Knowledge, attitude, and drug-resistant preventive behavior of university students: A study among university students in Chonburi, Thailand

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ABSTRACT

Background: Drug resistance preventive behavior at the community level is linked to antibiotic use and hygiene, both of which influence the spread of anti-drug resistance diseases. Drug resistance infections are harmful to the country's health and waste money. To promote better anti-drug resistance behavior, health education regarding drug resistance, as well as forming a public attitude to prevent the development of drug resistance illnesses, should be supported. **Objectives:** The study aims to access knowledge, attitude, and drug resistance Preventive Behavior of University Students. This is a descriptive research that studied a group of college students of Burapha University in Chonburi. **Materials and Methods:** The study was conducted using a questionnaire. A total of 250 college students participated during January-March 2021. All college students of Burapha University were invited to participate in completing an online questionnaire. Drug resistance related to knowledge, attitude toward preventive behavior, and preventive behavior was assessed. Differences between outcomes and socio-demographics were analyzed through descriptive statistics, independent t-test, and the ANOVA. A multi-regression analysis was calculated to determine the predictive variables of preventive behaviors. **Results:** The college students revealed Moderate knowledge about drug resistance, correctly answering 3.27 (SD = 0.95) questions in a total of 5 and favorable attitudes toward preventive behaviors, on the average, 10.74 (SD = 0.75). The students reported always engaging in preventive behavior 52.68 (SD = 4.56) 12 behavior analyzed. Female students showed higher knowledge levels about antibiotic resistance than male students. There was a positive correlation between knowledge about anti-drug resistance behavior ($r = 0.376**$, $P = 0.01$) and a correlation between attitude towards anti-drug resistance behavior ($r = 0.154*$, $P = 0.05$) statistically significant. Having knowledge about drug resistance predicted the adoption of those behaviors of the students (Beta = 0.313, $P < 0.01$). **Conclusion:** The findings revealed that students had a modest degree of understanding of anti-drug resistance, that most students had a positive attitude toward preventive behavior and that drug resistance preventive behavior resulted in a high level of prevention.

KEY WORDS: Drug Resistance; Preventive Behavior; Anti-drug Resistance Behavior; College Students

INTRODUCTION

In the present world, it is helpful to understand infection exposure by pathogens that might cause widespread sickness.

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Our bodies are naturally full of germs, but when the immune system is compromised, problems occur. As a result, germs avoid the immune system entirely. Depending on which sort they are, though, they can spread and transmit in a multitude of ways. Antibiotic resistance can only be caused by the type of them known as "Bacteria", and only a small group of individuals are aware of this.

Anti-drug resistance is a significant problem that refers to the increasing number of patients who are affected by diseases. Drug resistance has been considered to be infectious diseases

caused by pathogens in a type of bacteria and also caused by other microbes. By the way, the supervision of drug resistance is in bad conditions and the point is that it causes the growing number of microorganisms which are resistant to an antimicrobial collision. Therefore, the results clearly showed that many patients are at risk of death as staged by the study of Stephen and Kennedy.[1]

According to the World Health Organization (WHO), anti-drug resistance can impact anyone, regardless of the age or locality. These bacteria can infect humans and even animals, making the infestation more difficult to control than non-resistant bacteria caused infections. In this situation, the world has to increase its ability to cure bacterial illnesses since antibiotic resistance raises medical expenses and delays treatment, which can lead to patient death rates. Moreover, in addition to infections caused by various diseases, the rate has been increasing as antibiotics have been less efficient. However, even though antibiotics are misused in some countries, there are no quality treatment recommendations. And if urgently excellent management is not implemented, it can have long-term serious implications in a variety of different ways as claimed by The WHO.[2]

Moreover, environmental variables play an important role in the transmission of antidrug resistance infections, and the management of utility in each community contributes significantly to the global spread of antibiotic resistance. One of the factors that have contributed to the spread of antibiotic resistance is the overuse of antimicrobials as corroborated by the WHO.[3]

Furthermore, we should be well-protected to keep infections at bay. To protect themselves against diseases, people should wash their hands and apply an alcohol hand gel, as well as get vaccinated. People must also wash their hands routinely because they are a major component of illness transmission. As a result, everyone should always keep washing their hands. Vaccination is also important because vaccines can develop immune systems in our bodies, so if we are vaccinated and contract a disease, our immune system will start working and respond to prevent and protect us from disease, and vaccines can reduce the probability of us becoming ill or suffering from the disease's effects as reported by Health Navigator.[4]

MATERIALS AND METHODS

Participants and Procedure

This was qualitative research. An online questionnaire was purposely developed and made available through Google From which was developed from January 10, 2021, to January 15, 2021, and was sent out to all Burapha University, Chonburi, Thailand, college students on January 23, 2021. The survey was voluntary and 250 responses were received.

