

ปัจจัยที่มีความสัมพันธ์ต่อพฤติกรรมป้องกันเชื้อโควิด-19 ของร้านขายยาแผนปัจจุบันในจังหวัดชลบุรี

Factors Affecting COVID-19 Prevention Behavior in Community Pharmacies in Chonburi Province, Thailand

นิพนธ์ต้นฉบับ

Original Article

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บทคัดย่อ

วัตถุประสงค์: เพื่อศึกษาความสัมพันธ์ระหว่างระดับพฤติกรรม กับความรู้และทัศนคติต่อการป้องกันเชื้อโควิด-19 และสังเคราะห์ข้อเสนอแนะการป้องกัน ของร้านขายยาแผนปัจจุบัน (ข.ย.) ในจังหวัดชลบุรี **วิธีการศึกษา:** การวิจัยแบบผสมผสาน รวบรวมข้อมูลเชิงปริมาณจากกลุ่มตัวอย่างจำนวน 285 คน ด้วยแบบสอบถามซึ่งแบ่งตามสัดส่วนและใช้การสุ่มแบบเป็นระบบ เก็บข้อมูลเชิงคุณภาพจากผู้ให้ข้อมูล 9 คนโดยการสัมภาษณ์ วิเคราะห์ข้อมูลเชิงปริมาณโดยใช้สัมประสิทธิ์สหสัมพันธ์แบบสเปียร์แมน และวิเคราะห์ข้อมูลเชิงคุณภาพด้วยการวิเคราะห์เนื้อหา **ผลการศึกษา:** ความรู้และทัศนคติมีความสัมพันธ์ทางบวกต่อพฤติกรรมในการป้องกันเชื้อโควิด-19 อย่างมีนัยสำคัญทางสถิติ ($\rho = 0.833$ และ 0.421 ตามลำดับ, $P\text{-value} < 0.05$) ตามมาตรฐานของการบริการที่ดีทางเภสัชกรรมที่ร้านขายยาแผนปัจจุบัน ข้อเสนอแนะที่สังเคราะห์ได้ซึ่งอาจนำไปประยุกต์ใช้ได้ประกอบด้วย 5 หมวด ได้แก่ สถานที่ เครื่องมือ บุคลากร การควบคุมคุณภาพยา และการให้บริการทางเภสัชกรรมในร้านยา **สรุป:** ความรู้และทัศนคติเป็นปัจจัยที่สัมพันธ์ทางบวกต่อพฤติกรรมในการป้องกันเชื้อโควิด-19 ดังนั้นหน่วยงานและเครือข่ายความร่วมมือควรมีนโยบายที่ส่งเสริมการพัฒนาความรู้ สร้างเสริมทัศนคติการป้องกันเชื้อโควิด-19 ให้ดียิ่งขึ้น

คำสำคัญ: ปัจจัย, ความรู้, ทัศนคติ, พฤติกรรม, การป้องกันเชื้อโควิด 19, ร้านขายยาแผนปัจจุบัน, เภสัชกรรมชุมชน

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Abstract

Objectives: To determine the relationship between COVID-19 prevention behavior and knowledge and attitude, and to synthesize recommendations of type I drugstores in Chonburi province, Thailand. **Method:** In this mixed methods research, quantitative data were collected from 285 participants using a survey and systematic sampling; while qualitative data were collected from nine key informants in the interview. Spearman's rank correlation analysis was used to test the correlations. Content analysis was conducted for qualitative data. **Results:** Knowledge and attitude were positively related to COVID-19 preventive behavior with statistical significance ($\rho = 0.833$ and 0.421 , respectively, $P\text{-value} < 0.05$). Based on the existing Good Pharmacy Practice, five synthesized recommendations for COVID-19 prevention which could be followed for better COVID-19 control included physical area, tools and equipment, personnel, medicine quality control, and pharmaceutical care. **Conclusion:** COVID-19 preventive behavior was positively related to knowledge and attitude. Thus, knowledge and attitude should be promoted to improve the COVID-19 prevention behavior by responsible agencies.

Keywords: knowledge, attitude, behavior, COVID-19, prevention, community pharmacies, drugstores

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Introduction

According to current information, COVID-19 first broke out in the People's Republic of China in December 2019, in the city of Wuhan in Hubei province. There have been no vaccines and specific medicines are undergoing clinical research, notably the antiviral medication favipiravir, which has been shown to be effective in COVID-19-infected patients in China. After receiving multiple reports of increasing numbers of COVID-19 patients in over 121 countries worldwide,¹ the World Health Organization (WHO) declared COVID-19 a pandemic. At the time this research was conducted, there

were 143,844,290 COVID-19-infected patients, 3,058,152 reported deaths, 82,494,846 complete recoveries, and 58,291,292 patients still recovering in hospital worldwide. In Thailand, the corresponding figures were 48,113 infected patients, 117 reported deaths, 29,848 complete recoveries, and 18,148 patients still under recovery, along with an ever-increasing number of infected patients.²

