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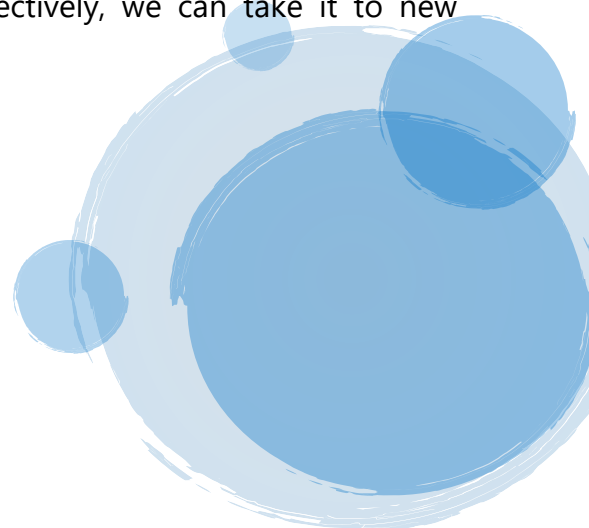
## Editorial Messages

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On behalf of the editorial board of the *Journal of Medical Globalization (J Med Glob)*, our authors, readers, and reviewers, I would like to express my deep appreciation to **Assoc. Prof. Bangorn Benjathikul**, the President of BangkokThonburi University. Under her leadership, the journal has seen a consistent increase in the number of views, articles downloaded, submissions, and publications. Since its establishment, I have been engaging in my role of Executive Editor of the *Journal of Medical Globalization*. I have had the privilege of working closely with our editorial team, reviewers, and readers.

We plan for more issues on important scientific topics and academic activities in the Thailand Region, and internationally. We hope that this issue and all other publications of the *J Med Glob* continue to provide valuable and high-quality material on scientific research in medical fields.

Our goals would not be achieved without collective efforts of publishing good quality and impactful publications. I invite each of you to actively participate and contribute to the *J Med Glob* as an author, reviewer, and reader and advocate for new ideas and leader for change. The *J Med Glob* has a strong foundation, and I am confident that collectively, we can take it to new heights.



# Long COVID-19 syndrome: What we learn from the past?

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Many millions people worldwide has been suffering from an emerging highly contagious viral disease, COVID-19, in the Year 2019. Not only the acute phase or "early phase" can cause mortalities, but also the stage IV or "Long COVID phase" can cause morbidities in these groups of patients. To date, COVID-19 infected patients presented with "Long COVID phase" are rising all the time. At "Long COVID phase" (stage IV), various complications of the bodies' systems are involved, such as pulmonary, cardiovascular, renal, neuropsychiatric, and gastrointestinal systems, etc. The mechanisms underlying these complications are not well established. However, recent reports demonstrated that the symptoms of the stage IV might be resulted from the abnormal immunities after the infection, especially the adaptive immune response. Thus, this prompted us to review the pathophysiology, risk factors, symptomatology and complications, including diagnosis and treatment of "Long COVID phase".

**Keywords:** complication; Long COVID; mechanisms; stage IV COVID-19

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## INTRODUCTION

After the first case of COVID-19 in China in the Year 2019, there are over 180 million cases infected around the world since then. In natural history of this disease, 4 phases of COVID-19 are reported. "Phase I" is called "early stage" with predominant viral replication. This stage is typically asymptomatic and highly contagious. "Phase II" is called "pulmonary phase" characterized by lung viral replication with radiological findings. "Phase 3" is called "hyperinflammatory phase" with the cytokine storm, and "phase 4" is named "long COVID" with acute or subacute to chronic conditions and multiorgan involvement. Usually, the average recovery time of

COVID-19 acute illness is about 2-3 weeks [1]. However, over 70% of infected cases are suffered from some organs impairment within 4 months after diagnosis. As reported, these involve pulmonary complications, such as impaired exercise capacity, and chronic cough; cardiovascular complications, such as hypotension, and tachycardia; gastrointestinal complications, persistent hyperlipidemia, renal impairment, post traumatic stress disorder, hematologic abnormalities and coagulopathy, etc [2]. All these illness "Long COVID" symptoms are so-called as "chronic COVID syndrome", or "long-haul COVID-19", or "post-COVID-19 syndrome", or "long COVID-19 syndrome" [3]. These disease features can affect at all COVID-19 severity, even at mild disease. Nowadays, many descriptions of "Long COVID" have already been proposed, whereas the symptoms lasting over 3 months after the first onset are the most commonly used [4]. Despite of its high prevalence, the specific knowledge and treatment of "Long COVID" are still unelucidated. Thus, in this literature review, we will summarize the areas in the fields of pathophysiology,

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risk factors, symptoms, and complications, including recent management of long COVID-19 syndrome.

## Nomenclature

From the year 2020, there is no consensus definite name for "Long COVID", the name as known in public media. At that time, National Institute for Health and Care Excellence (NICE), defined the "Long COVID-19 syndrome" as "signs and symptoms that develop during/after the COVID-19 infection persisting for more than 4 weeks and cannot be explained by any other diagnosis". This means that NICE defines "Long COVID" into two categories, i.e., "Ongoing symptomatic COVID-19", which indicates the symptoms lasting for 4–12 weeks; and the other is "Post- COVID-19 syndrome", which means symptom persistence beyond 12 weeks, in the absence of an alternative diagnosis. Notably, NICE diagnosis is based on "by exclusion" diagnostic criteria [5]. Meanwhile, several terms of "Long COVID" have also been used, such as "Chronic COVID syndrome", "Long Haulers", "Post-infectious COVID-19". The difference of these definitions depends on the organ-based staging of the illness and also the duration of symptoms from the initial onset. For example, the term "Post-infectious COVID-19" is named for those who continued with symptoms beyond 3 weeks after the onset of the disease [6]. Post- Acute COVID-19 syndrome is defined as the persistence of COVID-19 symptoms for >3–4 weeks [7]. Importantly, it must be emphasized that the virus is not found in respiratory secretions in these "Long COVID" cases. Possibly, these symptoms could be called in the scope of "Post viral syndromes".

