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Irrational Use of Antibiotic Among Thai People

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Abstract:

Drug resistance is now considered a world threat that is responsible for a huge economic loss and over 1 million deaths per year. It is caused by an irrationality of antibiotics, which are due to a lack of knowledge and good attitude toward antibiotics. Therefore to reduce these irrational uses of antibiotics, it is important to improve knowledge and attitude toward antibiotics, which one way of doing it, is to provide good public health services. This study aimed to study and analyze antibiotic use behavior and drug resistance preventive behavior among studies in Thailand. Previous related studies were selected from research database sources. The Health Belief Model was used to analyze the data.

Result: Knowledge and attitude toward the use of antibiotics among Thai people are still considered low to medium, which can lead to a misuse of antibiotics, the common misuse of an antibiotics are self-medication, the use on a diseases that are not due to bacteria and the use of left-over antibiotics, However the knowledge and attitude toward the subject are varied mainly by age, gender, education level, occupation and earnings. There is still a lack of an understanding of antibiotics use in animals by farmers, which causes a residue of antibiotics in livestocks that they provided.

Conclusion: Knowledge and understanding about antibiotic use are crucial factors for antibiotic use in both use in humans and in livestock. Therefore antibiotic use education should be provided to all antibiotic users.

Keywords—**antibiotic resistance, drug resistance, behavior, irrational use**

Introduction

Drug resistance is caused by misuse and overuse of antibiotics which are meant to cure disease that are caused by bacteria by killing or weakening them. However, misuse and overuse of antibiotics can cause the bacteria to develop immunity to antibiotics or drug resistance. When bacteria develop drug resistance to antibiotics, it will become harder to use the antibiotic to kill or weaken them, therefore the disease due to them will be harder to cure. In order to get rid of them we will need to create new antibiotics but the misuse will create the same cycle [1].

Unfortunately, misuse and overuse of antibiotics are not only factors in drug resistance, we can also receive drug resistance via eating animal meat that has an antibiotic residue. Antibiotics are not used only for medical purposes in humans but also in livestock in order to guarantee the health of the animal, however, many farmers in Thailand do not have enough knowledge about antibiotics which leads to misuse of antibiotics in animals [2]. The residue of antibiotics in animals can also cause a bacteria to create a drug resistance in humans after consuming those livestock as well [3].

Bacteria that develop an immunity to antibiotics are called superbugs, and they are contagious, meaning it can be transferred to another person via one person without a direct contract. So it is important to keep good hygiene, which many hospitals in Thailand are failing to do. Drug resistance is responsible for more than 1 million deaths per year [4], and costs an enormous loss in economics, and the rates are continuing to grow. A lot of investments are made to create a cure to drug resistance and a lot of the medical population are being used for the same reason [5]. Should the problem not be fixed, the death rate due to drug resistance will continue growing. Many study suggest that the misuse of the antibiotics are significant to the knowledge and attitude toward antibiotics and these factors are varies from age, gender, level of education earnings and lifestyle however, in average Thai people still have knowledge and attitude that are considered low to middle [6]. Which affect the behavior of antibiotics used to be a low to middle level as well. The common misuse of the antibiotics of Thai people is to use it to cure a disease that is not caused by bacteria because they confuse antibiotics as Anti-inflammatory drugs, this is due to a lack of knowledge in antibiotics [7], while some of a wrong attitude toward the use of antibiotics are to buy antibiotics by themself [8] without a recommendation of health professional or to use leftover antibiotics. Therefore it is important to raise awareness of antibiotics use among Thai people, and encourage the right behavior of using them. It is also important to encourage healthy hygiene to prevent the contagiousness of the superbugs. Moreover, the hygiene of the hospital and other health care should be taken care of seriously and antibiotics given to patients via health by health professionals should also ensure that it is reasonable.[9]

1. What is drug resistance?

Drug resistance

Drug resistance is when a drug that usually works on killing or weakening microorganisms, such as viruses or bacteria, doesn't work. This is because bacteria and viruses are able to develop a resistance to a drug that has been used on them before, Therefore it will become harder to get rid of them by using the same kinds of drugs used before. These antibiotic-resistant bacteria are called superbugs. It is reported by medical journal, the Lancet that estimated 1.2 million deaths globally per year are caused by superbugs [4] and

It is now considered a world-threat problem, most of the cases were gotten from misunderstanding antibiotics, such as they are anti-inflammatory drugs [6] and sometimes they do not know that there are various kinds of antibiotics that work against different kinds of bacteria. These misunderstandings lead to a misuse of antibiotics. However bacteria can develop itself to resist antibiotics, therefore misuse of antibiotics can create superbugs which are bacteria that resist antibiotics and become harder to cure.