Information about the objectives of the study as well as the ethical guarantee of confidentiality and anonymity in the data collected as stated in the informed consent were explained. Participation was completely free and voluntary, and no personal data were collected from any participant.

Instruments

The questionnaire was developed based on a literature review including (1) information provided by and guidelines from the WHO and Ministry of Public Health in Thailand regarding's infection and prevention control and drug resistance. (2) Studies already performed on the same and relevant topics where several common items were used to assess each of the dimensions analyzed in this study. The proposed items were then grouped, and redundant items were removed. Three infection control specialists from a public hospital in Thailand assessed a draft version of the instrument to ensure that it was accurate. A small sample of university students was then given a pretest to assess understanding and difficulty. All the questions remained without modifications. The psychometric characteristics of the questionnaires were tested, as described in the statistical analysis subsection. The final version of the questionnaire contained 27 questions; six about demographic data, five about knowledge and understanding regarding drug resistance, four about attitudes toward drug resistance, and 12 questions about behavior toward drug resistance.

Demographic data

The responses to the questions consisted of age, gender, education level, faculty, household income, and living arrangements. A number was assigned to each response for each question (e.g. for gender, one was assigned to male and two was assigned to female).

Knowledge and understanding regarding drug resistant

The questions consisted of five multiple-choice questions in regard to the knowledge of transmission and prevention of drug resistance. A point was assigned to each correct answer; for multi-select questions, 1 point was assigned to each correct selected choice. The sum of all the responses indicates the knowledge of drug resistance of each individual, in which higher scores indicate more knowledge.

Attitudes toward preventive behavior

There are four multiple-choice questions for each individual to answer. The responses to the questions consisted of the individual's concern for drug resistance. The 2 responses are limited to the following in general: Very much, moderate, not at all. The answer was assigned a number (3-very, 2-moderate, and 0-not at all).

Other specific answers not listed in the former are assigned numbers as seen as appropriate (e.g., 0-careless). The sum of all the responses indicates the attitudes of each individual in the presence of rules and regulation toward drug resistant, with higher scores indicating more positive attitudes.

Behavior toward drug resistance

12 of the responses are in the format of five-point linear scale (from 1-never to 5-always). The responses of the five-point linear scale questions are "When you have a cold, fever, and diarrhea, do you usually go to see the doctor?", "Follow the instructions "before meals or after meals" by the prescription of the doctor". "Keep taking the medicine until it's finished"., "Did not buy antibiotics without the prescriptions of the doctor." "Did not take antibiotics that are leftover from others and previous illness." "Read the instructions clearly before taking it." "Always wash your hands with soap before eating and using the bathroom." "Wash your hands after you finish urinating and defecating." "Do you take a bath daily?" "Eating cooked food as always." "Wearing a mask when you are in a high-risk situation of epidemic diseases" and, "Keep your household clean all at the time." Assigned numbers as selected, and the responses of the multiple-choice questions are assigned numbers with never as 0 and always as 1. The sum of all the responses correlates with more preventive behaviors.

Ethical Consideration

This study used a Google form to collect data from Burapha University students in Chonburi, Thailand, using an anonymous data collection method. Students' institutional emails were utilized to send the invitation. The study's objectives, as well as the ethical guarantee of privacy and anonymity in the data obtained, are included in these surveys.

RESULTS

This study consisted of a total of 250 Burapha University, Chonburi, Thailand students. The demographic data of the sample are presented in Table 1. Most were students of year level 2 (n = 94, 37.6%). 69 students (27.6%), 65 students (26.0%), and 22 students (8.8%) are in year 1, 3, and 4, respectively. Most participants were women (n = 143, 57.2%).

The majority of students were in the Science faculty, 67 students (26.8%), Health Science 59 students (23.6%), Social Science 26 students (104%), Arts 35 students (14%), Education 23 students (9.2%), Engineering 32 students (12.8%), and 8 others (3.2%).

Most of the students had a household income range 50,000–100,000 (n = 114, 45.6%) <50,000 (n = 86, 34.4%) and above 100,000 (n = 50, 20%). Most of the students were not living with their parents (n = 128, 51%) and living with their parents (n = 122, 48.8%) [Table 1].

