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Knowledge, Attitude, and Practice on the Antibiotic Usage among Patients and Caregivers at Outpatient Pharmacy, Sibu Hospital

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ABSTRACT

Introduction: The spread of antibiotic resistance due to inappropriate and indiscriminate use of antibiotics has emerged as a growing problem globally in the 21st century. Substantial evidence showed that the general public played a pivotal role in increasing and spreading antibiotic resistance. The present study was designed to determine patients and caregivers' knowledge, attitude, and practice (KAP) towards antibiotic use. Doctors' habits and patient-doctor relationship regarding antibiotics prescribing were explored as well.

Methods: A cross-sectional study was performed using a validated questionnaire self-administered by the patients and caregivers at the Outpatient Pharmacy Department (OPD) of Sibu Hospital from August 2019 to March 2020. Data were collected by using a convenience sampling method. Participants were above 18 years old, patients or caregivers who visited OPD of Sibu Hospital were aware of the term "antibiotics", accepted consent and provided complete responses.

Results: Three hundred and eighteen randomly selected participants responded. Nearly half (42.1%) claimed that they were prescribed antibiotics within the past 12 months from the study period, while 23.9% confessed that they had purchased antibiotics from local or abroad pharmacies without prescriptions. However, 25.2% of them did not finish the antibiotic course. More than two-

thirds of the respondents (88.0%) could correctly identify that antibiotics are effective against bacteria. However, 46.8% of them incorrectly thought that antibiotics could be used against the virus. The majority of respondents (88.9%) were well-informed that they needed to stop taking antibiotics as soon as possible if they experienced side effects from the antibiotic treatment and 58.2% of them recognised antibiotic resistance as a global problem. More than half (69.5%) of the respondents expressed a positive attitude on antibiotic usage, and most of them agreed that pharmacists (93.4%) and doctors (79.0%) often counselled them on the correct antibiotic usage. They also trusted the doctors' decision on antibiotic prescribing.

Conclusion: These findings highlighted the lacking in our public's education on antibiotics. It offers further insight into the need to design targeted and multifaceted interventions to empower the public of various age groups to reduce the KAP gaps on antibiotic usage to control the development and spread of antibiotic resistance.

Keywords: antibiotics, attitude, caregivers, knowledge, Malaysia, practice, patients

INTRODUCTION

Antibiotics, also known as antibacterials, are agents used to inhibit the growth of bacteria (bacteriostatic effect) or kill the bacteria (bactericidal effect). They have frequently prescribed classes of drugs in clinical practice (1). According to the Centers for Disease Control and Prevention (CDC), the majority (>60%) of antibiotic expenditures were associated with the outpatient setting (2). Five out of six people receive one antibiotic prescription each year in the United States. However, at least 30% of antibiotics prescribed in the outpatient setting were unnecessary. Most of these unnecessary prescriptions were intended for acute respiratory conditions or bacterial infections that do not always need antibiotics (like many sinus and ear infections) (3).

Antibiotic resistance has been a major public health concern and a global emergency (4). The emergence of antibiotic-resistant microbial strains is due to excessive and uncontrolled use (5). Consequently, clinicians need to deal with poor treatment outcomes, treatment failures, prolonged hospitalisation or severe disease episodes, increased cost of treatment, increased morbidity and mortality rates (6). A study by Jim O'Neill stated that the annual death could reach 10 million in 2050 if this issue was not addressed (7). All these gave rise to the economic burden of the national health system.

Substantial global evidence showed that the general public played a pivotal role in increasing and spreading antibiotic resistance as they were the last point of contact to the drug. This directly influences the therapeutic efficacy of antibiotics. Studies have shown that improved knowledge of antibiotics and the problem of resistance and a better understanding of beliefs, concerns, and expectations, from both the patient's and clinician's perspectives, are fundamental for controlling antibiotic use (8, 9).