## Pathophysiology of "Long COVID"

There are some mechanisms that have been proposed to cause "Long COVID" (or phase IV COVID-19), as followed [8].

1. The sequelae of organ damage, including the varying extent of organ injury and also the time required to recover of each organ system.
2. Persistent chronic inflammation (convalescent phase) or immune response/auto antibody generation.
3. Rare persistent of virus in the body in people with altered immunity, re-infection, or relapse.
4. Nonspecific effect of hospitalization. Post intensive care syndrome and complications related to corona infection or complications related to comorbidities or adverse effects of medications used.

5. The sequelae of critical illness, including the social and financial impact of COVID-19, and psychological ones.
6. Deconditioning, psychological issues like post-traumatic stress.

However, in "Long COVID", the multiple mechanisms may contribute to the onset of this condition. One of the pathogeneses of "Long COVID" was suggested to be the outcomes of "the oxidative stress and inflammation that leads to weak immunologic response and incomplete viral eradication" [9]. Moreover, T-cells dysfunction and thyroid dysfunction may also promote "Long COVID" pathogenesis, similarly in an autoimmune disease [10]. Multisystem inflammatory syndrome (MIS) results in the elevation of systemic pro-inflammatory markers, such as CRP, IL-6, ferritin, and D-dimer. It is proposed to involve in dysregulated adaptive immune system and autoantibodies in these cases [11]. Thus, the potential mechanisms of "Long COVID" can be summarized into 3 major mechanisms [7]:

1. Virus-specific pathophysiology in organ system
2. Immunologic aberrations and inflammatory damage responding to the stage I-III of COVID-19
3. The sequelae of post-critical illness

Of note, the molecular mechanisms involving in pathogenesis of COVID-19 have 3 physiological systems, i.e., (1) the kinin-kallicrein system; (2) the renin-system angiotensin; (3) the coagulation system coexpressed with hACE2-R in alveolar cell [12].

## Risk factors for developing "Long COVID"

The risk factors for those infected with COVID-19 highly associated with "Long COVID" are noted. Women are twice commonly found than men. Increasing age is also found "Long COVID" commonly than those in younger one. Presentation of COVID-19 with over 5 symptoms in the first week of the acute stage increases risk of "Long COVID". Developing of "Long COVID" can also increase with those who have co-morbidities [13]. As reported, the elevation of blood urea nitrogen (BUN) and D-dimer levels are the risk factors of pulmonary dysfunction, especially in three-month survivors of COVID-19 [14]. Though the changes of D-dimer, CRP, and lymphopenia may serve as potential biomarkers of "Long COVID", these inflammatory markers are known to fluctuate in concordance with disease severity and patient characteristics [4].

## Symptomatology and complications of "Long COVID"

From previous report, "Long COVID" patients usually manifest with a wide range of physical and



psychological symptoms, which can be categorized into 2 clusters symptoms [1]:

1. Those with only symptoms of fatigue, headache, and upper respiratory complaints.
2. Those with multi-system complaints including fever and gastrointestinal complaints.

## Generalized symptoms

Fatigue is the most common generalized symptoms found in "Long COVID" at 55% using the Fatigue Severity Scale. Some reports showed that after ten weeks follow-up post SAR-CoV-2 infection, 50% of patients developed fatigue. No correlation is demonstrated between COVID-19 severity, fatigue, and the inflammatory level. Moreover, female sex shows high correlation with fatigue and depression. Other generalized symptoms include headache, myalgia, sore throat, skin rashes, alopecia, and unrefreshing sleep [13].

## Respiratory sequelae

In "Long COVID", dyspnea is the most common persistent symptoms found in this disease, ranging from 42-66%, and prevalence at 60-100 days follow-up. It is most likely that those patients who suffered from dyspnea are in old age group. The pulmonary function test, such as diffusion capacity for carbon monoxide, and total lung capacity, may take time to recover from the onset of disease. The possible mechanisms of dyspnea include pre-existing lung abnormalities, fibrotic changes inducing cytokines releasing, pulmonary vascular damage, and thromboembolism [7,15].

## Cardiovascular sequelae

The most common symptom in cardiovascular system is postural orthostatic hypotension (or tachycardia syndrome), resulting in palpitation, dizziness, headache, etc. Other cardiovascular symptoms that may be presented are myocardial infarction, myocarditis, pericarditis, arrhythmias, chest pain, and cardiac failure, including venous thromboembolism. Increasing of major adverse cardiac events 3 times higher at the median of 5 months post discharge has been reported. The possible mechanisms underlying these symptoms include autonomic dysfunction, hypovolemia, hyperadrenergic stimulation, dysautonomia, and psychological stress. However, the etiology of some events requires further study [8,16,17].

## Neuropsychiatric sequelae

"Long COVID" has been associated with major depressive disorder, anxiety disorder, and insomnia. Manifestation of malaise, headache, vertigo, tremor, and

myalgia has also been found. Some studies reported symptoms of anosmia, and ageusia, without rhinorrhea or nasal congestion [18]. The possible mechanisms involving these symptoms are direct viral infection, neuroinflammation, microvascular thrombosis and neurodegeneration [7].