In response to the pandemic, the Thai government decided to come up with measures to prevent, preempt and slow the spread of COVID-19, including educating the people

about the nature of the disease and the precautionary measures necessary to avoid contracting it. The government's emergency decree included some obligatory requirements to abide by the medical and public health recommendations for preventing and bringing the epidemic to an end. Health and sanitation, quality of life, allocation of medical supplies and resources, and adequate medical services for Thai citizens are now considered priorities.³ To ensure the achievement of concrete, timely results, the Department of Disease Control, under the Ministry of Public Health, has drawn up measures and guidelines for all relevant government sectors and organizations to be vigilant in preventing and controlling COVID-19. All private sectors are also required to cooperate in strictly complying with the measures.⁴

Medical centers are key to the success of this response, as they do a significant role in preventing, diagnosing, treating and controlling COVID-19. These centers include not only hospitals and clinics, but also community pharmacies (or pharmacies or drugstores). Some pharmacies are closely involved in providing people with health care services. A study of consumer choices in this regard found that most Thai people (70%) would purchase medicines from a pharmacy rather than go to a hospital or clinic due to the convenience in traveling. The fact that pharmacies are also knowledgeable and able to provide helpful advice at a reasonable price, and with quality medicines they supply.⁵ As long as the emergency is in place, pharmacies will continue to function as health service centers.⁶ It is important, therefore, for pharmacies to adjust to the changes brought about by COVID-19. Pharmacies have always played a crucial role in health care services, specifically handling medicines and advising consumers on medicine usage. Pharmacies also ensure the quality of medicines prior to distribution, in accordance with proper pharmacy practice. Nevertheless, the COVID-19 situation has arisen, requiring that pharmacies implement COVID-19 preventive measures that are efficient and dependable.

COVID-19 has been reported in Chonburi province with 1,667 confirmed patients and the numbers of cases in all districts have been different as follows: Muang district (506 patients), Sriracha district (172), Bang Lamung district (668), Phanat Nikhom district (37), Sattahip district (59), Ban Bueng district (35), Phan Thong district (90), Bo Thong district (20), Ko Chan district (1), Nong Yai district (3), Ko Srichang district (5). In addition, there have been 71 people living outside the

province who have come to Chonburi for treatment. Of the 1,667 cases, 1,609 have been recovering and 58 have completely recovered. The public and private sectors are fully cooperating in pandemic prevention and control. Apart from hospitals that are primarily dealing with the pandemic, Chonburi also has pharmacies that serve the public in 1,098 locations, including 41 qualified pharmacies and 1,057 Good Pharmacy Practice (GPP) certified pharmacies. Some of these pharmacies also participate in the "Ob Oon Drugstores" initiatives of the National Health Security Office. These drugstores provide medication refill service for chronic diseases. In Chonburi province, there are 38 drugstores in this project.⁷

The literature and theory review relating to health-promoting behaviors⁸, respiratory-related diseases⁹⁻¹², and other disease prevention in the past^{13,14} found that both knowledge and attitude are related to health-promoting behaviors. Accordingly, the knowledge, attitude and practice (KAP) theoretical model¹⁵ was applied in this study. The first study objective was to determine the relationship between knowledge and the COVID-19-preventive behaviors of type I drugstores in Chonburi province. The type I drugstores are the majority of drugstores in Thailand. With pharmacists as the practitioner at these drugstores, they are allowed to provide most kinds of medicines including dangerous drugs and special controlled drugs. The second objective was to determine the relationship between attitude and the COVID-19-preventive behaviors of type I drugstores in Chonburi province. The findings could be useful for knowledge enhancement and attitude and behavior transformation plan. The third objective was to synthesize the recommendations for COVID-19 prevention in drugstores. The more a drugstore implements these measures, the lower the risk will be of the disease spreading in the drugstore. This could be a good way to encourage drugstores to maximize their capacity to promote efficiency, safety, and customer trust. Based on the first and second objectives, it was hypothesized that knowledge and attitude had a positive relationship with the COVID-19-preventive behaviors among type I drugstores in Chonburi province.

Methods

This mixed methods research was conducted between May and December 2020. The study population consisted of

1,098 extended-license modern drugstores or type I drugstores.⁷ Sample size was estimated using the Krejcie and Morgan method.¹⁶ With a confidence level of 95% and an acceptable errors level of 5%, a sample size of 285 participants for quantitative survey was required. This sample was divided into three groups, with the sample size for each group based on its proportion relative to the overall total drugstore population. Specifically, group 1 consisted of 140 pharmacist practicing drugstores or type I drugstores; while group 2 consisted of 110 type II drugstores or non-pharmacist drugstores, and group 3 had 35 franchise drugstores. Drugstores were systematically sampled from the drugstore registry. For each drugstore selected, to be eligible, they had to be either 1) the person with the drugstore license, 2) practicing pharmacist, or 3) practicing pharmacist who also held the drugstore license. They were also willing to participate. Questionnaires with incomplete answers were excluded. For example, those with at least one missing answer on individual quantitative questions on behavior of, knowledge about and attitude toward COVID-19 prevention measures in drugstores.

