of 113 respondents most of them ($n = 106$, 93.81%) had used antibiotics before. The majority ($n = 30$, 26.55%) took antibiotics for more than a year ago. Among those who had used antibiotics before, almost all of them ($n = 101$, 95.28%) used to get antibiotics from a doctor or other healthcare professional while only ($n = 78$, 73.58%) of them tend to get proper advice on the use of antibiotics. Most of the time, they ($n = 100$, 94.34%) used to get antibiotics from medical store or pharmacy. The data are presented in table 2.

3.3 Knowledge of antibiotics use among the respondents

Generally, their perceived knowledge was good as all the students know that antibiotics can only be stopped when all the antibiotics had taken as directed. Additionally, 96.46% of them know that the antibiotics should not be given to the family members or friends even though the same illness happened. Around 86% of the respondents aware that even the same symptoms happened, still it is inappropriate to buy or request the same antibiotics from the doctors. The data are shown in table 3.

Moreover, majority of the respondents know that antibiotics are useful in treating bacterial infection such as UTI (96.46%), gonorrhoea (88.50%) and skin or wound infection (82.30%) instead of any pain or inflammation just like sore throat (57.52%), headache (3.54%) or any viral infections such as HIV/AIDS (7.08%), cold and flu (8.85%).

3.4 Knowledge of antibiotics resistance among the respondents

In this study, among all the terms related to antibiotics and its resistance, majority of them were aware of the antibiotic resistance ($n = 108$, 95.58%), followed by drug resistance ($n = 101$, 89.38%), antibiotic-resistant bacteria ($n = 99$, 87.61%), superbugs ($n = 89$, 78.76%), antimicrobial resistance ($n = 85$, 75.22%) and AMR ($n = 40$, 35.40%). Regarding these terminologies, most of the respondents heard them from doctors ($n = 58$, 51.67%), followed by media ($n = 20$, 17.67%) and pharmacist ($n = 12$, 10.71%) as shown in table 4.

Furthermore, the respondent's knowledge on antibiotic resistance was assessed using True or False type of questions. The overwhelming majority of participants were aware that many infections and bacteria are becoming increasingly resistant to the antibiotic and are very difficult to treat ($n = 112$, 98.12%; $n = 110$, 97.35% respectively). Almost all the respondents ($n = 110$, 97.35%) agreed that "antibiotic resistance is an issue that could affect them and also their families". Apart from statement one and seven, other items are statistically significant ($p [?] 0.05$). The details are presented in table 5.

3.5 Attitudes, perception, and practice towards antibiotics use and its resistance

Other than accessing the knowledge, the outcomes concerning the attitude, perception, and practice of respondents on antibiotic usage were analyzed using 5 points Likert's scale response from agree strongly to disagree. After dichotomizing the 5-point Likert scale, the responses such as "agree strongly" and "agree slightly" were computed to get Net Positive Responses (NPR) while the responses such as "neither agree nor disagree", "disagree slightly" and "disagree strongly" were combined to get Net Other Response (NOR). The positive response rate was calculated by dividing the NPR by total response rate and multiply by 100. In this study, chi-square test was performed to evaluate whether these proportion differences between NPR and NOR. A p value $[?]0.05$ was considered as statistically significance. The details are summarized in table 6.

Indeed, it showed moderate to good overall attitudes and perception on the use of antibiotics and its resistance among the respondents. Apart from "there is not much I can do to stop antibiotic resistance" and "I am not at risk of getting antibiotic resistance bacteria as long as I take the antibiotics correctly", other items

showed more positive responses. In addition, almost all the respondents ($n = 112$, 99.12%) agreed with the statement “parents should make sure their children’s vaccination are up-to-date” and “doctors should only prescribe antibiotics when they are needed”. However, a minority of them are not aware of their roles and responsibilities ($n = 65$, 57%) towards antibiotics usage and think that there is not much they can do to stop the emergence of AR ($n = 23$, 20.35%).

