


# Perceptions of Communities Regarding Look-Twin Sound-Twin Drugs: A Case Study of a Sub-District in the Northeastern Region of Thailand

Attapol Khontum<sup>1,2</sup>

Kornkaew Chanthapasa<sup>3</sup> 

<sup>1</sup>Health Consumer Protection and Pharmacy Department, Nongbualamphu Provincial Public Health Office, Mueang Nongbualamphu, Nongbualamphu, 39000, Thailand; <sup>2</sup>Faculty of Pharmaceutical Sciences, Khon Kaen University, Khon Kaen, 40002, Thailand; <sup>3</sup>Department of Social and Administrative Pharmacy, Faculty of Pharmaceutical Sciences, Khon Kaen University, Khon Kaen, 40002, Thailand

**Background and Objectives:** Look-twin sound-twin (LTST)-drug-related problems are a worldwide concern because they are associated with safety among medication users. LTST drugs make up one of four types of potentially inappropriate medications circulating within communities. The present study investigates people's perspectives on characteristics of LTST drugs, their experience of use, and abilities to differentiate LTST drugs.

**Methods:** The research was conducted via a survey. The data were collected through interviews with individuals aged between 18 and 75 from 330 households during the period November 2017–February 2019.

**Results:** The majority of the participants, accounting for 97.9% of the interviewees were found to have experienced or used them previously. The essential features that enabled the participants to identify LTST drug pairs were similarities in terms of their appearance (93.6%), packaging (82.7%), medication names (76.1%), and medication labels (70.6%). The majority of the interviewees were unable to differentiate between the drugs in LTST drug pairs. In fact, while the drugs in one LTST drug pairs were distinguished accurately with the rate of 79.4%, 44 pairs of drugs were separated accurately by less than 35%. Furthermore, drugs in eight LTST drug pairs could not be accurately differentiated.

**Conclusion:** LTST-drugs-related problems in communities arise from the lack of a monitoring system and effective law enforcement. In fact, they are associated with people's safety in medication use, for most people are unable to distinguish differences among LTST drugs due to their similarities in terms of packaging, physical appearances, and drug names.

**Keywords:** look-twin sound-twin drugs, self-medication, safety in medication use, inappropriate drugs, LTST drugs

## Introduction

Look-twin sound-twin (LTST)-drugs-related problems are a global concern. In 2007, the World Health Organization published an article titled “Nine Patient Safety Solutions” to propose approaches to promote safety among medication users, and LTST drugs are one of the nine topics titled “Look-Alike, Sound-Alike Medication Names”.<sup>1</sup> LTST drugs are, in fact, a major cause of medication errors due to their similar characteristics, thus resulting in misconceptions that pairs of LTST drugs are essentially identical.<sup>2,3</sup> Such problems are associated with safety among medication users since they pose certain risks, such as wrong drugs or under- or over-dosage in case pairs of LTST drugs with similar features are the same drugs with different potencies, or adverse drug reactions from wrong drugs.<sup>4,5</sup>

Correspondence: Kornkaew Chanthapasa  
Department of Social and Administrative  
Pharmacy, Faculty of Pharmaceutical  
Sciences, Khon Kaen University, Khon  
Kaen, 40002, Thailand  
Tel +66 81 261 8095  
Fax +66 43 202 379  
Email korchak@kku.ac.th

These potential risks may be posed to patients receiving medications from hospitals or purchasing medications themselves without visiting health care centers. Drug System Monitoring and Development Centre specifies that LTST drugs make up one of four types of potentially inappropriate medications (PIMs) circulating within communities.<sup>6</sup> Apart from that, the risk assessment of unsafe products available in communities at a national level indicates that PIMs are one of the five unsafe products.<sup>7</sup> This reflects that besides patients, people in communities face certain risks from the use of LTST drugs.