Therefore, this study was carried out to assess our outpatient public's understanding of antibiotic use in various diseases and to identify inappropriate attitudes and practices among the public on antibiotic use that might lead to increased antibiotic resistance. Doctors' habits and patient-doctor relationship regarding antibiotics prescribing were explored as well.

METHODS

Study Design

A cross-sectional survey using a validated questionnaire was conducted from August 2019 to March 2020 among the patients and caretakers attending the Outpatient Pharmacy Department (OPD) of Sibu Hospital. The study was approved by the Medical Research & Ethics Committee (MREC), Malaysia (NMRR-19-1526-48698). Participants were eligible to be included if they were above 18 years old, patients or caregivers who visited OPD of Sibu Hospital and aware of the term "antibiotics". Those who did not meet any of these criteria refused consent, and incomplete responses in the questionnaire were excluded from the study.

The sample size of this study was estimated by using Krejcie and Morgan's sample size formula (10). Based on the estimation from a total of 15,151 newly registered patients in a specialist clinic in the year 2018, at least 385 participants were needed to achieve a 95% confidence level with a 5% margin of error. By estimating a dropout rate of 10%, we required 423 subjects.

Questionnaire

The data of KAP regarding antibiotic use were collected using a validated questionnaire from Awad *et al*. 2015. The questionnaire is comprised of five parts. The first part was the demographic profile of the respondents, which includes age, gender, race, and educational level. The second part consisted of eight questions regarding the practices of antibiotic use. The eighth question contained five statements in which they were asked to tick any related statement on their self-medication with antibiotics. The third part of the questionnaire shown in Figures 2 and 3 consisted of thirteen statements evaluating the knowledge about antibiotics from three aspects: action and use by using three correct and incorrect statements, respectively, side effects with three correct statements, and resistance with another three correct and one incorrect statement(s). The fourth part included one statement reflecting a positive attitude and six statements reflecting a negative attitude regarding antibiotics usage (Figures 4 and 5). The fifth part contained six statements on the doctors' habits and the patient-doctor relationship regarding prescribing antibiotics (Figure 6). Responses from third to fifth parts were measured using a five-point Likert scale ranging from “strongly disagree = 1” to “strongly agree = 5”.

Data Collection

Data were collected by using a convenience sampling method. Patients approaching the OPD screening counter were screened for inclusion and exclusion criteria. Eligible subjects were provided with a patient information sheet. If the participant agreed to join, each participant signed and dated the informed consent form prior to answering the survey questionnaire. The original questionnaire was distributed and self-administered by the participant. Pre-trained investigators provided a standardised explanation for participants needing investigator-guided administration. A group discussion among investigators had been carried out to ensure all data collection was standardised.