## Hematologic sequelae

Thromboembolic events, such as venous thromboembolism, pulmonary embolism, intracardiac thrombus, and ischemic stroke, are reported in "Long COVID". Notably, thrombosis is found more common than bleeding. The mechanisms of these events are due to hyperinflammatory and hypercoagulable state [19].

## Endocrine sequelae

Diabetic ketoacidosis has been found after the resolution of COVID-19, though no history of diabetes mellitus. Subacute thyroiditis and thyrotoxicosis has also been reported. Diagnosis of Hashimoto thyroiditis or Graves' disease has been recognized. The possible mechanisms of endocrine sequelae are direct viral injury, immunological and inflammatory damage [7].

## Renal sequelae

Acute kidney injury can occur in 5-30% of COVID-19 cases depending on varying degree of severity. Approximately 35% of patients at 6 months show decreasing in estimated glomerular filtration rate (eGFR). The possible mechanism may be thrombi in the renal microcirculation that potentially contribute to the renal injury [7].

## Gastrointestinal sequelae

Significant symptoms in gastrointestinal and hepatobiliary systems have been reported, such as post-infectious irritable bowel syndrome and dyspepsia. The changes in gut microbiota have also been recognized. Specifically, *Faecalibacterium prausnitzii*, which is a butyrate-producing anaerobe associated with normal health, has been found to inversely correlate with disease severity [7,20].

## DIAGNOSIS

To diagnose "Long COVID", the risk factors and clinical manifestation are approached. All risk factors that lead to "Long COVID" should be identified, for example, the old age group, a severity of acute phase COVID-19, obesity, female sex, and comorbidities. However, "Long COVID" is not always related to severity of acute illness. Nowadays, diagnosis of "Long COVID" is presented when

patients do not have other medical explanations (diagnosis by exclusion) [21]. This is a process of taking history and physical examination, including investigations, as usual, such as duration of current symptoms, timing, and pre-existing diseases. Investigations that should be carried out include; complete blood count, renal and liver function tests, CRP, ferritin, thyroid function test, and chest XR. Other specific diagnostic tools might be also necessary.

## TREATMENT

The guidelines for taking care of "Long COVID" patients have three major principles of care, i.e., personalized care, multidisciplinary support, and rehabilitation. In order to cope with personalized care, self-management of the symptoms with the appropriate support is led by medical doctor who has relevant skills and experience. A multidisciplinary support team includes psychological and psychiatric aspects of management. Healthcare professionals should also be involved in this team, such as expert in treating fatigue, and other symptoms. Physiotherapist, including speech and language therapists should support the rehabilitation team. Minor symptoms, such as cough, pain, and myalgia, can be supportive and symptomatic treatment. To date, three pathways for treating of "Long COVID" and hospitalization, depending on the severity of acute COVID-19, have been proposed [8]:

1. **Those who had never admitted with acute illness:** In this case, the general practitioner can conduct the holistic assessment and care.
2. **Those who needed hospitalization with acute illness:** In this case, patients should undergo a 12-week post discharge assessment, which include chest XR. If chest XR is normal, and no more symptoms, patients can be discharged. Follow up and evaluation are needed to be done before 12 weeks. Because the symptoms can usually be resolved by 12 weeks.
3. **Those with acute illness who was in Intensive Care Unit (ICU):** In this case, patients should undergo a post multidisciplinary clinic assessment at 4-6 weeks post discharge. If better, follow up as the other hospitalized ones is recommended. However, the frequency and duration of follow up is not exactly defined at this time.

## CONCLUSION AND FUTURE PERSPECTIVE

After the acute illness of COVID-19, the multiorgan manifestations are detected, named as "Long COVID". The symptoms involve in various systems, such as pulmonary, cardiovascular, neuropsychiatric, renal,

gastrointestinal, and endocrine systems. Though some mechanisms of these symptoms from "Long COVID" have been proposed, however, many mechanisms still cannot be elucidated. It is the challenge for the healthcare team to integrate all the knowledge and discipline for the improvement of taking care of patients in this group in the future.

**Conflicts of Interest:** Declare of no conflict of interest

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# Ultrasound-guided Percutaneous Catheter Drainage in Liver Abscesses

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**Objectives:** To study the outcome and effectiveness of ultrasound-guided percutaneous catheter drainage in liver abscess.

**Materials and Methods:** This prospective study was conducted from 2017 to 2018. A total of 33 patients with liver abscess were treated with this method. Ultrasound and CT abdomen were done after clinical assessment for the initial size and localization of the abscess cavity. The percutaneous drainage with a 12-Fr pigtail catheter was done with the “trocar and cannula” method. Then, the cavity size was assessed every 2 days by the ultrasound. After removal of the catheter, the patients were assessed with ultrasound at the 2<sup>nd</sup> and 4<sup>th</sup> weeks. Hospital stay, cavity size reduction, and outcomes were studied.

**Results:** The study showed that patients were mainly aged between 31 and 40 (21.2%). Most patients were males (78.8%). In this study, amoebic abscess patients started to gain a 50% reduction in abscess cavity size after drainage at 4–28 days (11.45 days±7.46) whereas pyogenic abscess patients started at 6–28 days (12 days±10.71). The amoebic liver abscess group showed 2–9 days of hospital stay (4.45 days±1.79). Patients with pyogenic abscess had 3–6 days of hospital stay (4.75 days±1.5). One patient experienced localized peritonitis (3.4%) and 1 patient encountered a blocked catheter (3.4%).

**Conclusion:** This study highlighted Myanmar’s clinical data of liver abscess and the results and outcomes of the percutaneous catheter drainage method for liver abscess treatment. Although this was a small sample size study, this method showed rapid improvement and good clinical outcomes.