When LTST-drugs-related problems in Thailand are systematically looked into, it is apparent that the cycle of these problems can be divided into three components, eg, upstream, midstream, and downstream.<sup>8</sup> The upstream situation refers to drug registration and manufacturing companies; it is found that laws pertinent to LTST drugs, guidelines on choosing trade names or designing medicinal products to prevent LTST-drugs-related problems, and clear practices for coping with such problems are missing.<sup>9–11</sup> Also, no database on drug names, characteristics of medicinal products, labels, and packaging has been established to allow pharmaceutical companies wishing to register medications to compare their products with registered products.<sup>2,5,12</sup> As a consequence, these companies produce medicines, intentionally or not, that imitate other drugs with dominant market shares. That increases sales of products and helps maintain or increase market shares. Moreover, these companies are exploiting gaps in the law regarding, eg, trade names and packaging, to produce medicines with similar features regardless of their distinct active ingredients and legal classifications. Doing so allows them to cross-promote the products.<sup>5,12</sup>

Distribution of medicines in communities, in the meantime, serves as the midstream. Thailand lacks a systematic monitoring system and enforcement of laws pertaining to distribution of medicines. Besides, its public health service system cannot separate roles of doctors and pharmacists clearly, so both of them can authorize and prescribe medications by themselves.<sup>13</sup> As a result, that enables drugstores to sell almost every type of medications without prescriptions. That means pharmacist at drugstore can diagnosis and dispensed medication while doctor in hospital and clinic can dispense medication too. Moreover, grocery stores in villages which are obliged by the law to sell only OTC medications illegally sell certain types of dangerous medications which must be prescribed by

pharmacists or doctors, such as antibiotics and NSAIDs. Dangerous medications in Thailand may compared with the prescription medications in USA, it is not surprising that the villagers are at risk from using these drugs. Prior studies have reached the conclusion that grocery stores serve as a source of medicine distribution in communities and are most favored among villagers since they are accessible and time-saving, match their lifestyles, and can supply any medication to villagers.<sup>14–17</sup> Grocery stores access to medications from a drugstore in a district.<sup>15,17–19</sup> Khontum A and Chanthapasa K's study revealed that 180 items of LTST drugs, amounting to 223 drug pairs, were distributed among drugstores and grocery stores in communities.<sup>20</sup> The analysis of potential risks from LTST drugs showed that 118 pairs of LTST drugs, constituting 52.91%, could potentially result in misuse due to misconceptions that they were essentially the same medications.

The downstream is associated with medication users. Although Thailand had a universal health security system and people could access to medications through health care centers, purchase of medicines for self-medication still rose from 20% in 2005<sup>21</sup> to 27% in 2015.<sup>22</sup> In addition, it is apparent that people tend to purchase medications without learning drug names; they often describe the tablets, colors, or packaging, or compare drug samples.<sup>15,17,23,24</sup> This may pose a high risk for medication errors, especially in case of LTST drugs. The patient taking medicines in a green box was found to experience severe drug allergies; he/she reported purchasing such medications from a grocery store and having taken them before.<sup>12</sup> It was found that the medicines in a green box were LTST drugs with similar features and had 7 trade names from different companies. Each medication had the similar packaging and labels, despite their different generic names, eg, penicillin V, sulfadiazine, and sulfamethoxazole + trimethoprim, or was the same medication with different potencies.<sup>12,25</sup>

It is apparent that LTST-drugs-related problems in communities result from the lack of a monitoring system and effective law enforcement and are related to purchase of medicines for self-medication among people in communities. Despite that, many studies on LTST drugs in Thailand have thus far focused on hospital contexts. Between 2007 and 2008, the Ministry of Public Health responded to World Health Organization's paper titled "Nine Patient Safety Solutions" by declaring that LTST drugs are part of the policy on the national patient safety.<sup>26</sup>

As a result, many studies investigated situations preventive measures for LTST drug problems on hospital contexts, whereas there has been a dearth of studies on such problems in communities which were the downstream.<sup>5,12</sup> This reflects a significant gap in knowledge about LTST drugs in Thailand. Consequently, this study was designed to investigate people's perspectives on characteristics of LTST drugs, their experience of use, and abilities to differentiate LTST drugs.

## Materials and Methods

The present study applied cross-sectional survey research conducted during the period November 2017 – February 2019. It obtained ethical approval in the form of Accreditation No. HE602166 from the human research ethics committee of Khon Kaen University on June 4, 2017. This study was conducted in accordance with the Declaration of Helsinki.