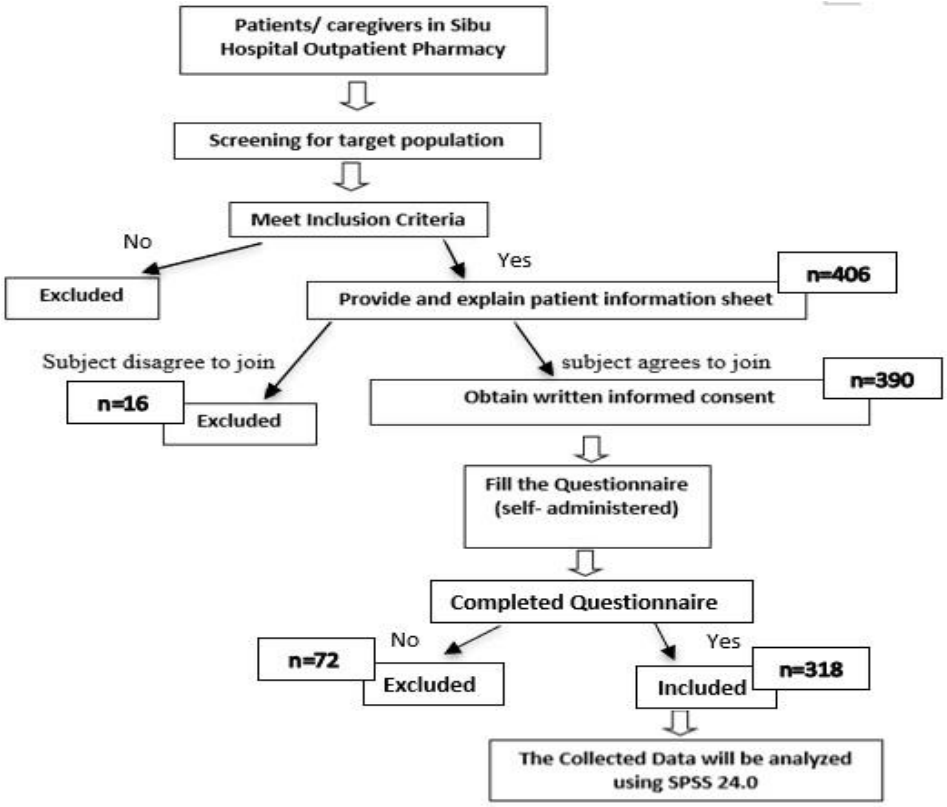

Figure 1: Flow Chart of the Research Methodology

Statistical Analysis

Data were entered into Statistical Package for Social Sciences (SPSS, version 22), and descriptive analysis was conducted. Categorical data were presented as frequency and relative frequency. For numerical data (i.e. age), the result was reported as mean (standard deviation) as the data was normally distributed.

RESULTS

Demographic Characteristics

A total of 406 samples approached met the inclusion criteria. However, due to the low response rate by the participants, only a total of 318 (78.3%) of them were included in the study. Sixteen participants disagreed to join, although they met the inclusion criteria, while 72 did not manage to complete the questionnaire.

The majority (55.0%) of the respondents were male, and the mean age of the respondents was 41.46 (SD =13.72) years old. Most (46.9%) of the subjects were Chinese, followed by Iban (25.8%), Malay (22.6%) and other races (4.7%). A total of 170 subjects (53.5%) had tertiary education, another 128 subjects (40.3%) had secondary education, while the rest (6.3%) either received primary education only or no formal education. Almost all (96.9%) respondents were not in the medical field.

Nearly half (42.1%) of the respondents (n=134) claimed they had been prescribed antibiotics within the past 12 months from the study period. Among the 134 respondents, 38.1% of the respondents were unsure about the frequency of antibiotics prescribed within the past 12 months, 26.1% have been prescribed antibiotics once within the past 12 months, 32.8% have been prescribed two to five times, and the rest (2.9%) of the respondents had been prescribed with antibiotics more than five times.

Table 1: Demographic Data (n = 318)

Variable	n (%)	Mean (SD)
Age (years)	-	41.46 (13.72)
Gender		
Male	175 (55.0)	-
Female	143 (45.0)	-
Ethnic		
Malay	72 (22.6)	-
Chinese	149 (46.9)	-
Iban	82 (25.8)	-
Others	15 (4.7)	-
Education		
No formal education	6 (1.9)	-
Primary	14 (4.4)	-
Secondary	128 (40.3)	-
Polytechnic/STPM/ Diploma/ Matriculation	79 (24.8)	-
Bachelor degree and above	91 (28.6)	-
Working or studying in the medical field		
Yes	10 (3.1)	-
No	308 (96.9)	-

n: Number of participants; SD: Standard deviation

Knowledge on Antibiotic Usage

Respondents' knowledge regarding the action and use of antibiotics was summarised in Figures 2 and 3. Most (75.2%) of the respondents knew that different antibiotics were needed to cure different diseases and were able to identify that antibiotics were effective against bacteria (88.0%), including those that normally lived on the skin and in the gut (60.4%). However, nearly half (46.8%) of the respondents incorrectly thought that antibiotics were effective against viruses, while another 21.7% were unsure if antibiotics would work on viruses. More than half (57.5%) of the respondents figured that antibiotics worked on most coughs and colds. An even greater number (61.7%) of respondents agreed that antibiotics could speed up the recovery from coughs and colds.