**Keywords:** Liver abscess, PCD Percutaneous catheter drainage, Pigtail catheter, Ultrasound-guided

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## INTRODUCTION

Liver abscess has been recognized since the time of Hippocrates (400 B.C). Because of its non-specific clinical features, relatively stable overall incidence and high morbidity and mortality if left untreated, it remains a formidable diagnostic and therapeutic problem [1].

Liver abscess is a common clinical problem in tropical countries and is most commonly caused by pyogenic, amoebic or mixed infections. Although the primary mode of treatment of amoebic liver abscess is medical, 15% of amoebic abscesses may be refractory to medical therapy. Also, secondary bacterial infection may

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complicate up to 20% of amoebic liver abscesses and hence drainage may be required in many patients with amoebic liver abscesses [2].

In patients with pyogenic and amoebic liver abscesses, a surgical drainage has been the traditional mode of treatment. However, the operative drainage is associated with significant (13%) mortality [3]. Over the last two decades, outcomes in patients presenting with liver abscess have improved as a result of advances in radiological diagnosis and percutaneous treatment options [4]. Currently, patients are treated with antibiotics along with percutaneous needle aspiration or percutaneous catheter drainage and surgical drainage is used only in patients who fail to respond to such treatment. Antibiotic therapy has also improved, but the principal advance in the management of hepatic abscess has been the application of percutaneous aspiration technique for diagnosis and treatment [5].

In Myanmar, the liver abscess is one of the most common problems in our surgical practice. Regarding admission data from three hospitals in Yangon (North Okkalapa Teaching and General Hospital, Thingangyun Sanpya General Hospital and Insein General Hospital), there were 130 cases of liver abscess admitted in 2013, 104 cases of liver abscess admitted in 2014 and recently 102 cases admitted in 2016 (Hospital admission data from North Okkalapa General and Teaching Hospital, Thingangyun Sanpya General Hospital and Insein General Hospital).

Generally, the choice of treatment and decision for drainage of the pus depend upon the site, size and number of abscess and complication developed. One randomized comparative study regarding two methods of percutaneous treatment was done at Mandalay General Hospital and submitted to University of Medicine, Mandalay [6]. With 50 randomized patients, the success rate in that study was 100% in both groups (needle aspiration group and percutaneous catheter drainage group). The catheter used in the percutaneous catheter group of this Mandalay study [6] was JMS infusion set with side holes (1 cm apart) and the method was 12-Fr trocar and cannula method for drainage. Another study regarding the outcome of ultrasound-guided indwelling catheter drainage of liver abscess was done in 2004 by Dr. Win Kyaw at University of Medicine – 1, Yangon [7]. Success rate was 100% with the treatment of ultrasound-guided indwelling catheter drainage in 48 patients with liver abscess. The catheter used in Dr. Win Kyaw study [7] was 7-Fr and the insertion method was Seldinger's technique with guide wire.

A meta-analysis compared the effectiveness of percutaneous needle aspiration and percutaneous

catheter drainage in the management of liver abscesses. It showed that percutaneous catheter drainage was more effective than needle aspiration. PCD is more effective than PNA because it facilitates a higher success rate, reduces the time required to achieve clinical relief and supports a 50% reduction in abscess cavity size [8].

Since 2004, there was no clinical data on percutaneous interventional treatment of liver abscess in Myanmar as the interventional radiology and real-time imaging methods are advancing more and more. With the availability of 12-Fr pigtail catheters on the Myanmar market, this study was done to evaluate the clinical data, outcomes, and effectiveness of ultrasound-guided percutaneous catheter drainage for treating liver abscesses in three general hospitals (secondary and tertiary levels) from Yangon, Myanmar.

## MATERIALS AND METHODS

### ***Study design, Study population and Study period***

This study was a hospital based prospective study done within one year period after approval from ethical review committee of University of Medicine – 2, Yangon. Total patients of 33 from the surgical unit 1, unit 2 and unit 3 of North Okkalapa Teaching and General Hospital, surgical ward of Insein General Hospital and surgical ward of Thingangyun Sanpya General Hospital were enrolled for the study.

### ***Sample size calculation***

All liver abscesses admitted to three hospitals were included in the study. According to hospitals admission data from three hospitals, during 2016, liver abscess patients admitted to three hospitals were 102 and patients with liver abscess more than 5 cm in diameter was 87.

To check sample size adequacy, sample size determination by using proportion of success cases of liver abscess was computed from the study conducted in 2015 [8].

The following formula used to check the sample size.

$$n = \frac{Nz^2p(1-p)}{d^2(N-1)+z^2p(1-p)} \text{ (Daniel \& Cross, 2013) [9]}$$

According to the study done by Yu-Long Cai et al (2015) [8]

p = Proportion of success rate of percutaneous catheter drainage in patients with liver abscess (97%)

z = Standard normal distribution of alpha ( $\alpha = 0.05$ ,  $z = 1.96$ )

d = Absolute precision = 0.05

N = Average available population size of patients with liver abscess more than 5 cm in diameter = 87 (Hospital record, 2016)

n = Minimum required sample size = 30

Therefore, minimum required sample size = 30

Adding drop-out rate 10% =  $30 + 3 = 33$

Although an overall sample size required is 30, this is increased by 10% because there will be loss to follow up. The actual sample size required, therefore, becomes 33.

Sample size of at least 33 was needed for the study which was below the total patient with liver abscess who were admitted to three hospitals previous year.