## Definition of LTST Drugs

Drugs were considered a LTST drug pairs showed one of the following attributes:<sup>2,5</sup> 1. naming: similar drug names, as in similar or identical generic names or trade names or trade names similar to generic names; 2. tablets or capsules with similar or identical sizes and colors; 3. labeling: labels featuring the same colors, text colors or size, or similar positions for the text or images; and 4. packaging: similar packaging, as in bottles, boxes, blister packs with similar features.

## Study Setting

The study setting was selected specifically from a district in the Northeast. It is a rural community consisting of 13 villages, 4 pharmacies, 28 grocery stores with drugs and 1612 households. Drawing on Khontum and Chanthapasa's study on LTST drugs in this setting, this study concentrated on 180 LTST drugs available in the examined community that could be categorized into 223 pairs. With regard to the risks arising from LTST drugs, their study showed that 118 pairs of LTST drugs, constituting 52.91% of the pairs, could be potentially misused due to people's misconceptions that they were the same drugs.<sup>20</sup> The most common characteristics that could pose a risk was the drugs of the same companies with similar or identical packaging and names and same active ingredients, but having many strengths and dosage forms (28 pairs of drugs, accounted for 23.73%), as shown in Table 1

**Table 1** Characteristics of the LTST Drugs That Could Pose a Risk

LIST Drugs	Number of Drug Pairs (%)
1. same company	90 (76.27)
1.1 similar/same packaging and name	77 (65.25)
1.2 similar/same packaging	8 (6.78)
1.3 similar/same name	5 (4.24)
2. different company	28 (23.73)
2.1 similar/same packaging and name	6 (5.08)
2.2 similar/same packaging	19 (16.10)
2.3 similar/same name	3 (2.54)

## Sample

The population comprised 1612 households where at least one member was between 18 and 75 years of age. The sample size was calculated using Yamane's formula at precision 0.05; as a result, the sample was to consist of 321 households but was rounded up to 330 households. The sample group was selected adopting a quota sampling method on the number of households in each village. To choose the sample in each village, an accidental sampling method was applied to achieve the target number of 330 households. The inclusion criteria were as follows: 1. People aged 18–65 years in households living in the district studied and 2. Consent and voluntary to cooperate in this study.

## Instrument

The survey instrument was 2 instruments: 1. an interview that probed on the characteristics of twin drugs in communities' perspective, experience, and their abilities to differentiate between drugs in LTST drug pairs. It was tested for content validity and reliability by an expert and a research advisor with over 10 years of experience in consumer protection work, then revised based on their recommendations and piloted in the vicinity of the sub-districts. Cronbach's alpha was used to measure the reliability of the interviews and was found to be 0.72. 2. LTST drugs couple picture sheet from Khontum and Chanthapasa's study<sup>20</sup> was used for interviews on 2 questions as Have you ever used such drugs? and Do you think these drugs are the same or different?

## Data Collection

The researcher conducted a fieldwork to collect the data. The data collection procedures started with the

researcher's self-introduction and explanation of data collection procedures to the participants. There are 3 specific questions as 1. What are the characteristics make the drugs are the same or similar? 2. Have you ever used such drugs or not? and 3. Do you think these drugs are the same or different? For asking the question number 2 and 3, LTST drugs couple picture was used to interview participants, as shown in Figure 1. The participants carefully observed the pictures and answered these questions. The data collection lasted 30 minutes. The data were recorded through note taking, and the researcher asked for their consent to record the interview through a recorder. In addition, the participants' confidential information was protected, and the data would be presented without disclosing their information in accordance with an information sheet approved by the human research ethics committee of Khon Kaen University. Only those who volunteered to participate in this study and signed the consent form, approved by the IRB of Khon Kaen University, were included and used as the participants of this study.

## Data Analysis

The participants' personal background, perspectives on characteristics of twin's drugs, experience of use, and

abilities to differentiate LTST drugs were analyzed using descriptive statistics, ie, frequency and percentage.