The majority of the respondents were aware that they needed to stop taking antibiotics as soon as possible (88.9%) and should not be using the same antibiotics again (87.1%) if they experience side effects. Half of the respondents (49.4%) also knew that antibiotic use could cause an imbalance in the body's bacterial flora.

In terms of knowledge on antibiotic resistance, we found out that almost half (46.4%) of the respondents were unsure whether the use of antibiotics among animals could reduce the effect of antibiotics among humans. It is interesting to note that most did realise antibiotic resistance was a worldwide problem (58.2%), and unnecessary use of antibiotics can increase its resistance (68.8%). Nearly two-thirds (72.3%) of the respondents had an incorrect knowledge that humans can be resistant to antibiotics.

Attitude on Antibiotic Usage

Most of the respondents expressed a positive attitude in completing the antibiotic course despite feeling better (69.5%) and denied stopping antibiotic treatment prematurely (62.0%). It was also an uncommon attitude among respondents to self-medicate on antibiotics, be it that they obtained the drug from relatives or friends without medical consultation (18.2%), purchased from the pharmacy without a prescription (20.8%) or stocking antibiotics at home in case of future needs (19.5%). However, when using antibiotics for prolonged cough and sore throat, similar responses from extreme ends were obtained (39.3% disagree vs 39.9% agree) and (38.7% disagree vs 43.7% agree), respectively.

Practice Regarding Antibiotic Use

A quarter of the respondents (25.2%) admitted that they did not finish their last course of antibiotics. A sense of recuperation had been the most common excuse among the respondents for them not to complete the antibiotic course (n=60, 75.0%). Forgetfulness hindered another 18.8% (n=15) of the respondents to complete their antibiotic course. Meanwhile, palatability of the drug and pill burden had an equal weightage of influence in completing the antibiotic course among respondents, 2.5% (n=2) respectively. Laziness also affected 1.2% (n=1) of the respondents' decision to complete their antibiotic course.

Fifty-five of the respondents (17.3%) had a history of using antibiotics without prior consultation within the past twelve months from the study period. Among them, nearly half (47.3%) were unsure on the frequency of antibiotics use without prior consultation, while one third (34.5%) had been using antibiotics without prior consultation once, eight respondents (14.5%) revealed self-medicating with antibiotics between 2 to 5 times and one respondent (1.8%) claimed to practise

such for 6 to 10 times. Twenty of the respondents (6.3%) admitted that they had given antibiotics to someone else that was not prescribed for them.

For the self-medication statements, almost a quarter of the respondents (20.8%) had used antibiotics originally prescribed for another indication. Some purchased antibiotics from local community pharmacies (16%) without prescriptions. Nineteen used antibiotics originally prescribed for another person, in which 4.7% (n=15) were meant to be used for another family member. In comparison, 1.3% (n=4) were meant for a non-family member.

Doctors' Habits and Patient-Doctor Relationship Regarding Prescribing of Antibiotics

Almost all (93.4%) of the respondents agreed that pharmacists explained proper antibiotic usage, and the majority agreed that doctors did the same as well during the consultation (78.9%). Mostly (80.5%) believed that doctors' antibiotic prescribing decision was often after careful thought and trusted their decision whether to prescribe (89.3%) or not (85.2%). Thus, only half (49.1%) of the respondents felt their expectations would lead to antibiotic prescribing.