### ***Sampling procedure***

The patients were examined by duty medical officers at the emergency department and outpatient department. The diagnosis of liver abscess was made clinically through history and physical examination and the diagnosis was confirmed by ultrasonographic examination. If the patients were within the inclusion criteria and no exclusion criteria, they were asked whether they want to participate in the study. CT abdomen was also requested. Those patients will be re-examined by the investigator after patients agreed to participate in the study to avoid the patient selection bias.

### ***Inclusion and Exclusion criteria***

All patients with liver abscess more than 5 cm were included. Hemodynamically unstable patients, patients with coagulopathy, technically difficult assess areas of liver abscess; abscess cavity with septations and multiple liver abscess, recurrent bacterial cholangitis and malignant disease of liver were excluded.

### ***Method of drainage***

A 12-Fr pigtail catheter was introduced into the abscess cavity by using the "Trocarn and Cannula" method. Under aseptic conditions and local anesthesia (1% lignocaine), diagnostic aspiration was first done to confirm pus and cavity and pus was sent to pathology (see Figure 1). This indicates depth and direction to assess liver abscess. Skin incision was made with No.11 blade. A 12-French Trocarn and cannula were inserted through the skin incision to abscess cavity under real-time ultrasound guidance. Pus was flushed out through the cannula when trocar was removed. The catheter (12-French pigtail) was introduced into the abscess cavity through the cannula (see Figure 2). The cannula was removed after positioning the pigtail catheter. Aspiration was performed with the catheter till no pus from the

catheter. Abscess cavity was then irrigated with normal saline (0.9% sodium chloride). The catheter was secured to the skin with a 2-0 silk suture. The catheter was connected to a sterile collecting bag. And then, sterile dressing was applied over the catheter.

Immediately after procedure, the patients were kept under observation to detect any complications (see Figure 3). The followings were noted: Amount of pus aspirated (ml), color of pus (anchovy/yellow/other), and odor (foul smelling or not), thickness of pus (thick/thin), number of percutaneous catheters drain and duration of catheter drainage (days).

A sample of pus was routinely taken and sent for gram stain, culture, and antibiotic sensitivity test. The patients were assessed daily for clinical improvement and daily catheter output (ml in 24 hours) until they were discharged from the hospital. Patient outcomes, including the duration of hospital stay, procedure-related complications, treatment failure and death were recorded. Ultrasound examinations were done every two days during admission and at follow up to monitor the cavity size and complications of percutaneous treatment.

The catheter was removed when the patient is clinically improved, when the catheter output become serous or less than 10ml in 24 hours and reduced in size or collapse of the abscess cavity without any residual pus by ultrasound. All the patients were followed up and assessed clinically and by ultrasound imaging in the outpatient clinic for complications of percutaneous treatment and recurrence liver abscesses at two weeks and one month.

### ***Outcomes and definitions***

In this study, the following working definitions were used according to Kyaw Win Aung study [6]. Liver abscess is defined as a collection of infected fluid or pus in the liver. Percutaneous catheter drainage is defined as the placement of a catheter within the fluid collection followed by continuous drainage over time. A single abscess is diagnosed when there was one abscess area in the liver by ultrasonography or CT scan. Multiple abscesses are diagnosed when there was more than one abscess area in the liver by ultrasonography or CT scan. The patients will be discharged from the hospital when the infection has subsided clinically and there is sonographic evidence of abscess resolution such as disappearance of abscess cavity or static or decrease in size of the abscess cavity. Hospital stay is defined as duration of hospital admission after 1st time of percutaneous treatment. Mortality is defined as death within 30 days of treatment. Percutaneous drainage is considered to have failed if no improvement occurs if the

condition worsens within 72 hours of drainage or blockage of catheter drained. The criterion of successful percutaneous intervention is defined as adequate drainage of abscess to allow resolution of infection without the need for surgical drainage and with subsequent discharge of patient from the hospital.

### Data analysis

Data management was checked by completeness, error, and inconsistencies prior to data entry. Data entry and analysis were done by SPSS 23 (Statistical package of social science) statistical software version 23. For the categorical data, number and percentage were calculated.

### Ethical consideration

This was the hospital based comparative study of needle aspiration and percutaneous catheter drainage in liver abscess involving human subjects – patients with liver abscesses. The research protocol was submitted to the Academic Board and Ethics Review Committee of University of Medicine (2), Yangon and it was carried out only after getting approval of the Ethic Review Committee on 23rd June 2017.

All eligible participants according to the selection criteria for this study had the chance to participate in this study. They were thoroughly explained in detail about the research by the investigator with information sheet. Only after they have fully understood the nature of the study including aim and objectives, methodology, procedures, duration, risks, and benefits, they were invited to take part in the study. The participants were fully informed that the research data was used and published for the academic purposes - only in dissertation papers, in medical seminars and medical journals. The investigator strictly maintained the rules of privacy and confidentiality. The history taking, examination and the research works were done in places with proper privacy. No names were mentioned in this study. Only coded system was used, and research information was kept by a password-protected file in the investigator's personal computer. If they agree, the written informed consent was obtained.

The participation in the research was voluntary. The participants had the right to refuse to take part in the study and withdraw at any time from the study. There were acceptable risks to the participants for taking part in this study because both methods were standard treatments and with the benefits of rapid recovery or cure.

The participants were closely monitored throughout the research process. If any adverse reactions occurred,

the urgent treatment was given, and the necessary actions were taken according to the standard treatment procedure. No money, any forms of incentives and material goods were supplied to the participants by the investigator for taking part in this study.