More than 38,000 deaths each year which cost 0.6% economical loss of gross domestic product in Thailand are due to drug resistance. However misuse of antibiotics is only one of the factors that cause drug resistance. It can also be gotten via agriculture and farm products, such as meats, fruits and vegetables. The report found that 80 percent of antibiotics used in the US are not for a medical purpose but for farming to create a resistance in animals, therefore we can get indirect antibiotics from the animals that we consume. In addition, some antibiotics such as tetracycline or streptomycin are used in plants.

2. Threat to Public health

The study from the Lancet, a medical journey, reported that in 2019 approximately 4.95 millions deaths are associated with bacteria AMR (antimicrobial resistance) [4]

And from the study of Prevalence of Carbapenem-Resistant Enterobacteriaceae Infection Among Patients Attending in Tertiary Care Hospital, Bordering Province of Southern Thailand [5].Suggests that should the problem not be solved effectively, there will be approximately 4.7 million deaths due to AMR in Asia in 2050. Drug resistance in bacteria known as superbugs are contagious therefore can be transferred without physical contact, this leads to a huge economic loss, one of the examples being CDC has invested more than 300 millions dollars to help detect and prevent the threat from drug resistance alone. Moreover, a lot of health professionals are used to taking care of these patients. Drug resistance is now considered a world threat, since not only it is contagious and being developed daily by human behavior but also because it is hard to cure, therefore it takes a lot of countries involved to help detect and prevent the drug resistance. [10]

Cause of drug resistance

Antibiotics can kill or weaken bacteria therefore stop their growth. However, too many doses of unnecessary antibiotics. In the present day, many bacteria can develop drug resistance to many antibiotics in Thailand such as enterobacteriaceae that resist fluoroquinolones and third-generation cephalosporins or Acinetobacterbaumannii that resist to carbapenem [11]

From recent study, discovered that the main reasons that causes drug resistance are

2.1 inappropriate behavior of antibiotics used among patients.

From the study of Antibiotics use behavior of patientsinSrangsoke, Ban Mo District. Saraburi Province [24], discovered that 55% of the sample group have a behavior of antibiotics that need to be improved, and 49% of the sample group have low knowledge of how to use antibiotics. And from the study of Antibiotic Use Behavior Among Clients in Nursing Room at King Mongkut's University of Technology North Bangkok, Prachinburi Campus reported that 67.8% of the sample group have low knowledge of antibiotics uses (answer correctly in lower than 60% of the survey of antibiotics knowledge question) while the rest (32.8%) have medium knowledge (answer correctly in 61-79 % of the survey of antibiotics knowledge question). The misbehavior that was discovered in this research are such as, buying themself antibiotics from pharmacy (24%), using leftover antibiotics from their family (14%) and using leftover antibiotics from their friends (11.5%). This can be caused by an attitude toward antibiotics use such as self-medication, which from the research of attitude toward antibiotics use among students in grade 10-12 in school in Bangkok found that good amounts of the student have a not good attitude toward self-medication [8]. This also happens among citizens of the US as well, where they think they understand their disease better [12]. However, from the study of Knowledge, attitude, and drug resistance preventive behavior among Thai people:A cross-sectional online study in Thailand still indicates that average Thai people groups still have a considered middle to good behavior in antibiotics use.[6]

2.2 *inappropriate behavior of antibiotics used among livestocks.*

Antibiotics are commonly used in animals to control and prevent diseases, such as the use of penicillin in pigs and meat. [13] the residue of the antibiotics from these animals can

be transferred to humans via their meat and later will cause drug resistance in humans when consumed. This can be caused by a misunderstanding of antibiotics use in animals among farmers, although most of them understand correctly that antibiotics will indeed help with curing disease due to bacteria and will not help in livestock growth, some of them still failed to understand that antibiotics cannot help prevent diseases. More importantly, only few (26%) from a sample group of a farmer in Chiang Mai, Thailand, understand correctly that antibiotics residue in livestocks can and will cause drug resistance in humans when consumed. [2]. Moreover, in study of a farmer group in Roi et, Thailand, found that most of the farmer even though lacking in knowledge, were buying antibiotics on their own without a recommendation from verified professionals, this led to the amount of residue that found in livestocks are vitals. [14]

2.3 Inappropriate antibiotics in other drugs

In Thailand, there are some drugs that consist of unnecessary antibiotics, such as Neomycin, Bacitracin and Tyrothricin. They were meant to help with sore throat medication. Antibiotics in these drugs will not help with sore throat because antibiotics only weaken bacteria, if the sore throat was caused by a virus it would be no use, furthermore antibiotics in these drugs cannot weaken or kill bacteria in the throat, therefore antibiotics will not help with sore throat but will only cause drug resistance.[7]