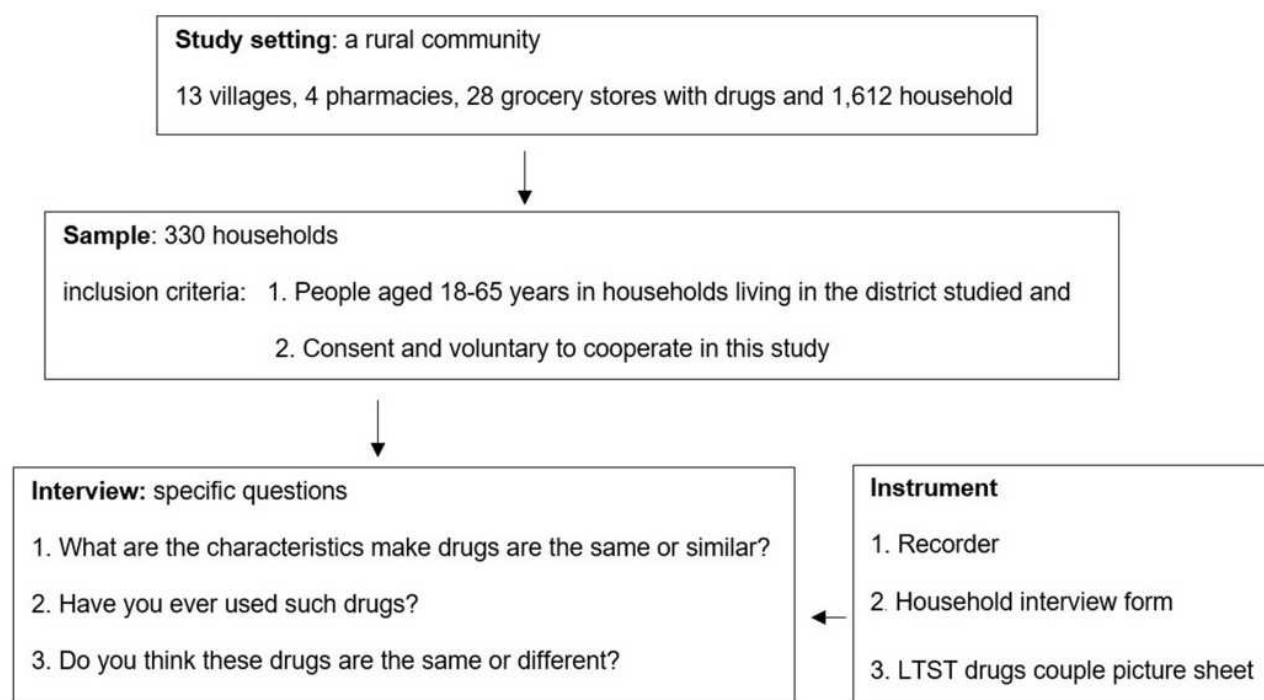
## Results

### Socio-Demographic Data

The majority of the interviewees were female (74.5%) and aged 22–75 years (58.20%). A good share of participants had completed primary and secondary education or a vocational certificate (30.6%) and were agricultural or livestock farmers (68.50%) with average monthly family incomes below 10,000 baht (approximately 333 USD).

### LTST Drugs Characteristics in Communities Perspectives

It was found that 97.9% of participants had experienced or used at least one of them, while 2.1% never had. For the characteristics of LTST drugs in Communities perspectives, it was found that 93.6% stated that LTST drug pairs had similar or identical physical appearances in terms of tablets, size, and colors, while 82.7% pointed out that their packaging was similar or identical. Moreover, 76.1% mentioned that LTST drug pairs had similar or identical drug names, and 70.6% said that they had similar or identical labels, eg, in terms of colors, text, text size, or in the positioning of the



**Figure 1** Data collection process.

text or images, as shown in Table 2. In addition, all participants label drugs with these characteristics as twin drugs.

## LTST Drugs: Experience and Differentiation

The results demonstrated that all participants had experienced or used at least one of the 48 pairs of LTST drugs, representing 40.67% of all LTST drugs with potential risks of medication errors (n=118). Among these pairs, 36 were made up of drugs from the same company, while the other 12 pairs contained drugs from different companies. In terms of active ingredients, 32 pairs contained drugs with different active ingredients, whereas 16 pairs contained drugs with the same active ingredients.

With regard to the differentiation of the drugs in LTST drug pairs, the participants were able to distinguish between the drugs in very few LTST drug pairs. As illustrated in Figure 2, only four pairs of the LTST drugs could be differentiated at an accurate level of over 48%, and 44 pairs could be differentiated at the level of lower 35%. In addition, eight pairs could not be accurately distinguished.