In regard to the knowledge and understanding of drug resistance, the average score of students is 3.27 out of 5 (SD = 0.95). Question time "what is drug resistance" was the most answered correctly (n = 233, 89.2%) while the least correctly answered question item was "What is penicillin used to treat?" (n = 111, 44.4%). Female students showed higher scores of knowledge (n = 3.29, SD = 0.912). The 4th year student had the highest knowledge score about drug resistance (m = 3.41, SD = 1.09) followed by the 3rd year students (m = 3.35, SD = 0.89). Students from social science faculty showed the highest knowledge score (m = 3.85, SD = 0.73) followed by engineering faculty (m = 3.67, SD = 0.90) and health science and arts faculties had the equal score (m = 3.34, SD = 0.86 and 0.83), respectively. Student group which had a monthly household income range 50,000–100,000 had the highest knowledge score about drug resistance (m = 3.36, SD = 0.96). Students who live with their parents showed a higher knowledge score than students who did not live with their parents (m = 3.36, SD = 0.94) [Table 2].

For the attitude toward preventive behavior, the students had an average score of 10.74 out of 12 (SD = 0.75) Most students (n = 237, 94.8%) showed a high level of attitudes toward preventive behavior. Question time "Do you agree to follow the instructions of the doctor or not?" was the most approved answer (n = 247, 99.2%) while the least concur answer was "What's your opinion about always washing your hands to prevent germs and infections?" (n = 181, 72.4%). Moderate level of attitude (n = 12, 4.8%) and low level about attitude towards preventive behavior (n = 1, 0.4%). Moreover, the study showed that male had the same attitude level as females (m = 10.73, SD = 0.71 and SD = 0.77). Education level of the 1st year students had the most attitude range (m = 10.78, SD = 0.78) followed by the 2nd year student (m = 10.74, SD = 0.82%). Students from the faculty of social science showed the highest attitude score (m = 10.96, SD = 0.20%) followed by health science faculty (m = 10.93, SD = 0.72%) and students from the other faculty (m = 10.88, SD = 0.93). Furthermore, students who had a household monthly income range 50,000–100,000 Bath had the highest attitude score (m = 10.85, SD = 0.79%). Moreover, students who live with their parents had the highest attitude score (m = 10.80, SD = 0.62) [Table 3].

In regard to the preventive behavior of students toward drug resistance, the average score is 52.68 out of 60 (SD = 4.56) related to Table 1. The study showed that the most engaging drug resistance behavior was "Do you take a bath daily?"(n = 210, 84%), the second most engaging behavior was "Read the instructions clearly before taking it" (n = 178, 71.2%), and "When you have a cold, fever and diarrhea, do

Table 1: Differences in outcomes according to the socio-demographic characteristics of participants (*n*=250)

Socio-demographic Characteristics	*n*	%	Knowledge about Drug Resistance (Range 0–5)		Attitude toward Drug Resistance (Range 1–12)		Drug Resistance Preventive Behavior (Range 12–60)	
			Mean	SD	Mean	SD	Mean	SD
Gender			3.27	0.95	10.74	0.75	52.68	4.56
Male	107	42.8	3.24	0.99	10.73	0.71	52.40	4.41
Female	143	57.2	3.29	0.916	10.73	0.77	52.40	4.67
Education Level (Year)								
Year 1	69	27.6	3.26	0.90	10.78	0.78	52.77	4.62
Year 2	94	37.6	3.18	0.98	10.74	0.82	52.27	4.72
Year 3	65	26.0	3.35	0.89	10.71	0.61	53.22	4.34
Year 4	22	8.8	3.41	1.09	10.63	0.726	52.50	4.42
Faculty								
Health Science	59	23.6	3.34	0.86	10.93	0.72	53.37	4.71
Social Science	26	104	3.85	0.73	10.96	0.20	54.27	2.43
Arts	35	14.0	3.34	0.834	10.43	0.70	54.89	3.00
Education	23	9.2	3.30	8.22	10.61	0.66	54.65	2.92
Engineering	32	12.8	3.67	0.90	10.72	0.96	53.44	3.54
Science	67	26.8	2.75	3.25	10.67	0.79	49.39	4.83
Others	8	3.2	3.25	0.46	10.88	0.83	51.50	5.60
Household monthly Income (Baht)								
Below 50,000	86	34.4	3.20	0.98	10.60	0.71	53.10	4.36
50,000–100,000	114	45.6	3.36	0.96	10.85	0.79	52.79	4.45
Above 100,000	50	20.0	3.18	0.85	10.70	0.68	51.68	5.08
Living with								
Living with parent	122	48.8	3.36	0.94	10.80	0.62	52.76	4.84
Not living with parent	128	51.2	3.18	0.94	10.68	0.85	52.59	4.29
Total			3.27	0.95	10.74	0.75	52.68	4.56