3. How to prevent drug resistance

3.1 Stop developing drug resistance. To stop developing drug resistance

We need to use antibiotics correctly, which can be done by 1.) Only use antibiotics under doctor's orders 2.) Don't demand antibiotics if health professionals do not recommend, this includes getting antibiotics by yourself 3.) always follow health professionals when using antibiotics 4.) Do not share leftover antibiotics 5.) Prevent infections by taking care of good hygiene 6.) Prepare hygienic food [15] but another important thing to use antibiotics effectively is to understand the basics of antibiotics. Antibiotics are medicine that is used to cure a disease that is caused by bacteria, meaning that antibiotics will not work against disease that are caused by viruses and overuse of antibiotics will cause bacteria to create resistance. However Thai people in some areas such as in Saraburi Province, Chanthaburi Province and Pathumthani Province have a low to medium knowledge in antibiotics and antibiotics use and from their research, they found out that knowledge about antibiotics and antibiotics use have a significant effect on the sample group behavior. Inappropriate use of antibiotics will cause bacteria to develop drug resistance, therefore we need to raise awareness of antibiotics use. However, from the study about knowledge and understanding of antibiotics use of first year Mahidol college students by answering surveys about antibiotics discovered that participants have medium knowledge and understanding of the topics (answer correctly 7.1-9.7 out of 17 questions). The question that they answer the least correctly is, are antibiotics Anti-inflammatory drugs?.[16][17]But the knowledge and understanding are also varies by sex, education, income occupation and age. From the research of Knowledge, attitude, and drug resistance preventive behavior among Thai people:A cross-sectional online study in Thailand, discovered that more women are likely to have more knowledge in the topic than men, people who age around 41-50 years tend to have most knowledge about antibiotics, while people who age around 21-30 are likely to know least about

antibiotics. [18] Despite the knowledge, we have to encourage the right behavior of antibiotics uses from The Study of Customer's Knowledge and Behavior in Using Antibiotics at Community Drug Store in Pathum Thani Province discovered that people still behaving not very correctly in biotic uses in these topics; take antibiotics consistently according to doctors' order, take antibiotics immediately when have cold or flu, don't use antibiotics when having diarrhea and when label before meal, always taken antibiotics 30 minutes to 1 hour in advance before meals.[16]

3.2 Stop receiving drug resistance

From research, Detection of Antibiotic Residues In Fresh Pork In Sold In Fresh Market In Bangkok Metropolitan Area, Thailand, discovered that from 11 markets (10 supermarkets and 1 fresh markets), in total of 62 pork samples 45 of them have tetracycline residue, in which 6 of them contain over maximum residue limit (MRLs). 44 of the sample was found positive in Macrolide, Aminoglycoside, Sulfonamide, 7 of them contain more than MRLs and 24 of the sample contain residue of Penicillin and 2 of them contain more than MRLs.

However, products sold in different areas can have a different amount of residue. From research of, Determination Of Drug Residue In Fresh Pork And Chicken Sold In Bangkok, Thailand has found that Thanyaburi have the lowest pork sample that exceed the MRLs with 0% but all the sample was found positive in all antibiotics (Tetracycline, Macrolide, Aminoglycoside, Sulfonamide and Penicillin) following byPathumwan area where only 1 out of 6 were found exceed MRLs in each antibiotics. [19]. In addition, in research of Situation of Antibiotic residues in fresh meats and ready to drink cow milk sold for consumers in Bangkok, found that hygienic samples (fresh pork and fresh chicken) was found 0% positive in Tetracycline, Macrolide, Aminoglycoside, Sulfonamide and Penicillin compared to others sample where 63.49% of pork and 85.71% of chicken have residue of antibiotics. [3]

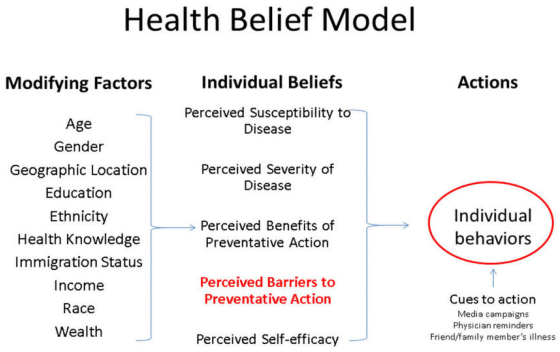
The lack of understanding in antibiotics of farmer in animal are one major reason that can cause a residue of antibiotics in animal while 98% of farmer in Chiang Mai, Thailand use antibiotics in livestock, 44% of sample group of 100 farmer are not certain that antibiotic uses in livestock can cause residue in manure. 42% of them have a misunderstanding that antibiotics uses in livestock will not cause residue in local water source, and only 29% understand correctly that drug resistance in animal can be transferred to human. [2][14][20]