It was found that LTST drugs could be categorized into three groups, as follows: 1) drugs with similar or identical packaging and drug names; 2) drugs with similar or identical packaging and physical appearances; and 3) drugs with similar or identical packaging or drug names, as shown in Figure 3.

Based on Figure 3, note that:

1. There were 33 LTST drug pairs with similar or identical packaging and drug names (see Figure 4). Not all of these pairs had the same active ingredients. All 33 pairs could be separated with an accuracy rate of 35% or

less. Additionally, none of them could identify the differences in the drugs in seven pairs, an example of which is shown in Figure 5. As can be seen in Figure 5, it was very difficult to differentiate the LTST drug pairs due to their similar packaging and drug names.

2. There were nine LTST drug pairs with similar or identical packaging and physical appearances. As displayed in Figure 3, it is evident that the majority of the participants were able to separate more pairs of LTST drugs in this group compared to the first group. However, their ability to accurately differentiate between the drugs in these pairs was still lower than 50%, which implies that more than half of the interviewees were unable to identify the differences between the drugs in the pairs in this group. PLOCANMAD-M600<sup>®</sup> and PENICILLIN V 500000 I.U.<sup>®</sup> were most commonly differentiated (with the accuracy rate of 48.4%). Figure 6 shows that this pair had similar packaging and physical appearances but differed in their drug names, which were clearly visible on the packaging. Nevertheless, approximately 50% of the participants could not recognize differences between the drugs.

3. There were six pairs of LTST drugs with similar or identical packaging or drug names. As shown in Figure 3, the majority of the participants were able to distinguish between the drugs in these LTST drug pairs in this group. In fact, the pair of drugs that they were able to differentiate between most often (with the rate of 79.4%) contained Difelene<sup>®</sup> in different doses (see Figure 7). As seen in Figure 7, this pair of drugs had the same drug name, but the colors of the boxes were clearly different, making this pair the top most differentiated pair.

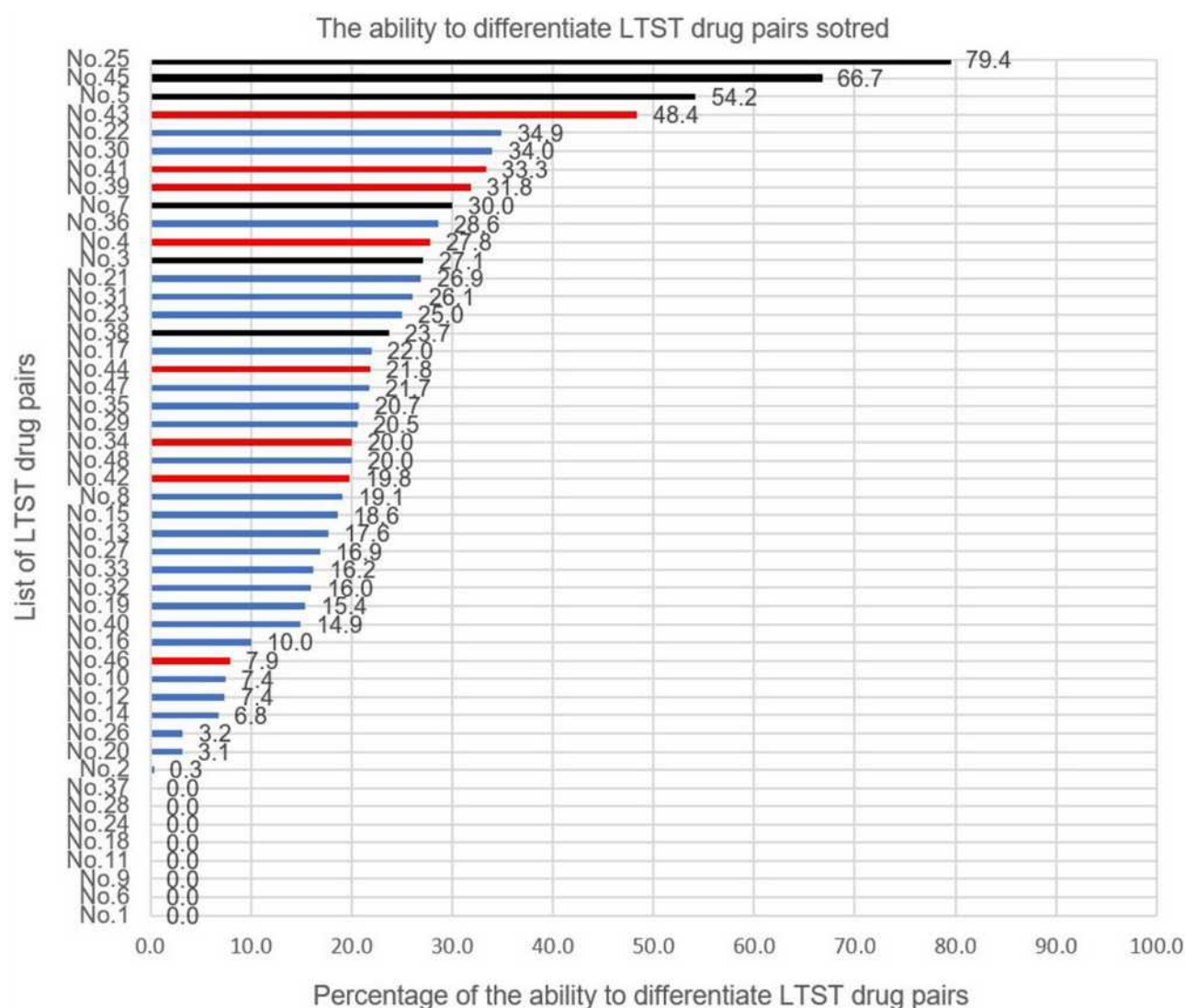
According to Figure 3, the second most differentiated pair of LTST drugs (66.7%) consisted of GANOSPEC 500<sup>®</sup> and GANO Wan Chak Mod Luke<sup>®</sup> (see Figure 8). It is apparent that these drugs have similar trade names, yet their distinct characteristics allowed the interviewees to distinguish between them.