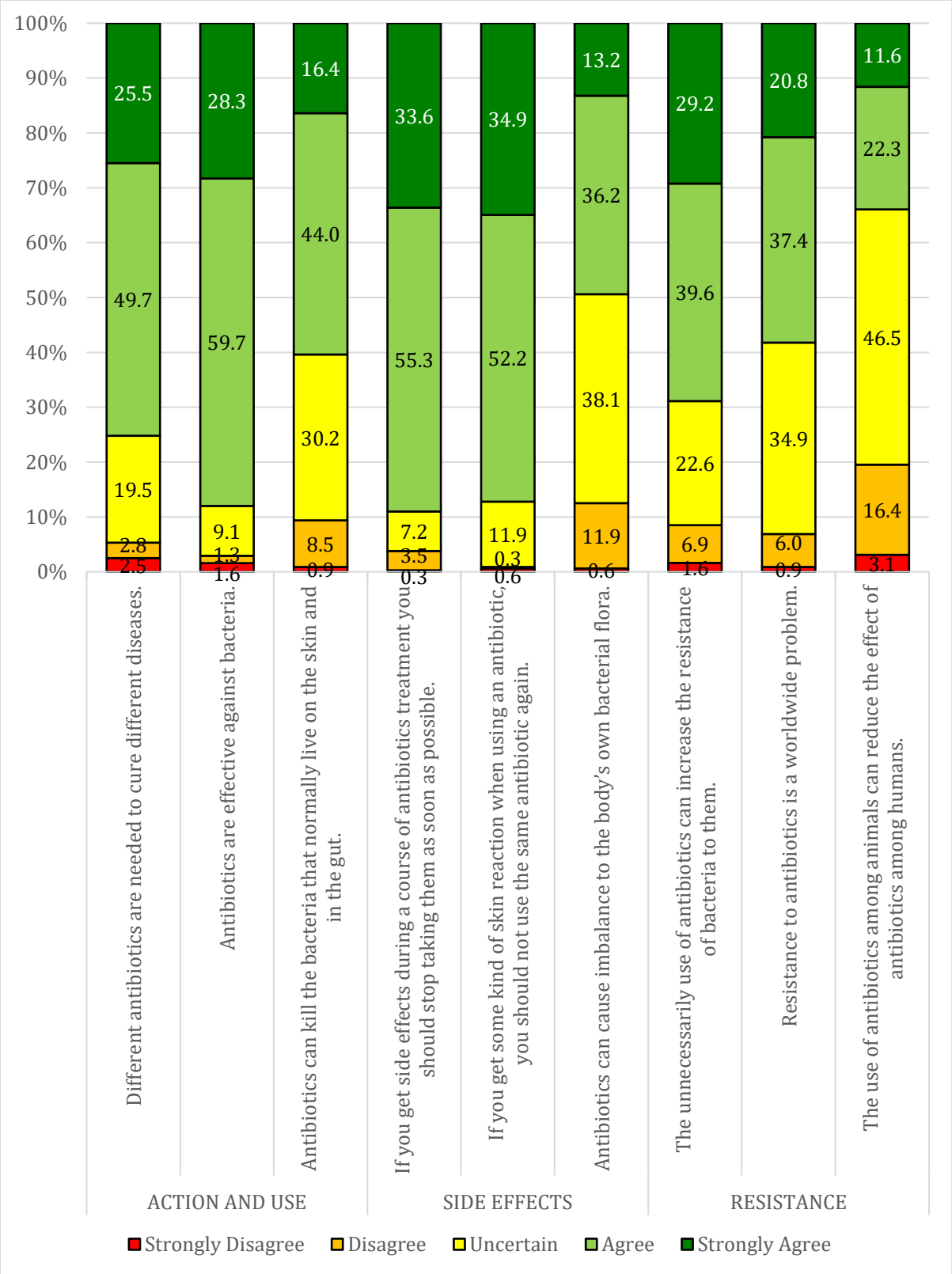

Figure 2: Patients' Knowledge of Antibiotic Usage (Correct Statement)