Qualitative study

The interview was conducted from July 16 to August 25, 2020. The data were collected from nine individuals using the snowballing method. To be eligible, they had to have a drugstore in Chonburi province with experience in implementing COVID-19 preventive measures as determined by the Centre for COVID-19 Situation Administration. They also had to participate in drugstore quality improvement in accordance with the GPP standards. They had to be willing to participate the interview. The interview with irrelevant information was discontinued. The informants were in-person interviewed using sound recording in a private room.

In the semi-structured interview for qualitative data collection, open-ended questions were used. These questions included 1) what was the importance of using COVID-19 preventive methods in the drugstore, 2) how type I drugstores should determine which COVID-19 preventive methods to use, 3) what methods type I drugstores should use to prevent COVID-19, and 4) how the participant would like to be supported by the government in initiating COVID-19 prevention methods.

The semi-structured interview started with the president of the Chonburi Pharmacists Association as the first informant

due to his in-depth knowledge and understanding of GPP standards in the drugstore. More interviews were conducted with subsequent informants until the information was saturated. The information was summarized.

In the actual interview, the nine interviewees included 1) the president of the Chonburi Pharmacists Association, 2) the president of the Chonburi Drugstore Entrepreneurs Association, 3) the president of the "Ruam Jai" Eastern Drugstore Entrepreneurs Association, 4) the deputy director of the Chonburi Provincial Public Health Office, 5) the drugstore manager at a pharmacy school, 6) the head of the Consumer Protection and Public Health Pharmacy of the Chonburi Provincial Public Health Office, 7) a representative of the drugstores in Chonburi province qualified in the Quality Drugstore project of the Pharmacy Council of Thailand, 8) a representative of type I drugstores in Chonburi province, and 9) a representative of drugstores affiliating with the "Ob Oon Drugstores" project for medication refill service for chronic diseases.

To summarize results of the qualitative study, data source triangulation technique was applied. For the time aspect, for a given topic or issue, data obtained from different times or occasions were checked whether they were still relevant to the topic or issue. For the place aspect, for a given topic or issue, data obtained from different places were checked whether they were still relevant to the topic or issue. For the person aspect, for a given topic or issue, data obtained from different persons were checked whether they were still relevant to the topic or issue.

Quantitative survey study

The questionnaire survey was conducted from May to June 2020. The survey questionnaire consisted of 4 parts. The first section asked the participants about demographic characteristics including the position of the participant in the drugstore, gender, age, education level, and duration in years of work experience in the drugstore business, and their drugstore legal type. The second section tested the knowledge relevant to COVID-19 including disease etiology, means of contagion, symptoms and complications, diagnosis and risk factors, and the prevention method. The questions were developed from related documents and research on self-care manuals⁴, a set of questions on knowledge of self-protection from COVID-19⁸, and a public health practice to manage the COVID-19 epidemic issued in the section 9 of the

Emergency Decree on Public Administration in Emergency Situations B.E. 2548 (No.1). The test consisted of 15 true-false questions with a score of 1 for the correct answer and 0 for the wrong one. Based on Bloom's criterion¹⁷, levels of knowledge were categorized as low, moderate, and high corresponding to the less than 60%, 60% to 79%, and 80% or higher of the total score. With the total score of 15 points, such three levels of knowledge were indicated with the total scores of lower than 9.00, 9.00 – 11.99, and 12.00 points or higher, respectively.

In the third section, participants were evaluated on their attitudes toward COVID-19 contagion, infection, preventive methods, and self-protection practice in the drugstore. The test was developed from a questionnaire on knowledge, attitude and health-promoting behaviors¹⁸ and a questionnaire on attitudes about tuberculosis preventive methods among medical personnel.⁹ This 12-items questionnaire had a response of a 5-point rating scale ranging from 1-strongly disagree, to 5-strongly agree. Based on the class interval distribution of the mean¹⁶, low, moderate and high levels of attitude were classified in accordance with the total mean scores of 1 - 2.33, 2.34 - 3.67, and 3.68 - 5.00 points, respectively.