Overall, due to the three major characteristics of the LTST drug pairs, the participants were able to differentiate between the drugs in the LTST drug pairs at the accuracy rate of lower than 35%. The characteristic that did not or helped slightly in distinguishing differences between the drugs was visual appearance, eg, packaging and drug names. As evidenced by the results, the number of characteristics LTST drug pairs had in common was inversely proportional to the ability to differentiate between the drugs.

**Table 2** LIST Drugs Characteristics in Communities' Perspectives (N=330)

LIST Drugs Characteristics	Communities' Perspectives
1. similar or identical appearance (tablets, capsules)	93.6 (309)
2. similar or identical packaging (bottles, boxes, blister packs, tubes)	82.7 (273)
3. similar or identical naming (trade names, generic names)	76.1 (251)
4. similar or identical labeling (colors, text, text size, positions of text or images)	70.6 (233)



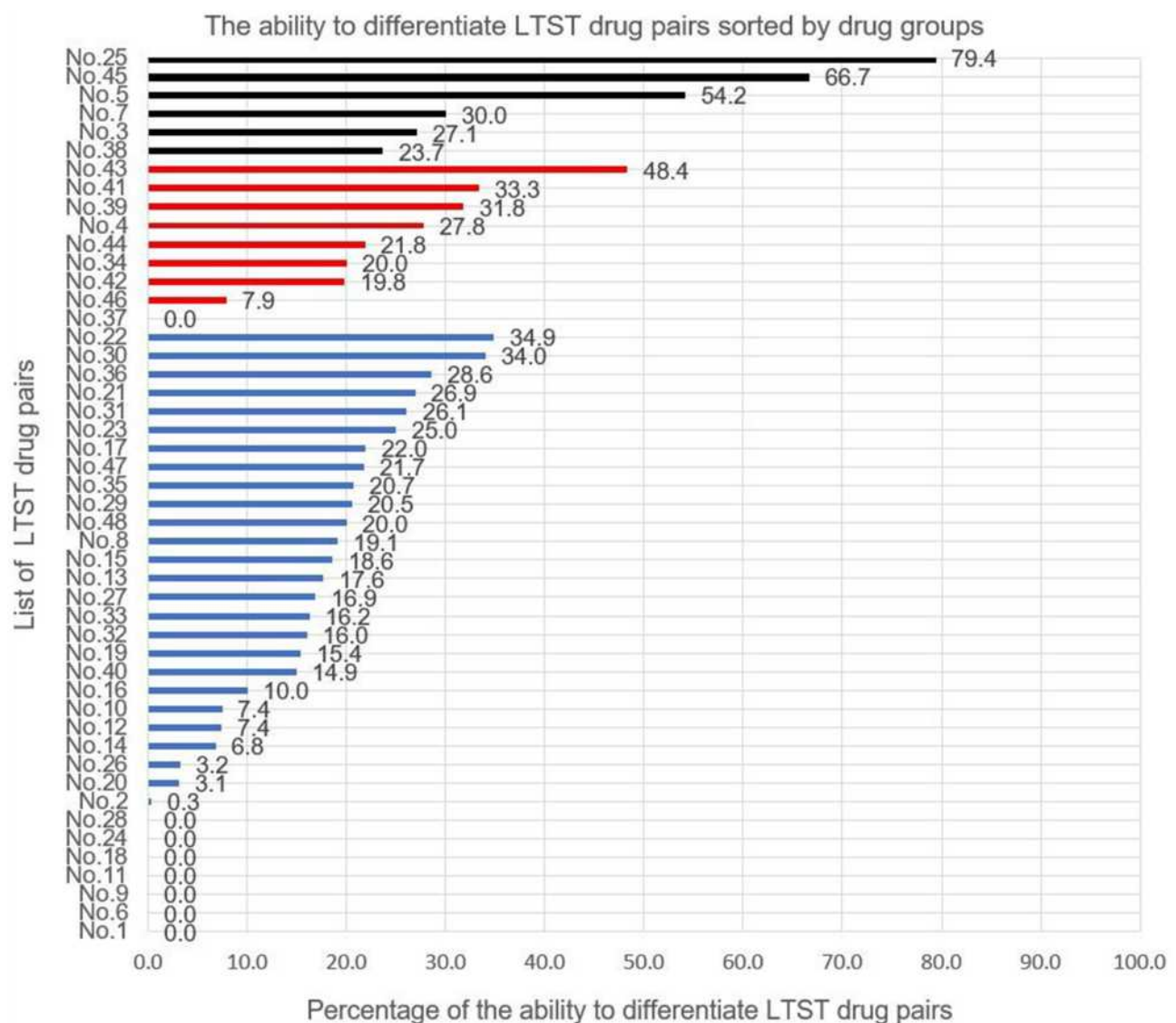


**Figure 2** Percentages of correct differentiations between the drugs in LTST drugs pairs. Blue: LTST drugs with similar or identical packaging and drug names. Red: LTST drugs with similar or identical packaging and physical appearances. Black: LTST drugs with similar or identical packaging or drug names.

## Discussion

The findings revealed that similar packaging, physical appearances, and naming were characteristics of medications which reduce the participants' ability to differentiate LTST drugs. This finding was different from that of Kenagy and Stein's study mentioning that drug names, packages, and labels were attributes of medications which caused confusion.<sup>27</sup> This may be associated with Thai people's purchase of medications for self-medication use; they tend to rely on packaging, physical appearances, and drug names when purchasing medications. Specifically, it was found that the villagers often supplied grocery stores with packaging, such as medicines in a green box, or drug names, particularly trade names. It

can be stated that villagers tended to memorize the visual appearances of drugs and ignore information and labels.<sup>12,16,18,22,23</sup> The survey of opinions on the use of labels of health products indicated that only 13.5% of the participants always read the labels before purchasing products, while 45.2% of them sometimes did, and 36.5% of them rarely did.<sup>28</sup> Thus, labels do not cause confusion or can be used to help distinguish differences between LTST drugs. In fact, they serve as an essential source of information to ensure safety in medication use and enable people to differentiate LTST drugs. Despite their benefits, the reason as to why the participants did not read the labels may lie in the fact that the texts are too small, and they have difficulty understanding information on the labels.<sup>28</sup>



**Figure 3** Percentages of correct differentiations between the drugs in LTST drug pairs sorted. Blue: LTST drugs with similar or identical packaging and drug names. Red: LTST drugs with similar or identical packaging and physical appearances. Black: LTST drugs with similar or identical packaging or drug names.