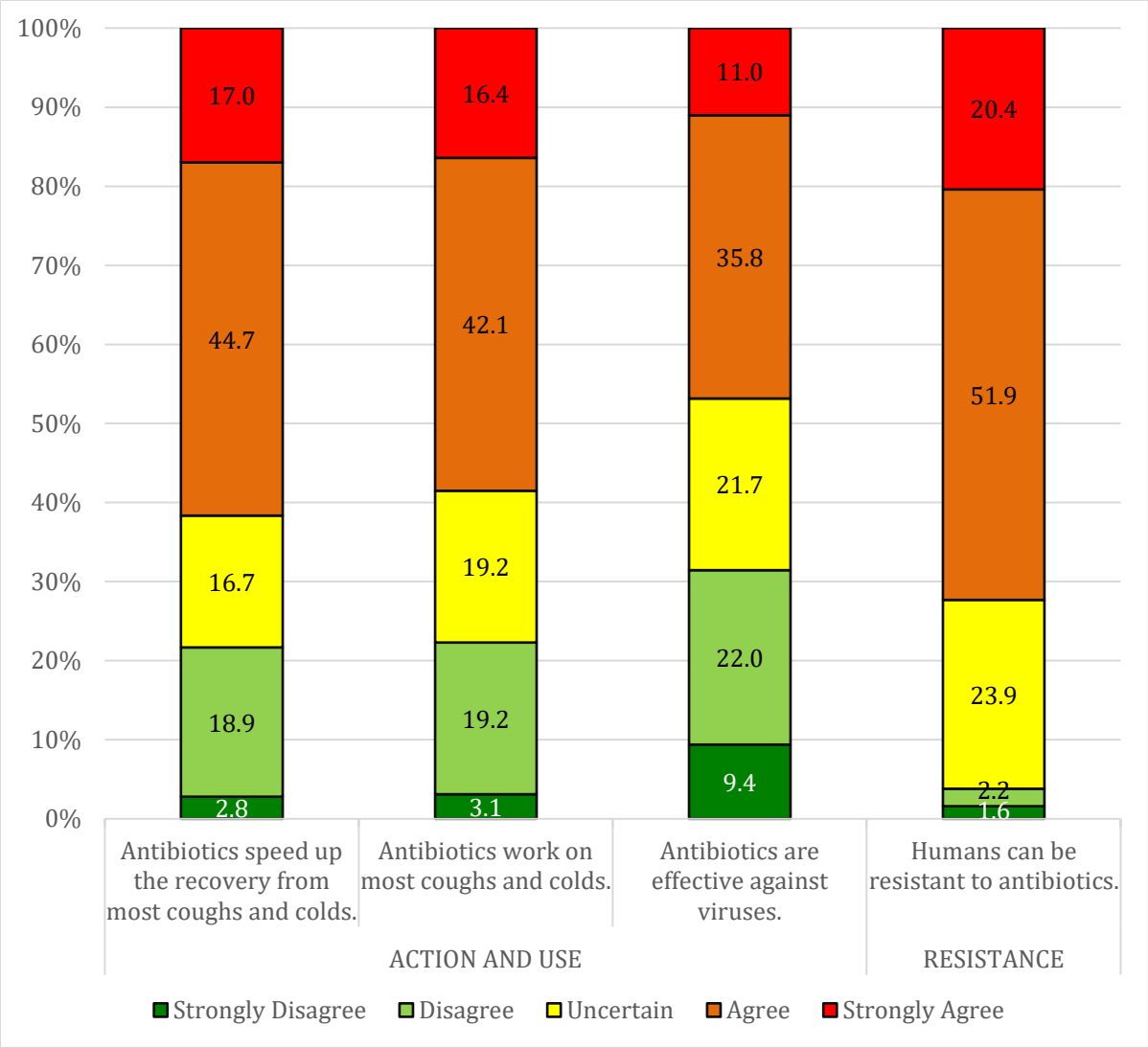

Figure 3: Patients' Knowledge of Antibiotic Usage (Incorrect Statement)

DISCUSSION

Incorrect Antibiotic Knowledge

Overall, respondents lacked incorrect antibiotic knowledge. One of the important findings that can be drawn from this survey is that nearly half of the outpatient public agreed that antibiotics work on coughs and colds. It can speed up their recovery from these ailments, and antibiotics work against viruses.