Fourth section evaluated the COVID-19 preventive behavior of drugstores including activities relating to COVID-19 prevention and supervision in the drugstore. The questions were modified by the researcher from the work of the previous research on the COVID-19 self-care prevention behavior of Thai people.⁸ For each of the 15 statements of the behavior, the response was a 5-point rating scale ranging from 1-the least practice (never practice), 2-some practice (1 - 2 times/day/week), 3-moderate practice (3 - 4 times/day/week), 4-frequent practice (5 - 6 times/day/week), and 5-most practice (every time/every day). The behavior was categorized as low, moderate, and high with the corresponding mean scores of 1.00 - 2.33, 2.34 - 3.67, and 3.68 - 5.00 points, respectively.¹⁶

In terms of instrument quality assurance, the questionnaire was examined for content validity by three experts including a physician specialist in infectious disease, a pharmacist with extensive pharmacy service experience, and an academic pharmacist taking part in COVID-19 prevention measure in drugstores. It was found to be acceptable with content validity index of 0.67 to 1.00. Wordings were revised according to the experts'

recommendations. The revised questionnaire was further tested for internal consistency reliability in 30 individuals in Rayong province with characteristics comparable to prospective participants in the study. Acceptable reliability was found in section 2 (knowledge) with a Kuder-Richardson coefficient of 0.76, and in sections 3 and 4 with Cronbach's alpha coefficients of 0.80 and 0.82, respectively.

Quantitative data collecting was conducted by mailing the questionnaire in person to 285 drugstores. A 100% response rate was found.

Participant protection

The study was approved by the Ethics Committee on Human Research, Chonburi Provincial Public Health Office (approval number: CBO REC No 19-2563; approval date: May 13, 2020). They were assured that their identity and answers were kept anonymous. Research results were presented as a summary not individual participants' answers.

Data analysis

Descriptive statistics including mean with standard deviation (SD) and frequency with percentage were used to summarize participants' demographic characteristics and study variables. Relations between the behavior and its related knowledge and attitude were tested using correlation analysis. Since scores of knowledge and attitude scores were not normally distributed, Spearman's rank correlation (ρ) analysis was used.

Data of the qualitative study were analyzed by applying the content analysis method. Data were classified into groups, of topics or issues, for further interpretation of relationships, associations. The conclusion could then be made.

Results

Of the 285 participants for the questionnaire survey, majority of them were drugstore license holding practicing pharmacists (44.6%), female (73.3%), in their 40 - 49 years of age (33.33%), with bachelor's degree (75.1%), and in the drugstore business for more than 10 years (42.81%). Most drugstores were pharmacist-owned (68.1%) (Table 1).

Knowledge about COVID-19 and its prevention

The knowledge about COVID-19 was at a high level (mean = 13.23 ± 1.89 out of 15 points). Most of the participants had

a high level of knowledge (79.60%). For individual questions, all of them were correctly answered by 80% of the participants. The most correctly answered question was COVID-19 is a cause of human respiratory diseases (99.3%) while the least correctly answered one was Avoiding contact with eyes, nose and mouth before washing hands can prevent COVID-19 (83.5%) (Table 2).

Table 1 Demographic characteristics of the participants (N = 285).

Characteristics	N	%
Position in the drugstore		
Drugstore license holding individual	90	31.6
Practicing pharmacist	68	23.9
Drugstore license holding practicing pharmacist	127	44.6
Gender		
Men	76	26.7
Women	209	73.3
Age (years)		
Less than 30	31	10.9
30 – 39	91	31.9
40 - 49	95	33.3
50 - 59	52	18.2
60 or higher	16	5.6
Education level		
Junior high school	2	0.7
Senior high school	4	1.4
Associate degree or equivalent	11	3.9
Bachelor's degree	214	75.1
Higher than bachelor's degree	54	18.9
Number of years in business		
Less than 5	62	21.7
5 – 10	101	35.4
More than 10	122	42.8
Drugstore type		
Pharmacist-owned drugstore	194	68.1
Non-pharmacist-owned drugstore	71	24.9
Branched or franchised drugstore	20	7.0

Attitude toward COVID-19 and its prevention

The attitude toward COVID-19 was at a high-level (mean = 3.76 ± 0.418 out of 5 points) (Table 3). Most individual items of attitude were at the high level (7 items); while the rest were at the moderate level (5 items). The item with the highest mean score was “the prevention of COVID-19 in drugstores is necessary for the safety of customers and service staff” (4.78 ± 0.63 points); while the one with the lowest mean score was “COVID-19 is only risky for those who have returned from a country with an epidemic” (2.39 ± 115 points) (Table 3).

COVID-19 prevention behavior

Overall, the COVID-19 prevention behavior of these participants was at a high level (mean = 4.22 ± 0.52 out of 5 points) (Table 4). For individual behaviors, the behavior with the highest mean score was “You ensure that pharmacists

and staff in the store always wear face masks when serving the customer” (mean = 4.93 ± 0.25 points); while the lowest one was “You require customers entering the store to register in a visitor log-book or on the government-issued phone application” (mean = 2.62 ± 1.53 points) which was considered a moderate level (Table 4).

Table 2 Knowledge about COVID-19 and its prevention (N = 285).