## RESULTS

In this study, total patients of 33 enrolled and there were no drop-out patients throughout the study. Most of the patients were age between 31 and 40 years (8 patients, 24.2%) followed by age between 41 and 50 years (7 patients, 21.2%). The mean age of the patients was 46.21 years ( $\pm 16.46$ ). Out of 33 patients with liver abscess, 26 patients (78.8%) of the patients were male and the rest 7 patients (21.2%) were female. On ultrasound findings, liver abscess was found at right side in 31 patients (93.9%) and at left side in 2 patients (6.1%). Most of the patients got aspiration of pus amount of >500 ml (9 patients, 27.3%) followed by pus amount of 151-200 ml (7 patients, 21.2%). The mean pus amount of the patients was 394.24 ml.

**Table 1.** Age and Gender distribution of the study population.

Age	Number	Percentage
Age group		
21 – 30	6	18.2
31 – 40	8	24.2
41 – 50	7	21.2
51 – 60	4	12.1
61 – 70	4	12.1
>70	4	12.1
Age (years±SD, Min, Max)	46.21 ± 16.46, 25, 87	
Gender		
Male	26	78.8
Female	7	21.2

Out of 33 patients with liver abscess, 29 patients (87.88%) were sterile in pus culture. The rest 4 patients were 3 patients with *E. coli* (9.09%) and 1 patient with *Pseudomonas* species (3.03%). All the patients with amoebic liver abscess had 2-9 days of hospital stays (4.45 days  $\pm$  1.79) whereas those with pyogenic liver abscess had 3-6 days of hospital stays (4.75 days  $\pm$  1.5). Most of the patients with amoebic liver abscess had 50% reduction in abscess cavity after catheter drainage at day 6 whereas those with pyogenic liver abscess had also 50% reduction in abscess cavity after catheter drainage

at day 6. All the patients with amoebic liver abscess had 50% reduction in abscess cavity after catheter drainage at 4 – 28 days of hospital stays (11.45 days  $\pm$  7.46) whereas those with pyogenic liver abscess had 50% reduction in abscess cavity after catheter drainage at 6 – 28 days of hospital stays (12 days  $\pm$  10.71).

All patients with pyogenic liver abscess were discharged and cured. Out of 29 patients with amoebic liver abscess, 27 patients were discharged and cured (93.1%), 1 patient showed signs of localized peritonitis (3.4%) and 1 patient encountered with blocked catheter (3.4%). There was no mortality in both pyogenic and amoebic liver abscess.

**Table 2.** Outcome of percutaneous catheter drainage.

	Pyogenic Liver Abscess		Amoebic Liver Abscess	
	No.	Percent	No.	Percent
<b>Discharge and Cured</b>	4	100.0%	27	93.1%
<b>Complications (Peritonitis)</b>	0	0.0%	1	3.4%
<b>Blocked Catheter</b>	0	0.0%	1	3.4%
<b>Mortality</b>	0	0.0%	0	0.0%
<b>Total</b>	4	100.0%	29	100.0%

## DISCUSSION

In a developing country like Myanmar, liver abscess is still a common problem in surgical wards. In recent years, there were changing trends in the treatment of liver abscess. Image guided percutaneous treatment methods have replaced the routine surgical intervention as a primary treatment for liver abscesses.

In general, the surgical drainage has been reserved for patients who fail to respond to treatment with percutaneous drainage and antibiotics or ruptured abscess cavity or who have concurrent intra-abdominal pathology which requires surgical management. Combination therapy with percutaneous drainage and antibiotics is indicated when the abscess is large and accessible [10].

In this study, age distribution of liver abscess showed that 24 percent of the study population was between 31 and 40 years. Second most common age group was between 41 and 50 years. Mean age of liver abscess patients in this study was 46 years. Regarding with the previous interventional studies of liver abscess in

Myanmar, Win-Kyaw study [7] described that the peak age incidence was 30-39years age group for amoebic liver abscess and 40-49 years age group for pyogenic liver abscess. Another Myanmar study, Kyaw-Win-Aung [6], stated that the mean age incidence of liver abscess was 40 years for liver abscess patients in Myanmar.

Gender distribution of this study showed male patients (78.8 %) and female patients (21.2%). Ultrasound examination showed that abscess cavities were located at the right lobe of liver in 93.9% of patients in this study. These findings were also similar with previous Myanmar studies of liver abscess.

After imaging study with ultrasound, most of the liver abscesses were more than 500 ml (9 patients, 27.3%). The largest one in this study was 1800ml. In this study, maximum hospital stay after catheter drainage was 9 days for amoebic liver abscess and 6 days for pyogenic liver abscess. Previous study showed that the durations were 10-16 days for amoebic liver abscess and 11-15 days for pyogenic liver abscess [7]. His study did not mention whether it was the total length of hospital stay or days after catheter drainage. The study done in Mandalay region showed that duration of catheter drainage ranged from 4-7 days [6].

Patients were discharged after catheter removal in this study. No patients with catheter in situ were discharged. All the patients were treated with systemic antibiotic first before catheter drainage and so, clinically stable at the time of catheter drainage and after catheter removal. Patients with pyogenic liver abscess in this study were smaller cavity size than amoebic liver abscess before intervention and resolved faster than amoebic patients.

Out of 33 patients with liver abscess, 29 patients (87.88%) were sterile in pus culture. Three patients showed *E. coli* (9.09%) in culture and 1 patient with *Pseudomonas* species (3.03%).

Abscess cavity size was assessed for 50% reduction of cavity size. In pyogenic liver abscess, out of 4 patients, 2 patients gained the 50% reduction of cavity size at day 6 after catheter drainage. The rest showed cavity size reduction after that. Most of the patients with amoebic liver abscess also had 50% reduction in abscess cavity after catheter drainage at day 6. This study showed that amoebic liver abscess resolved 50 percent of cavity size within 4-28 days. Pyogenic liver abscess resolved 50 percent of its cavity size within 6-28 days after catheter drainage.