3.3. Stop spreading drugs resistance

It is important to prevent the spread of drug resistance, since superbugs can be transferred from human to human, we need to maintain good hygiene. Especially in hospitals where a lot of antibiotics are being used. Development of a Model for Promoting Practices to Prevent Drug-resistant Organisms Infections among Nursing Personnel, Medical Department of a Tertiary Care Hospital program [21]has taken a survey and found that 45.8% of sample groups who work in hospitals wash their clothes incorrectly and only 65.4% clean patient environments.Knowledge toward good hygiene varies among groups of people. Research of Knowledge, attitudes, and preventive behaviors toward pathogens transmission: A study among Grade 10–12 students of Mahidol University International Demonstration School at Nakhon PathomFound that Knowledge, attitudes, and preventive behaviors toward pathogens transmission of female to male students and science to non-science programs are greater. It also shows that Knowledge about pathogens prevention of study is better from grade 10-12,

however, Attitude toward preventive behavior is the opposite. Attitudes toward preventive behavior in grade 11 are the greatest followed by those in grade 10. [20]

4. Health belief model



[22]

Health belief model is the model that explains behavior of health that's influenced by personal belief or perception toward diseases and how to prevent them. Those belief (perception) are 1) Perceived Susceptibility refer to find a risk and possibility ofthemself getting disease 2) Perceived Severity refer to acknowledge threats of the disease itself and when it is not being treated 3) Perceived Benefit refer to decide how to created new behavior that is more effective than the old one, and how it will help prevent disease 4) Perceived Barrier refer to understand their situation of what preventing them from developing new behavior[23]

5. Knowledge and Behavior regarding antibiotic use among Thai People

Health belief models can effectively explain the misuse of antibiotics among people. The model explains 1) The lack of understanding in the correct use of antibiotics, from the research, we discovered that knowledge of the use of antibiotics among Thai people is considered high to low, this is varied by its demography. Research from different provinces conveyed that client's knowledge toward antibiotics are varied. While study of Khlung hospital, Chanthaburi 17.5% of their client have decent knowledge of antibiotics use (answer correctly above 80% of the question in their survey) and 57.5% of their client have mere knowledge of antibiotics use [17], research study by Srangsoke, Ban Mo District. Saraburi Province found that 27.5% of the sample group have high understanding in the subjects and 58.2% of them have middle understanding [24]. From these 2 studies we can see that the ratio of people who have high understanding to low and middle understanding is not similar in these provinces. However, not only geography is not the only factor that affect the understanding, age, gender, studies and earning are also a big factors in the understanding as well, in the study of Knowledge, attitude, and drug-resistant preventive behavior of university students: A study among university students in Chonburi, Thailand and Knowledge, attitude, and drug resistance preventive behavior among Thai people:A cross-sectional online study in Thailand discovered that it term of gender, females in the sample groups are more likely to have more knowledge than males in the sample groups. And based on the data about educational attainment (highschool, BSc, MSc), they discovered that the higher education the more they're likely to have more knowledge about antibiotics uses, despite knowledge of year 2 students in Chonburi are slightly less than those in year 1. In terms of age, people who age 41 - 50 are likely to have the most knowledge about antibiotics use and people who age around 21 - 30 are likely to have the least. When comes to earning, both research suggest that people who earn less than 50,000 baht monthly are likely to have less knowledge than those who earn more than 50,000 baht, however, in the study of Knowledge, attitude, and drug-resistant preventive behavior of university students: A study among university students in Chonburi, Thailand people who earn more than 100,000

tends to have less knowledge than people who earn less than 50,000 baht
[25] [6]