Question	Number with correct answer		Level of knowledge*
	N	%	
1. COVID-19 is a cause of human respiratory diseases.	283	99.30	high
2. COVID-19 can be transmitted from one person to another.	255	89.50	high
3. COVID-19 can spread through phlegm mist from coughing and sneezing, and through mucus and saliva.	239	83.90	high
4. People infected with COVID-19 will have flu-like symptoms, and some may have severe symptoms leading to complications such as pneumonia, kidney failure, or death.	239	83.90	high
5. All people who return from a country with a COVID-19 epidemic are considered high-risk even without any symptoms.	244	85.60	high
6. People infected with COVID-19 can be diagnosed and have their COVID-19 status confirmed through a laboratory test.	244	85.60	high
7. Avoiding touching or approaching a sick person can prevent COVID-19 infection.	253	88.80	high
8. Avoiding contact with eyes, nose and mouth before washing hands can prevent COVID-19.	238	83.50	high
9. Refraining from dining with others can prevent COVID-19.	251	88.10	high
10. Washing hands often with water and soap or cleaning hands with a 70% alcohol-based hand sanitizer can prevent COVID-19.	256	89.80	high
11. Social distancing of at least 1-2 meters can prevent COVID-19.	244	85.60	high
12. Wearing a face mask in crowded areas can prevent COVID-19.	268	94.00	high
13. Cleaning appliances and living spaces with a cleaning product or a 70% alcohol-based surface disinfectant can prevent COVID-19.	254	89.10	high
14. People returning from a country with a COVID-19 outbreak must quarantine themselves in their homes and isolate themselves from others for at least 14 days to minimize the risk of spreading the infection.	260	91.20	high
15. Taking care of one's health is a way of immunizing against and preventing COVID-19.	243	85.30	high
Overall knowledge about COVID-19, mean = 13.23 ± 1.89 points			High
Level of knowledge			
High (≥ 12.00 points)	227	79.60	
Moderate (9.00 – 11.99 points)	45	15.80	
Low (< 9.00 points)	13	4.60	

* Level of knowledge about COVID-19: low (< 9.00 points), moderate (9.00 – 11.99 points), and high (≥ 12 points).

Relationships between COVID-19 prevention behavior and knowledge and attitude

The prevention behavior was significantly, positively related with knowledge about and attitude toward COVID-19 and its prevention ($\rho = 0.833$ and 0.421 , respectively, P -value < 0.001 for both) (Table 5).

Table 3 Attitude toward COVID-19 and its prevention (N = 285).

Attitude: You believe that	Mean [†]	SD	Level of attitude*
1. COVID-19 can be transmitted and people can easily get infected.	4.73	0.50	high
2. COVID-19 is only risky for those who have returned from a country with an epidemic.	2.39	1.15	moderate
3. the published information on COVID-19 prevention is difficult to put into practice.	2.75	0.78	moderate
4. Thailand has no need for COVID-19 prevention as it does not have many infected people.	2.68	0.83	moderate
5. social distancing of at least 1-2 meters is necessary to prevent the spread of COVID-19.	4.56	0.88	high
6. wearing a face mask in crowded areas can prevent COVID-19.	4.72	0.70	high
7. washing hands often with water and soap or a 70% alcohol-based hand sanitizer can prevent COVID-19.	4.75	0.67	high
8. prevention of COVID-19 in drugstores is necessary for the safety of customers and service staff.	4.78	0.63	high
9. introducing COVID-19 preventive measures in drugstores is an unnecessary expense.	3.12	1.02	moderate
10. customers are not interested in whether a drugstore has COVID-19 preventive measures or not.	2.42	1.11	moderate
11. during the COVID-19 epidemic, drugstores with preventive measures will perform better than their competitors.	3.88	1.29	high
12. COVID-19 preventive measures in drugstores will gain more trust from customers.	4.56	0.64	high
Overall attitude toward COVID-19	3.76	0.42	high

* Level of attitude toward COVID-19: low (1 – 2.33 points), moderate (2.34 – 3.67 points), and high (3.68 – 5.00 points).

† Possible total mean score of 1 – 5 points.

Recommendations for COVID-19 prevention

Based on the in-depth interviews, certain recommendations were drawn. As the closest healthcare service to the community, drugstore should be highly concerned about the most up-to-date circumstance of COVID-19 infection and its safety measures. All safety measures appropriate for current situations should be applied for space, tools, equipment, personnel, and customers.

For the **store space**, the most critical measure was social distancing of at least 1 – 2 meters. It was mandatory to place a list of regulations at the storefront requesting the customer to wear face mask, get their temperature screened, use contact channels such as the store phone line or Facebook page for potential risk information such as traveling to high-risk areas or showing signs of infection, and register their visit for contact tracing. The sign also showed the limited number of customers reaching service capacity at a given time which was in accordance with service space of the given store.