Table 2: Frequency and percentage on level of knowledge about drug resistance of the participants (n=250)

Question items of the knowledge about drug resistance	Correct Answered (*n*)	Correct Answered (%)
What's drug resistance?	233	89.2
Which drug was first discovered to be drug-resistant infection?	177	70.8
What is penicillin used to treat?	111	44.4
Does individual behavior affect antibiotic resistance?	220	88
Antibiotics are ineffective against which types of pathogen?	132	52.8

Table 3: Frequency and percentage on level of attitude toward anti-drug resistance behavior of the participants (*n*=250)

Question items about attitude toward anti-drug resistance behavior	Agree	Neutral	Disagree
Do you agree to follow the instructions of the doctor or not?	247 (99.2)	1 (0.04)	1 (0.04)
What do you think about, should not buy antibiotics without a doctor's prescription?	238 (95.2)	12 (4.8)	0
What's your opinion about always washing your hands to prevent germs and infections?	181 (72.4)	69 (27.6)	0
What do you think about going to see the doctor when you get sick?	222 (89.2)	26 (10.4)	1 (0.04)

you usually go to see the doctor?" (*n* = 57, 22.8%) was the least engaging behavior. The behavior score of male and female showed the same level (*m* = 52.40, SD = 4.41 and 4.67). The 1st year students had the highest level of behavior towards anti-drug resistance (*m* = 52.77, SD = 4.62) followed by the 4th year students (*m* = 52.50, SD = 4.42). Students in the faculty of arts showed the highest level of behavior (*m* = 54.89, SD = 3.00) followed by the education faculty

(*m* = 54.65, SD = 2.92%) and health science (*m* = 53.37, SD = 4.71%). The students who had a household monthly income below 50,000 Bath had the highest behavior score (*m* = 53.10, SD = 4.36%). Furthermore, the students who live with their parents had higher behavior scores than the

Table 4: Frequency and percentage on level of anti-drug resistance behavior of the participants (*n*=250)

Questions items about the preventive toward behavior	Always	Often	Sometimes	Rarely	Never
When you have a cold, fever and diarrhea, do you usually go to see the doctor?	57 (22.8)	138 (55.2)	53 (21.2)	2 (0.8)	0
Follow the instructions "before meals or after meals" by the prescription of the doctor	153 (61.2)	67 (26.8)	30 (12)	0	0
Keep taking the medicine until it's finished	175 (70)	53 (25.2)	11 (4.4)	1 (.4)	0
Did not buy antibiotics without the prescriptions of the doctor	92 (36.8)	97 (38.8)	57 (22.8)	1 (.4)	3 (1.2)
Did not take antibiotics that are leftover from others and previous illness	172 (68.8)	58 (23.2)	15 (6)	1 (0.4)	4 (1.6)
Read the instructions clearly before taking it	178 (71.2)	48 (19.2)	23 (9.2)	1 (0.4)	0
Always wash your hands with soap before eating and using the bathroom	94 (37.6)	130 (52)	25 (10)	1 (0.4)	0
Wash your hands after you finish urinating and defecating	145 (58)	73 (29.2)	32 (12.8)	0	0
Do you take a bath daily?	210 (84)	26 (10)	14 (5.6)	0	0
Eating cooked food as always	89 (35.6)	120 (48)	37 (14.8)	4 (1.6)	0
Wearing a mask when you are in a high-risk situation of epidemic diseases	109 (43.6)	119 (47.6)	22 (8.8)	0	0
Keep your household clean all at the time	93 (37.2)	123 (49.2)	32 (12.8)	2 (.8)	0

students who did not live with their parents (*m* = 52.76, SD = 4.84%) [Table 4].

The analysis of Pearson's correlation coefficient between the study outcomes found that there was a positive correlation between knowledge about anti-drug resistance behavior (r = 0.376**, *P* = 0.01) and a correlation between attitude towards anti-drug resistance behavior (r = 0.154*, *P* = 0.05) statistically significant [Table 5].