The outcome of this study was assessed with discharge from hospital, complications, and mortality. There was no mortality in this study. In this study, 31 patients were discharged and cured without

complications. One patient showed signs of localized peritonitis after catheter drainage and recovered with systemic antibiotics treatment and saline irrigation of abscess cavity. Another patient encountered blockage of catheter one day after insertion of catheter due to thick viscid nature of the pus and sludge from abscess cavity wall. Flushing with normal saline and ultrasound guided recheck of catheter position was done and these treatments solved the blockage. But none of these patients' hospital stay were prolonged and no complications at follow-up ultrasound examinations.

Serial ultrasound assessments were done to all patients every 2 days during catheter drainage and every 2 weeks for 1 month after discharge for response to treatment. Sonographic resolution of an abscess cavity following the procedure may occur at any time between 2 weeks to 4 months [11, 12].

Sumit Kapadia study showed small residual cavities may persist indefinitely and 40 percent of his patients had small residual cavities (<2 cm) at 3-month follow-up [13]. In Win-Kyaw study, most of the lesion disappeared on ultrasound examination at the end of third month in Myanmar patients [7].

The problems of failure in pigtail catheter drainage were reported by earlier studies [14, 15]. The causes were due to thick and viscid pus which cannot be easily drained by percutaneous catheter or early premature removal of the catheter. These problems can be avoided by using adequate size pigtail catheter depending on the viscosity of pus (5 Fr. to 12 Fr.) and following a strict protocol for flushing and removal. In this study, 12-Fr. pigtail catheter was used for all cases of liver abscesses. Another important factor for pigtail catheter drainage in Myanmar was the cost of the pigtail catheter. However, the advantages of the percutaneous drainage make the cost for the patient or for the hospital justifiable and cost-effective.

## CONCLUSION

Changing trends of treatment in liver abscess are directed towards less invasive methods like percutaneous catheter drainage and needle aspiration and medical treatments. Moreover, easy availability of image guided treatment and serial monitoring and check-ups with ultrasonography also improve the treatment and outcome of liver abscess.

This study highlighted the prevalence of age, gender, clinical data and results of liver abscess and outcomes and complications of percutaneous catheter drainage method. Although this was a small sample size study with short duration, it showed rapid improvement

of percutaneous catheter drainage methods like 50 percent reduction in cavity size and hospital stays after catheter drainage.

As one of the less invasive methods, percutaneous catheter drainage has its own risks which need precautions. This study also highlighted these precautions to consider for further studies of liver abscess treatments. However, percutaneous catheter drainage method was not a cost-free method for the treatment of liver abscess. The cost of pigtail catheter and instruments were needed to consider for the patients of a developing country like Myanmar. But this study may suggest the cost-effectiveness of the percutaneous catheter drainage and duration of hospital stay in the treatment of liver abscess.

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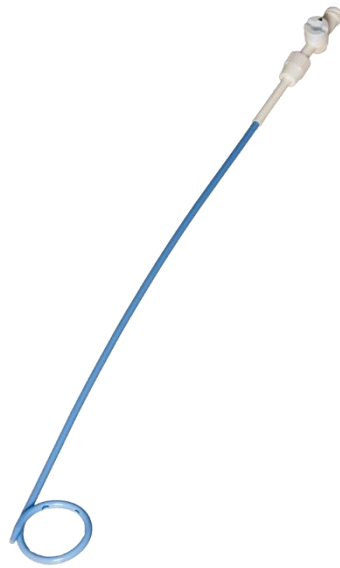
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**Figure 1.** Initial diagnostic needle aspiration to confirm pus and cavity depth



**Figure 2.** Pigtail Catheter used for liver abscess drainage



**Figure 3.** Pigtail catheter inserted into the liver abscess cavity

# Knowledge and Attitude towards Transfusion Transmissible Infections among New Blood Donors at Blood Bank of Mandalay General Hospital in Myanmar

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**Objectives:** To study the level of knowledge and attitude towards transfusion transmissible infections among new blood donors at blood bank of Mandalay general hospital in Myanmar.

**Materials and Methods:** From April 1<sup>st</sup> to December 31<sup>st</sup>, 2016, a cross-sectional descriptive study was conducted among 406 new blood donors at blood bank of Mandalay general hospital in Myanmar. Participants in this study were interviewed using structured questionnaires. Stata 13 was used to conduct the statistical analysis.

**Results:** About 53.7% of new blood donors were males and 46.3% were females. Regarding knowledge level, a high percentage of new blood donors (87.7%) had low knowledge of transfusion transmissible infections, while 12.3% had high knowledge. Almost all new blood donors (98.5%) had a positive attitude, with only a few (1.5%) having a negative attitude.

**Conclusion:** Despite a high percentage of low knowledge among new blood donors at blood bank of Mandalay General Hospital in Myanmar, there was a positive attitude towards transfusion transmissible infections. A positive attitude can result from adequate knowledge, which can lead to good practices. It is recommended that the community be educated on the prevention of transfusion transmissible infections and safe blood transfusion.


**Keywords:** Attitude, Blood bank, Knowledge, New blood donor, Transfusion transmissible infections

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## INTRODUCTION

A blood transfusion can help save a person's life. Humans have long recognized blood as a "vital force and essence of life", as evidenced by the study and interest in blood knowledge [1-3]. If a person has certain medical conditions or has lost blood as a result of an injury or

during surgery, he or she may require a blood transfusion. A healthy person (a donor) provides blood, blood components, or blood products, which are then administered to the patient being treated in a medical procedure known as a blood transfusion. Unsafe transfusion, on the other hand, leads to several life-

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threatening complications and increases the incidence of transfusion-transmitted infections (TTIs) [4,5].