Table 4 COVID-19 prevention behavior (N = 285).

Behavior	Mean [†]	SD	Level of behavior*
1. You follow up on the news updates published by Public Health Ministry on COVID-19 prevention in drugstores.	4.69	0.58	High
2. You limit the number of customers that can enter the store by considering the available store space to keep a social distance of at least 1 - 2 meters.	4.54	0.64	High
3. You provide a safe way for handling the merchandises to the customers outside the store.	3.52	1.50	High
4. You take the customer's temperature before entering the store and advise those with fever, cough, sneezing, snuffle, or shortness of breath to see the doctor.	3.70	1.34	High
5. You require customers entering the store to register in a visitor log-book or on the government-issued phone application.	2.62	1.53	Moderate
6. You put up signs requesting customers not to touch merchandises or surfaces to prevent contamination and infection.	3.41	1.64	High
7. You set up partitions between service staff and customers inside the store.	4.02	1.44	High
8. You provide alcohol-based hand gel for customers at the entrance, exit and cashier areas.	4.90	0.32	High
9. You provide alcohol-based hand gel for store staff in an accessible area separated from the customers.	4.90	0.47	High
10. You ensure that pharmacists and staff in the store always wear face masks when serving the customer.	4.93	0.25	High
11. You ensure that pharmacists and staff in the drugstore clean their hands with alcohol-based gel before and after serving each customer.	4.87	0.39	High
12. You regularly clean every spot in the store that could be frequently touched by the customers.	4.73	0.51	High
13. You put up public advisory materials on preventing COVID-19 infection in prominent places in and around the store.	4.04	1.25	High
14. You ensure safe payment methods by placing cash in a basket or using an application or QR code scanners.	3.97	1.23	High
15. You provide an adequate air-circulating system in the store.	4.50	0.75	High
Overall COVID-19 prevention behavior	4.22	0.52	high

* Level of prevention behavior: low (1 – 2.33 points), moderate (2.34 – 3.67 points), and high (3.68 – 5.00 points).

† Possible total mean score of 1 – 5 points.

Table 5 Relationships between OVID-19 prevention behavior and knowledge and attitude (N = 285).

Relating factors	Behavior	
	ρ^{\dagger}	P-value
Knowledge about COVID-19 and its prevention	0.833	< 0.001
Attitude toward COVID-19 and its prevention	0.421	< 0.001

† Spearman's rank correlation coefficient.

The floor path was marked with colored stickers or obstacles placed on the floor. Sick customers were confined to a designated space to meet adequate social distancing and reduce the risk of contact with all surfaces, materials, and merchandises. Stores with limited space which could not allow for separately marked service areas should provide the confined service area outside the store. For private

pharmaceutical consultation and cashier areas, acrylic partition board should be placed to reduce personal contact and the risk of COVID-19 infection.

For air circulation, opening door or using air purifier could help reduce the chance of contraction. The use of short-wavelength UVC lights, i.e., 100 - 280 nanometers, such as fluorescent lightbulbs or LED bulbs in the store, can limit the spread of airborne viruses and surface residues.

Regarding **tools and equipment**, measures necessary for COVID-19 contraction reduction were as follows. The store should provide equipment and devices including infrared thermometers, mechanical stands for alcohol-based gel dispensers, touch-free gel dispensers. Stores with space limitations could provide a handwashing area for customers in front of the store. Surface cleaning products should be readily available. Equipment with high-contact surface such as scales, sphygmomanometers and altimeters, doorknobs and handles, product display shelves, light switches, refrigerator doors, hand washing sinks, computer keyboards, barcode scanners, and pens should be frequently cleaned. The schedule time could be as frequently as every two hours. Pharmacists and staff should be adequately provided with face masks, face shields, medical gloves, and antiseptic surface cleaning towels.

Processes **personnel** should follow were as follows. Pharmacists and store staff should be required to wear face masks when serving customers, medical gloves when cleaning surfaces and equipment, and attires suitable for routine cleaning. Pharmacists and store staff should refrain from wearing accessories that may get in the way of thorough hand washing and may also act as viral reservoirs such as watch, bracelet, ring and jewelry. Pharmacists and store staff should always maintain personal hygiene. They should have their hair up while providing service to reduce the risk of face touching and thereby prevent infection. Owners should focus on screening, health care, and prevention of sickness among pharmacists and store staff. Owners should place emphasis on the importance of proper practice by pharmacists and store staff. These included washing hands with water and soap or alcohol-based gel before and after service at all times, removing protective equipment, and disposing face masks after use and trash after cleaning.

For **medicine quality control**, drugstores should be managed to ensure an adequate stock of products throughout the epidemic period. Medicines and medical supplies should

be properly stored. For medicines and medical supplies with high demand, close inventory control should be exercised.