4. Discussion

The invention of antibiotics is essential in saving millions of lives, however, the indiscriminate and inappropriate use of it complicated to the development of antibiotics resistance whereby the microorganisms undergo persistent evolutionary changes.¹⁶ Hence, instead of saving lives, it also endangers millions of lives with life-threatening infectious diseases. In the absence of urgent corrective and protective actions, the world is heading towards a post-antibiotic era, in which many common infections will no longer have a cure and, once again, kill unabated.^{15,16}

4.1 Sociodemographic characteristics of the respondents

The response rate of this current study was 86.92% which showed a lower response rate as compared to the previous study. Yet, this was considered a good response rate because according to the American Journal of Pharmaceutical Education, “a response rate of more than 80% for a survey-based research” was considered good.¹⁷ As compared to the other Malaysian medical survey studies, the current study showed a higher number of female respondents than male respondents.¹⁵ However, these cultural factors were not directly explored in our study, although it might influence the responses.

4.2 Use of antibiotics among the respondents

In terms of the past personal antibiotics use, most of the respondents took antibiotics in the last 6 months to more than a year ago. Furthermore, almost all the respondents (95.28%) procured antibiotics with medical prescriptions from a medical store or pharmacy (94.34%) instead of using leftover antibiotics (1.89%). They also received proper advice given by healthcare professionals (73.58%). These findings suggested that our students are more adhering to the health policies and aware of the importance of getting antibiotic with a prescription. As compared to a study done by Scaiola et al., 77.6% of their respondents claimed to get antibiotics without medical prescription, and 17.7% of them took the leftovers antibiotics without doctor’s advice.¹⁸ Additionally, recent studies revealed that the leftover antibiotics will prone the medical students to be predisposed to self-medication of antibiotics (SMA).¹⁹⁻²¹ Subsequently, these might attribute to worsen infections, allergic reactions and even the development of AR.

4.3 Knowledge of antibiotics use among the respondents

WHO along with multiple national guidelines and protocols, strongly advise patients that “a full course of antibiotics should be finished even feeling better because stopping treatment early promotes the growth of drug-resistant bacteria”.^{22,23} It is noteworthy that all respondents in our study are having good compliance with the antibiotic regimen. In contrast, a survey conducted in Greece revealed that only 59% of them completed the full course of the antibiotic regimen.²⁴ This discrepancy could be attributed to our respondents are all final year medical students who have gone through adequate clinical practices. Hence, they are more conscious about the consequences of non-compliance to the full prescription regimen.

Apart from that, the overall knowledge of antibiotics’ use in various conditions among the respondents was moderate to good. This finding was consistent with the prior studies,^{18,19,25} which also showed adequate knowledge on the use of antibiotics. Among the respondents of this current study, most of them know that antibiotics can only be used to kill bacteria and treat bacterial infections instead of the viral infections such as HIV or AIDS, cold and flu. Interestingly, half of our respondents agreed that antibiotic can be used in treating sore throat condition. In fact, antibiotics should not be chosen as first-line treatment in treating any pain or inflammation as they are not indicated for this purpose.¹⁸ This misconception might due to the limited knowledge of the rational use of antibiotics.²⁶ Therefore, the future prescriber should be well taught on the proper use of antibiotics in order to provide a better treatment outcome to the patients. More

rigorous courses and assessments regarding the rational use of antibiotics are advisable to be imparted into the medical curriculum program.

4.4 Knowledge of antibiotics resistance among the respondents

Similar to a previous study done by Sakeena et al.²⁶, a substantial proportion of our students were familiar with many of the terminologies related to antibiotic-resistance, they knew these terminologies mostly from the doctors, followed by the media and pharmacists. This indicates that doctors are playing a major role in educating and disseminating the awareness of AR to our respondents. Since the final year medical students are the doctors of tomorrow, a better understanding of these terminologies allows them to provide proper counselling to their patients.