From the lacks of true understanding in antibiotics use of Thai people leads to

A study assessed knowledge and antibiotic use behaviors among patients in Khung Hospital in Chantaburi, the result showed that most participants had a moderate level of antibiotic use as well as antibiotic use behaviors where most participants' age was 26-60 years, highest level of education was in primary school.
[17].[24] 2.)Wrong attitude to the use of antibiotics, in terms of personal beliefs, found that some of the people in the sample group have an inappropriate attitude toward antibiotics use which lead to drug resistance, where the most misuse of antibiotics among Thai people are used in, cold, wounds and diarrhea. [26][27] And 3.) Perceived Severity of disease in Thai people does not acknowledge the following drug resistance problems and others following threats that is not immediate effects, therefore being one of a big factor of wrong behavior which they don't see the importance of the correct use of antibiotics 4.)The correct antibiotics do not have an immediate effect on people (Perceive Benefits), therefore are not convincing for people to give priority. 5.) Barrier to action, to use antibiotics strictly and correctly requires not only a right knowledge but also high responsibility. Some people tend to work hard or have many businesses to attend to, therefore it is possible that these businesses can be a barrier to the correct use of antibiotics. These barriers can affect the lifestyle of some people, giving them a challenge in the correct use of antibiotics. For instance some antibiotics are needed to eat before or after the meal, it is considered that on average, people will have 3 meals a day. While 42.9% of people in Bangkok, Thailand do have 3 meals daily [28] From the study about the behavior of antibiotics use, found that people from the sample group who have high knowledge and good attitude about how to prevent drug resistance use are those who have a Bachelor's degree or higher and earn 80,000 baht or more, have a middle behavior, this can be due to their busy lifestyle that prevent them from having a correct behavior. A study of attitude and knowledge toward antibiotics use of one highschool in Thailand found out that student do have good understanding and attitude toward antibiotics use, however they have a middle attitude toward buying themself antibiotics, shows that if necessary they will buy themself antibiotics. [8]this can be because the high competition in the study system force them to invest their extra time to take extra classes, so they figure it would waste less time to buy themself instead of receiving them from hospital. From the study of influencing factors of antibiotics use behavior of clients in Khlung hospital Chanthaburi, found out that most of the sample group have middle knowledge and behavior of antibiotics use, where most of the sample group have not studied Bachelor's degree. [52] which go in the same direction with the study of Antibiotics use behavior of patientsinSrangsoke, Ban Mo District. Saraburi Province [24] which studies knowledge and behavior of antibiotics use, where most of the sample group are farmers who studied primary school.

6. Health education

Health education

From Survey of Health Literacy and Desired Health Behaviors in School-aged Children, 2019A study and Survey of Bangkok university that studied about Thai people hygiene reported that knowledge toward hygiene of Thai people are considered low to medium, and are also considered low to medium in terms of behavior. The big factors of such a

behavior are knowledge, environment, earnings and lifestyles.
[29]

7. A good example

A good public health system which encourage the right way of antibiotics use can help with the threat, some of the good examples being the public health in Sweden, where the country not only provided a decent knowledge to help encourage the right behavior of antibiotics use but also provide a financial support to help patient who afraid will lose their time and will cost them a loss in income, when this barrier being reduce, more citizens will seek a right way to deal with the threat than a wrong way such as getting themself a antibiotics. Meanwhile, in Italy, they provide a cluster of highly aware medical professionals to specifically help with antibiotics cases, this reduces the misuse of antibiotics due to the poor understanding of antibiotics by some health professionals. Other countries such as Poland held a campaign where they raised awareness of antibiotics use with global knowledge on why it is important to use antibiotics correctly, one of the reasons that this campaign was held was to reduce the self-medication using antibiotics. These countries are a good example of showing that not only it is important to educated citizens to have a good acknowledgement in antibiotics but a good public health care such as reduce a loss in income due to the disease barrier, or an encouragement to not self-medicate using antibiotics which help reduce a unnecessarily use of antibiotics, can also help prevent a threat from drug resistance as well.
[12]

Conclusions

Although antibiotics are being used among Thai people daily, it seems that knowledge and attitude toward the use of antibiotics among Thai people are still considered low to medium, which can lead to a misuse of antibiotics, the common misuse of an antibiotics are self-medication, the use on a diseases that are not due to bacteria and the use of left-over antibiotics, However the knowledge and attitude toward the subject are varied mainly by age, gender, education level, occupation and earnings. In addition, there is still a lack of an understanding of antibiotics use in animals by farmers, which causes a residue of antibiotics in livestocks that they provided. Therefore it is important to have a good education in antibiotics and good hygiene, since drug resistance is also contagious. Unfortunately, the study shows that Thai people still have low to middle knowledge toward good hygiene behavior. Not only in person but many medical professionals in many hospitals have also failed to do so. Therefore it is important that we give priority to health education, public health policy and provide good public health services, in that way we can reduce the irrational use of antibiotics, which can be done in numbers of way such as start a campaign that focus on educating a basic knowledge about antibiotics, held a group of health professionals that are specialist in antibiotics to deal with the cases, a policy to detect and prevent a irrational use of antibiotics and health service that reduce an income barrier when citizens are absent to their work due to a disease.

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