For **pharmaceutical care** aspect of the service, various measures should be followed. For customers with a temperature higher than 37.5 degrees Celsius or with signs or symptoms of COVID-19 symptoms, they should be referred to a healthcare setting promptly. 2. For individual customers with different needs of service, different duration staying in the drugstore could be assigned to reduce the risk of COVID-19 spread and exposure. For example, a fast-lane service could be available for customers purchasing over-the-counter medications and certain non-prescription medications.

All printed materials to educate the public and customers how to prevent the contraction, to identify signs and symptoms of the infection, and to self-care and manage if infected, should be readily available. Online payment methods including QR code scanning and other online services such as PromptPay™, should be available for the customer. Telepharmacy service should be implemented to provide virtual pharmaceutical care and home-delivery for merchandises.

In attempting all COVID-19 prevention measures mentioned above, participants thought that this crisis offered an opportunity to boost the morale of the drugstores and promote a greater trust from the public. Drugstores needed more motivation from related organizations. On the other hand, supports on safety measures from these organizations could help drugstores attract and convince more customers. However, additional costs of implementing these prevention measures should be compensated with certain incentives such as public certification and/or monetary reward.

Discussions and Conclusion

In this survey study, opinions of informants from drugstores in Chonburi province, Thailand, on COVID-19 prevention measures were revealed. Their overall COVID-19 prevention behavior was at a high level while various aspects of the behavior were at moderate and high levels. The overall knowledge about and attitude toward COVID-19 and its prevention were both at a high level. The overall behavior was significantly, positively related with their knowledge about and attitude toward the prevention at a high and moderate level, respectively ($\rho = 0.833$ and 0.421 , respectively, P -value <

0.001 for both). This positive finding was consistent with the knowledge, attitude and behavior (KAP) concept.¹⁵

With the positive relationship between the behavior of COVID-19 prevention and knowledge and attitude, it could be explained that knowledge and attitude promote practice.¹⁵ Individual acts or expressions to prevent disease depend on knowledge, experience, beliefs and values. Drugstore entrepreneurs and pharmacists in Chonburi, through their general knowledge about health and direct contact with the community, had a high level of understanding and knowledge of COVID-19, including infection risk factors, signs and symptoms of illness, and self-protection, which could support the better behavior in preventing COVID-19. This finding is consistent with a study of Laemthaisong which revealed that knowledge, age, and difficulty awareness could predict prevention behaviors for respiratory tract infections among caregivers in the child care centers of the Bangkok Metropolitan Administration ($R^2 = 0.125$, P -value < 0.05).¹¹ A study by Glomjai and colleagues found that knowledge had a significant, positive relationship with behavior in preventing COVID-19 among general population (P -value < 0.001).⁸ It was also found that knowledge about prevention of lung tuberculosis had a positive relationship with the prevention behavior with statistical significance (P -value < 0.05).¹⁰ Knowledge about all-purpose prepacked medication (or Yachud) also had a significant, positive relationship with its proper use (P -value < 0.05).¹⁹

Attitude was another factor that predicted the COVID-19 prevention behavior. The participants had positive attitude toward the prevention measures. Since prevention measures were implemented in many geographical areas, responsible agents conducted vigilance and control initiatives to raise awareness of the outbreak and to monitor for the latest news and alerts on COVID-19 prevention. Drugstores in Chonburi province seemed to have a raised awareness on the importance of service quality and the safety of staff and customers. This was reflected by the high level of attitude from the participants which could in turn lead to an improved COVID-19 prevention behavior. Our finding is in line with various studies. A study by Jampajan and co-workers showed that attitude had a significant, positive relationship with conjunctivitis preventive behavior (P -value < 0.05).¹⁴ Knowledge and attitude toward tuberculosis prevention had a positive relationship with occupational tuberculosis preventive behaviors.¹²

In Chonburi province, recommendations on COVID-19 prevention were initiated from various agencies including the Chonburi provincial Drugstore Development Committee and cooperative networks, the Chonburi Provincial Public Health Office, all Provincial Public Health Offices and government hospitals, the Chonburi Pharmacists Association, the Chonburi Drugstore Entrepreneurs Association, the Eastern Drugstore Entrepreneurs Association, and Faculty of Pharmacy, Burapha University. The recommendations have promoted more efficiency and readiness for transformation among drugstores in the province as reflected by the high level of knowledge about, attitude toward, and behavior of COVID-19 prevention found in our study. Every drugstore has a fundamental role to play in preventing COVID-19, as outlined in the GPP criteria. In addition to the GPP criteria, drugstores could apply additional measures for emerging epidemic situations with updated advice.