Furthermore, similar to the WHO multi-country survey²⁷, about 60% of the respondents assume that AR happened when the body became resistant to it. The WHO multi-country survey stated that in facts, it is the bacteria strains that undergo changes in response to the use of antibiotics, subsequently, the bacteria can no longer respond to the effects of antibiotics that were once being sensitive.²⁷

Besides, around 78% of the respondents disagree that antibiotic resistance is the only problem for those who took antibiotics regularly and 84% of them believe that antibiotic-resistant bacteria can be spread from person to person. In contrast to the result of the WHO multi-country survey,²⁷ our students are having a better understanding of the mechanism of antibiotics resistance. Irrespective of the age, race and country, the risk of getting antibiotics resistance is common for everyone as the bacteria can be spread from one person to another. Poor sanitation, poor hygiene, and poor infection control will subsequently escalate the widespread of antibiotic-resistant bacteria. To tackle this issue, good hand hygiene is important as it minimizes the risk of becoming carrier of resistant bacteria.²⁸

4.5 Attitudes, perception and practice towards antibiotics use and its resistance

Around 70 to 85% of our respondents agree that “pharmaceutical companies should develop new antibiotic” and “government should give reward to these developments”. US Food and Drug Administration (FDA) summarized that “only one-tenth of new antibiotics being discovered in the last 35 years compared with the previous 35 years”.²⁹ This slow development is most likely due to the inadequate financial support given to the pharmaceutical companies to carry out the research, hence, they have stopped the research progress and only aimed at promoting the sales of drugs. In consistent with the pipeline of new drug running dry, AR has limited the options available in treating the life-threatening infection caused by antibiotic-resistant bacteria. Therefore, it is crucial for the prescriber to be more mindful in selecting appropriate antibiotics to treat bacterial infections. During their undergraduate level, outcome-based education (OBE) can be implemented into their preclinical phase. This is to ensure the medical graduates are fit for practice and prescribing appropriate antibiotics.

Furthermore, according to a study done by Ab Halim et al., more than half of the respondents are expecting the doctor to prescribe antibiotics even if it is not necessary.¹¹ Besides, Ab Rahman et al., also claimed that the presence of high antibiotics prescribing rate among the primary care settings (87%) and most of them were used to treat unnecessary conditions such as URTI (46.2%), cold and flu.¹⁵ It had been established that these unnecessary prescribing was most likely due to overly high expectations and pressure from patients or even due to financial incentives for the general practitioners. Similarly, the current study showed that almost all the respondents understood the antibiotics should only be given when necessary.

Further, more than half of our respondents disagree that medical experts will solve the problem of antibiotic resistance before it becomes too serious. Conversely, based on the WHO multi-country survey, 64% of them agreed with the statement above.²⁷ This finding revealed that our respondents are less aware of their role in tackling with this issue. Perhaps, the prescriber should be nurtured with the sense of responsibility of stopping the emergence of antibiotic resistance as they play a major role in prescribing antibiotics.³¹ Instead of only increase the knowledge of antibiotic and its resistance among the students, it is also important to change their attitude and perception towards their role and responsibility in accordance with the development

of AR.

Despite of the good overall theoretical knowledge, there are still a minority of the final year medical students who were practicing incorrect behaviours concerning the antibiotics consumption. In healthcare field, we shall not compromise even a single mistake because every action we take is concerning the safety of the patient. The undergraduate students are at the stage of the steppingstone whereby they need to be properly educated and well trained regarding the appropriate usage of antibiotics as they play a vital role in treating various illnesses in future days. Hence, a more comprehensive understanding of antibiotic resistance and the knowledge of the use and misuse of the antibiotics are absolutely inevitable for undergraduate medical students.

4.6 Future perspectives

The study was conducted among the final year medical students at a private medical university and there may be bias in their response to the survey as they may tend to maintain their reputation. Moreover, the study's findings are not generalised as it involved only the final year medical students at a private university. Hence, further study can be extended to few other public and private universities in the future with different cohorts to compare their KAP level about antibiotics and its resistance.

5. Conclusion

Prescriber plays a key role in tackling the emergence of antibiotic resistance as they are given with the antibiotics prescribing rights. This study showed a moderate to good knowledge, attitude, perception, and practice of final year medical students regarding the antibiotics and its resistance. However, there are some gaps in the current practice such as knowledge of medical conditions treated with antibiotics, knowledge on mechanism and risk factors of antibiotics resistance, common terminologies used in the day-to-day practice, roles, and responsibilities of healthcare providers. These can be considered to draft an effective educational intervention and curriculum for better healthcare delivery.

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