It is unknown where this public misconception is rooted from. One speculation is that the frequent antibiotic prescribing for acute respiratory conditions indirectly educated patients regarding

treating such conditions. This was supported by a study done by Ab Rahman et al., which showed that in Malaysia, upper respiratory tract infection (URTI) was the most frequent diagnosis in outpatient patients and accounted for 49.2 % of prescriptions in primary care clinics. Of the patients diagnosed with URTI, 46.2 % received antibiotic treatment (public 16.8 %, private 57.7 %) (11). The fact is that most acute respiratory conditions (including common colds and viral sore throats) are viral in nature, and current evidence does not support the use of antibiotics for these illnesses because they do not improve symptoms or shorten the course of illness. Over time, wrong knowledge can be shaped in the public's mind.

As a qualified medical doctor, the causes and treatment of acute respiratory conditions are basic medical knowledge. Therefore, theoretically, this should not lead to excessive antibiotic prescribing for such conditions. From study documentation, there was diagnostic doubt, lack of knowledge or experience and lack of confidence regarding optimal therapies that often resulted in unnecessary antibiotic prescribing (12-15]. Apart from that, the patient-doctor relationship in antibiotic prescribing also provided clues to the reasons for excessive unnecessary antibiotic prescribing.

Patient-Doctor Relationship in Antibiotic Prescribing

Modern medicine often included patient-centred care. Patients were partners to their doctors, having shared decision-making in their treatment plans. This awareness was growing but not high yet among the outpatient respondents. From this study results, one out of two patients did realise that they had the right to expect a specific cure which might end up changing doctors' treatment plans. Patients' expectations could pressure doctors into prescribing antibiotics unnecessarily. Over time, it became a norm for doctors to prescribe antibiotics because they perceived that patients wanted antibiotics despite their opinion that antibiotics were not required (16-18). This resulted in a vicious cycle of indirect education, the antibiotic expectation by patients or perceived expectation by doctors and antibiotic prescribing. Thus, patient-centred care needed to be skilfully practised alongside evidence-based medicine.

In local culture, consultation time in an outpatient setting was often limited, and most patients were shy to have a thorough discussion about their treatment with their doctors. Thus, they mostly

entrusted decision making solely to their doctors to choose the best treatment option based on their expertise. When the awareness of patient-centred care is increased coupled with incorrect antibiotic knowledge, this can lead to false treatment expectations causing treatment dissatisfaction, especially if patients did not understand or were unsure about the treatment received. When expectations were not met, patients tended to turn to alternative ways to obtain their desired treatment, such as seeking a second opinion, self-purchased from a pharmacy, obtaining the antibiotics from relatives or friends etc., which happened in nearly 20% of the respondents.

Antibiotic Side Effects

Each year, the unnecessary prescriptions put patients at needless risk for adverse drug reactions and drug interactions. Respondents had limited insights on the potential antibiotics side effects and interactions. Most were only aware of drug allergies presented as skin reactions. However, adverse drug reactions can present more than just skin reactions. Unnecessary drug exposure puts patients at risk of serious life-threatening reactions such as anaphylactic reaction and can cause *C. difficle* infections (CDI). Half of the respondents were either unsure or denied this fact.

A systematic review of CDI studies from Asia found a mean overall prevalence of 14.8% among hospital inpatients and outpatients [19]. Despite a high prevalence of CDI in Asia (19-22), reports of severe outcomes of CDI such as pseudomembranous colitis and toxic megacolon were rare (23). The apparent rarity of these severe outcomes was likely influenced by the poor awareness of CDI among physicians. As demonstrated in the study in the Philippines, CDI was misdiagnosed as amoebiasis and treated with metronidazole which was often sufficient for resolution of milder cases of CDI, resulting in missed cases (24). This explained the lack of insights of the public in gastrointestinal side effects of antibiotics as the awareness among the professionals was already poor.