**Figure 4** Examples of a LTST drugs pairs having similar or identical packaging and drug names and the same active ingredients but different potencies or forms.



**Figure 5** Example of a LTST drug pair from the same company having similar or identical packaging and drug names but with different active ingredients.



**Figure 6** Example of a LTST drug pair with similar or identical packaging and physical appearances.



**Figure 7** Example of a LTST drug pair with identical or similar packaging or names.



<p><b>Trade Name:</b> GANOSPEC 500®  <b>Generic Name:</b> Tetracycline HCL 500 mg.</p> 	<p><b>Trade Name:</b> GANO®  <b>Generic Name:</b> Wan Chak mod luke herbal mixtures</p> 
<p><b>Differentiation of a drug pair = 66.70%</b></p>	

**Figure 8** Example of a LTST drug pair with similar drug names.

Apart from that, the texts on the labels are often in the form of written language which requires a high level of literacy; as a result, people with a low level of literacy may fail to understand the labels and choose not to read them.<sup>29,30</sup> People's inability to discriminate LTST drugs and purchase of medicines for self-medication from grocery stores with a lack of knowledge can pose certain risks in medication use. In fact, the peoples may be supplied with wrong drugs and wrong dosage while the peoples and sellers are not aware of such risks. Thus, these problems are associated with people's safety in medication use. As the downstream, they reflect a lack of an effective monitoring system of medicine distribution, so grocery stores in villages have been selling some prohibited drugs; moreover, a mechanism and a system for addressing LTST drug problems systematically and curbing potential risks are all missing.

The results on the LTST drugs-related problems in communities also point out that pharmaceutical companies are exploiting gaps in the law regarding drug registration to produce medicines that imitate other drugs with dominant market shares by imitating visual characteristics of medicines, eg, packaging, physical appearances, and naming, on which people usually rely when purchasing medicines themselves. That increases sales of products and helps maintain or increase market shares.<sup>5,12</sup> Pharmaceutical companies should be aware of this, for it serves as the cause of medication errors, which will in turn cause detrimental effects on consumers.

In addressing such an issue, Policy Maker and FDA Thailand are urged to cope with LTST drug-related problems systematically to prevent potential risks from use of LTST drugs in communities. They should handle the upstream first since it serves as a starting point of LTST drugs-related problems; they should improve a drug registration system before sale, produce guidelines on choosing trade names and designing medicinal products, or establish clear practices regarding LTST drug management,<sup>12</sup> similar to US FDA's Best Practices in Developing Proprietary Names for Human Prescription Drug Products: Guidance for Industry<sup>31</sup> or Malaysia's Guide on Handling Look Alike Sound Alike Medications.<sup>32</sup> Furthermore, they ought to establish a database of medicinal products with drug names, physical appearances, labels, and packaging, so pharmaceutical companies wishing to register medications can use it to assess similarities between their products and registered products, along with development of the database for the comparison of medicines<sup>12</sup> similar to POCA system or the Phonetic and Orthographic Computer Analysis (POCA) of US FDA which can assess similarities of drug names through percentage.<sup>31,33</sup>

## Conclusion

LTST-drug-related problems arise due to the lack of a monitoring system and effective law enforcement and are related to inappropriate purchase of medicines for self-medication among people in communities. They are associated with people's safety in medication use. Based on the findings, it is apparent that most people are unable to distinguish differences among LTST drugs due to their similarities

in terms of packaging, physical appearances, and drug names; the findings show the characteristics of LTST-drug-related problems in communities. The present study only serves as an initial study on perceptions of LTST drugs in communities.

## Limitations of the Study

The present study may have some limitations. As it involved a case study of just one sub-district, the results cannot be generalized to the entire country. Instead, as it shed some light on the characteristics of LTST-drug-related problems in communities, it can serve as an initial study in this area. Additionally, the severity levels of the potential medication errors were not taken into account, so the results may not reflect clearly how severe the problem is.

## Acknowledgments

This study was generously supported by the Research Grants for Master's Thesis and Independent Study and Doctoral Dissertation program run by the Faculty of Pharmaceutical Sciences, Khon Kaen University. Our greatest appreciation is also extended to the many experts who offered insightful recommendations and guidance for this study.

## Disclosure

The authors report no conflicts of interest in this work.

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