The analysis of generalized linear model predicting behaviors indicated that knowledge about drug resistance was the factors

Table 5: Pearson's correlation coefficient between the study outcomes

Variable	Knowledge about Drug Resistance	Attitude toward drug resistance preventive behavior	Drug resistance preventive behavior
Knowledge about drug resistance	1		
Attitude toward drug resistance preventive behavior	0.197**	1	
Drug resistance preventive behavior	0.376**	0.154*	1

**Correlation is significant at 0.01* Correlation is significant at 0.05

Table 6: Factors influencing antibiotics use behavior among the students in Burapha University (*n*=250)

Generalized linear model predicting behaviors	B	SE	sig	Beta
Intercept				
Gender	−0.893	0.539	0.099	−0.097
Faculty	−0.549	0.132	0.000	−0.244
Monthly Income	−0.613	0.379	0.108	−0.097
Knowledge about drug resistance	1.509	0.287	0.000	0.313
Attitude toward anti-drug resistance	0.394	0.359	0.273	0.065

(Beta = 0.313, *P* < 0.01) that could predict the adoption of anti-drug resistance behavior of the students [Table 6].

DISCUSSION

The result regarding the drug resistance related to the knowledge revealed a medium understanding about drug resistance knowledge of the students in Burapha University. The outcomes transpired in this way maybe because the syllabuses of each faculty were contrasting in subject categories (http://reg.buu.ac.th/document/Gernaral54.pdf, July 6, 2021) as results, each faculty provides students with a specialized education. Moreover, most participants answered the questions correctly about "What is drug resistance?" This could be due to the rudimentary knowledge of each individual. Refer to the study of Leon *et al*.[5] found that health and education are deeply linked.

The difference in gender, year level was now significantly different. From the study information obtained, gender and educational level in the different levels had affected the level of the individual's knowledge. From Table 1, education levels of the students in the 4th year resulted in higher knowledge scores than the students in the 1st year (3.41% and 3.26%), respectively. Refer to the study about knowledge and attitude of nursing students regarding older adults' sexuality by Vivian *et al*.[6] found that amount of knowledge varied greatly by year of study: 1st-year students

had the lowest level of knowledge, while 3rd-year students had the most. Although, the result showed that female students scored higher on anti-drug resistance knowledge than male students but sex differences had no effect on each student's cognition. Because the knowledge levels of male and female pupils were nearly identical. According to the study of Marit et al.[7] had mentioned that drug resistance knowledge varied depending on some of the background characteristics. Men were more likely than women to have a poor understanding of antibiotics in general, but there was no gender difference in antibiotic resistance knowledge. Anti-drug resistance knowledge was connected with higher age and education, but not with knowledge of antibiotics in general. The opposite result of the study by Sebastian et al.[8] discovered that gender differences in test scores were discovered in all three nations.

While, attitudes toward preventive behavior and drug resistance preventive behavior were at a high level. It can be clarified by the study from Olson and Stone.[9] About the attitude that influenced behavior psychologically, having mentioned that each individual's activities were conducted by their internal attitudes. Therefore, attitudes were related to the behavior of each person. As the result of students who had a good attitude toward anti-drug resistance preventive behavior, the prevention of the behavior will result at a good level as follows. Since attitudes are the consequences of a rational thought process which can lead to behavior in any case then, if a person has a good attitude to do things, will result in good behavior as well. Hence, to revise the behavior of the students in some groups, the attitude of the student's toward antibiotic use must be taken into account. Another finding evidence from Aris et al.[10] mentioned that the majority of participants had moderate to adequate understanding of antibiotic use. According to the findings, they were aware of the consequences of using antibiotics so, it can be concluded that, the correlations between attitudes and knowledge related to more suitable their understanding about the use of antibiotics, and the fewer misconceptions people will have about antibiotic effectiveness. In contrast, the study from Cagri et al.[11] concluded that knowledge of antibiotics cannot be assessed completely on its own because it does not necessarily correlate with the individual's behavior.

Most of the participants showed a moderate level of knowledge about anti-drug resistance; this because of the fact that most participants did not have hands-on experience about antimicrobial use in their daily life so, it may affect their knowledge range, involving suggestions of the doctor, nurse, pharmacist, and the specialist. Furthermore, the study from Maria et al.[12] about a hands-on project for high school students mentioned that the possibilities of raising high school students' understanding of antibiotic resistance's repercussions and the significance of using antibiotics wisely The findings provide light on the educational advantages of introducing hands-on activities into scientific instruction.

CONCLUSION

The findings revealed that students had a modest degree of understanding of anti-drug resistance, that most students had a positive attitude toward preventive behavior and that drug resistance preventive behavior resulted in a high level of prevention. As a result, the university should explicitly provide fundamental training on the topic of drug resistance throughout every faculty. As long as all students in each faculty are fairly educated, this issue should be rudimentary knowledge, which is an essential basic comprehension. Furthermore, also provide campaigns for students, and even the general public, to be well-informed on antibiotic drug resistance infection, and to more effectively prevent the problem of drug-resistant disease.

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