Antibiotic Use in Animals and Emergence of Antibiotic Resistance

Two-thirds of the respondents lacked knowledge about the relationship between the use of antibiotics in animals and the spread of antibiotic-resistant bacteria in humans. However, this association has been proven in multiple studies. Meat production accounted for 73% of global antibiotic use. Organisation for Economic Cooperation and Development (OECD) estimated that

the number of antibiotics used in food animals will escalate globally from 63,151 tons in the year 2010 to 105,596 tons by the year 2030, an increase of 67%, due to increasing demand for animal protein in low- to middle-income countries (25).

Many classes of antibiotics used for humans were also being used in food animals. The extensive use of antibiotics posed a strong selection pressure on human and natural microbial systems, which may lead to genetic or mutational changes in normally sensitive bacteria, allowing the bacteria to survive and further proliferate as antibiotic-resistant bacteria. The occurrence of antibiotic resistance in disease-causing bacteria had tripled in developing countries between the year 2000 and the year 2018 (25). When people were exposed to these antibiotic-resistant bacteria from animals, this led to resistant infections in humans. Actions needed to be taken to restrict human antibiotics in farm animals.

General Attitude and Practice on Antibiotic Usage

The prevalence of antibiotic self-medication (ASM) reported in the World Health Organization Southeast Asian Region (WHO SEAR) ranged from 7.3% to 85.6%, with 42.6%. Our ASM prevalence was at the lower range of ASM reported in WHO SEAR. The results in the WHO SEAR review were similar to those reported for ASM in the Euro-Mediterranean region (26) and developing countries (27); the overall median proportions of self-medication reported for these countries were 40.9% and 38.8%, respectively. Developed countries, such as those of Europe where over-the-counter antibiotic sales were strictly regulated, had much lower prevalence rates of ASM, ranging from 1% to 4% (28).

From a systematic review done in WHO SEAR, previous experience of treating a similar illness, feeling that the illness was mild and did not require the service of a physician, less expensive in terms of time and money, gaps in terms of KAP regarding antibiotic use, such as keeping leftover antibiotics for future use, sharing antibiotics with others, and belief that antibiotics can speed up recovery and eradicate any infection, were the most common reasons for ASM among the general public.

Pharmacies are the main source of antibiotics used for self-medication, followed by friends and family (29). Pharmacists are commonly the preferred source of advice or information for the antimicrobial agents obtained and used over-the-counter due to their ease of accessibility and free-of-charge consultation. Thus, pharmacists could play an important role in educating patients, rationalising antibiotic use, and stopping antibiotic sales without a prescription.

To date, most educational efforts have been targeted at medical professionals (mostly medical doctors) after their training and at the adult public (30). However, since medical professionals and adults have already established their knowledge, attitudes, and behaviours about antibiotic use, changing their deeply established views and behaviours (31). Thus, educational efforts should also be focused on developing teaching programs to educate children.

Ministry of Health can work hand in hand with the Ministry of Education to incorporate antibiotic education into the national curriculum of our future generation to help break the vicious cycle of poor antibiotic knowledge and antibiotic misuse. There is growing evidence to suggest that empowering patients help to change attitudes and behaviour on antibiotic usage (32). Efforts from all parties may help control the development and spread of antibiotic resistance.

Limitations

Most questions in the questionnaire depended very much on the information given by participants, which may be subjected to recall bias. It was also possible that respondents may over-or under-report socially desirable behaviours.–The questionnaire used in this study was in the English version, and investigator-guided administration was used for participants unfamiliar with English. This can lead to low response rates as some participants might not fully understand the questionnaire, although guided by the investigator.-The study was only taken in a single centre Hospital Sibu; hence it might not generalise to the whole Malaysian population.

CONCLUSION

These findings highlighted the lacking in our public's education on antibiotics. It offers further insight into the need to design targeted and multifaceted interventions to empower the public of various age groups to reduce the KAP gaps on antibiotic usage to control the development and spread of antibiotic resistance.

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