Opinions on various aspects of GPP criteria were found and could be discussed as follows. For the store space, the GPP standards require the store space to be safe, secure, and at least 8 square-meters in size. This GPP requirement could be encouraged by the concept of social distancing. The required measures perceived by the informants included the signs about COVID-19 measures or regulations, the separation of areas for drugstore staff and customers, and the use for air purifiers and short-wavelength UVC lights. These perceived measures are all in line with a study by Glass and colleagues which found that social distancing requirements could effectively control an influenza epidemic in the United States even in the absence of a vaccine or antiviral medications.²⁰

For **tools and equipment**, as mandated in the GPP standards, there were sphygmomanometers, scales, height gauges and medication trays which could be contaminated from the customer's use. Regular cleaning with quality cleaning products can prevent COVID-19 infection which is consistent with the measure for eliminating COVID-19 from surfaces.²¹ It was found that the temperature measurement equipment was not adequately installed in the drugstore compared with other venues. Hence, additional recommendation for the measure was reflected by the participants.

For **personnel** aspect of the measures, processes that needed to follow were reflected. The GPP standards stated the role and responsibilities of practicing pharmacists in the

personnel in drugstores. All the necessary precautions should be taken with regard to personnel clothing, sanitation and disinfection, self-protection equipment should be worn or used as indicated. Removal and disposal of these items after use and hand washing should be followed strictly. This is consistent with the standards for personal protective equipment for COVID-19 by health care workers.²² The standards refer to the practice of preventive measures, the selection of suitable personal protective equipment, and training for the proper use, and removal and disposal of such equipment to ensure infection control among medical personnel.²²

Regarding **medicine quality control**, over-the-counter and certain non-prescription medications could be reached by the customers; hence a higher risk of COVID-19 contraction could be expected. The measure should mandate preventing the customers to pick these merchandises by themselves. Furthermore, a prolonged and widespread epidemic is likely to result in a shortage of medical supplies. Inventory should be closely managed and purchase volume allowed for each customer on each merchandise should be restricted. This measure is consistent with what were the operation of drugstores appropriate for COVID-19 outbreak by the work of Stewart and colleagues.²³ They emphasized the importance of stock management including possible limitations on selling products in bulk, regular checking to ensure adequate stock, and transferring customers to other branches or stores in case of supply shortage.²³

For **pharmaceutical care** aspect of the measures during the COVID-19 outbreak, drugstores played an important role in evaluating and screening potential risk of contraction by determining length of service to minimize risk distribution. Drugstores were expected to publicize COVID-19 prevention information. They were also expected to introduce online payment systems to reduce direct interaction with cash which can act as a viral reservoir. This is consistent with the risk reduction measures in drugstores that has been issued for the COVID-19 crisis.²⁴ The Community Pharmacy Association (Thailand) has emphasized the importance of screening systems, patient evaluation, and medication history recording. Such measures help avoid the use of non-steroidal anti-inflammatory drugs which could worsen COVID-19. The association has also encouraged the dissemination of COVID-19 prevention information, and self-care among staff and customers.

Since drugstores in Chonburi province had shown their potential and readiness for continuous development, they should integrate telepharmacy technology for their customers. Virtual consultations in telepharmacy could save time and money for the customer and reduce the risk of spreading COVID-19. Telepharmacy could also enhance the drugstore's capacity in the future market. The opportunity offered by telepharmacy is in accordance with a study on drugstore position during coronavirus 2019 outbreak by Thavornwattanayong.²⁵ Our study also highlights the importance of drugstore development initiatives to reduce crowdedness, governmental income subsidy projects, and the integration of technology in service provision, long-distance technology in health and medication consultation, and drugstore space and sanitation management. These initiatives will bring the progress in drugstore business in the long term.

Since COVID-19 is an emerging infectious disease, current and everchanging information is crucial for effective measures. Therefore, related organizations and networks should promote the dissemination of knowledge about the disease and its prevention from reliable, up-to-date sources through public relations media and online channels. Drugstores could use such information for effective prevention measures and pass the information to the customer as well. However, certain attitudes of participants in our study need improvement. For example, the beliefs that only individuals returning from a country with epidemic are at risk, the published information on COVID-19 prevention is difficult for practice, Thailand has no need for COVID-19 prevention as it does not have many infected people, introducing COVID-19 preventive measures in drugstores causes an unnecessary expense, and customers are not interested in whether a drugstore has COVID-19 preventive measures or not. Changes in attitude is needed to be more aware of the importance of disease prevention. More campaigns or seminars should be held by responsible organizations. Sharing experiences of COVID-19 preventive activity in the drugstore will improve understanding and attitude for a better practice. In addition, incentives could motivate entrepreneurs to practice more COVID-19 prevention in the drugstore. For example, drugstores that follow the assigned practices or pass a standards test should be accredited and given a certificate of safety for display during the epidemic. Public should be made more aware of the sign of safety certificate in front of drugstore as an assurance of quality and efficiency in service.

In terms of future research, additional factors influencing the COVID-19 prevention behavior in drugstore should be studied. More qualitative research on policy could also help the drugstore move forward in their quality accreditation.

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