Infections transmitted through blood transfusions are a major source of concern for safety of the patients. The occurrence of the TTIs varies by country, depending on the TTIs load in the population from which blood units are sourced [6]. Because the infected person serves as a reservoir for the infection and can transmit the disease while asymptomatic, transfusion transmissible infectious diseases have long-term consequences for recipients, families, and communities [7]. TTIs are a significant modern medical care burden in Myanmar, but the precise burden is unknown due to a lack of data, a lack of awareness, the high cost of screening tests, limited access to a health facility, the absence of a surveillance system, and the presence of asymptomatic people.

Raising awareness and fostering a positive attitude toward blood donation are priorities for all blood transfusion centers. Comprehensive studies that measure the community's present level of awareness, knowledge, beliefs, and attitude towards blood donation should be conducted as the first step to achieving these goals [8]. This present study aimed to investigate the level of knowledge and attitude towards TTIs among new blood donors at blood bank of Mandalay General Hospital (MGH) in Myanmar.

## **MATERIALS AND METHODS**

### ***Study design, Study population and Study period***

A cross-sectional descriptive study design was used for this study. The population of the study were new blood donors who came to blood bank at MGH for donation of blood. The blood bank of MGH was purposefully chosen due to an annual demand of 180,000 units of blood and being one of Myanmar's largest national blood banks [9]. Mandalay General Hospital is a 1,500-bed tertiary hospital in the upper region of Myanmar with a wide range of specialties.

This study was conducted in 2016 from April 1<sup>st</sup> to December 31<sup>st</sup>. The Epi-info version of the statistical software was used to determine the sample size, and the calculated sample size after a 10% drop out was 406. The inclusion criteria were new blood donors between the ages of 18 and 55, those who were declined to donate during the first stage screening process, and those whose immediate post-donation health status was excluded from this study.

### ***Research Instrument***

The questionnaire in this study was structured and consisted of four parts: 1) socio-demographic characteristics (five questions), 2) blood group and types of donations 3) knowledge on TTIs, 4) attitude towards TTIs. There are six questions in the knowledge on TTIs (awareness of TTIs with two items, source of knowledge with five items, name of TTIs with four items, mode of transmission with eight items, methods of prevention with seven items), and the majority of these questions used "Yes/No" answers. The scores were then summed and divided into two groups: low knowledge and high knowledge. There are 11 questions in the attitude towards TTIs section, with both positive and negative statements. For positive statements, the score was assigned as "strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5)", while for negative statements, the scoring was reversed. In terms of attitude towards transfusion transmissible infections, there are seven positive statements and four negative statements. The scores were then summed and divided into two groups: positive attitude and negative attitude.

### ***Data collection procedure***

The permission to collect data at blood bank of MGH was initially requested and granted by the Ministry of Health and Sport, as well as hospital administrators. In this study, a sample of 406 new blood donors who came for blood donations at MGH's blood bank was chosen using simple random sampling. One research assistant was hired and trained prior to data collection on how to build rapport and collect data. The researcher and research assistant collected data in person every weekday because blood donors are only permitted to donate blood at blood bank of MGH from Monday to Friday. Participants were informed about the study's objectives and benefits, as well as their anonymity, confidentiality, and the ability to withdraw from the interview at any time before the data collection process. They have also been informed that there would be no risk or harm in taking part or refusing to take part in this study.

### ***Data processing and analysis***

All questionnaires were kept in a drawer with a lock the same day they were collected, and only the researcher had access to these data. Data entry was done by using Epi data software. Stata version 13 was used to perform statistical analysis. Frequency and percentages were interpreted for all categorical variables.

## RESULTS

### *Socio-demographic characteristics of new blood donors*

**Table 1.** Socio-demographic (SD) characteristics of new blood donors.

Characteristics (n=406)	Frequency (n)	Percentage (%)
<b>Age group (years)</b>		
<20	215	52.9
21 – 30	145	35.7
31 – 40	32	7.9
41 – 50	13	3.2
51 – 55	1	0.3
<b>Gender</b>		
Male	218	53.7
Female	188	46.3
<b>Marital Status</b>		
Single	342	84.2
Married	60	14.8
Widowed/Divorced	4	1.0
<b>Education</b>		
Primary School	9	2.2
Middle School	78	19.2
High School	319	78.6
<b>Occupation</b>		
Government employee	20	4.9
Private employee	107	26.4
Own business	41	10.1
Student	226	55.7
Dependent	12	3.0

Table 1 shows socio-demographic characteristics of new blood donors. This present study included 406 new blood donors, 53.7% of whom were male and 46.3% of whom were female. More than half of the new blood donors (52.9%) were under the age of 20, with 35.7% being between the ages of 21 and 30, 7.9% being between the ages of 31 and 40, 3.2% being between the ages of 41 and 50, and 0.3% being between the ages of 51 and 55. As for education, about 78.6% of new blood donors completed high school. In terms of marital status, about 84.2% of new blood donors were single, 14.8% were married, and 1.0% were divorced/widowed. Regarding occupation, more than half of the new blood

donors (55.7%) were students, while 26.4% were private employees, 4.9% were government employees, 10.1% owned their own businesses, and 3.0% were dependent.

**Table 2.** Blood group and types of donations by new blood donors.

Blood group and types of donations (n=406)	Frequency (n)	Percentage (%)
<b>Blood group</b>		
A	95	23.4
B	138	33.9
AB	36	8.9
O	137	33.8
<b>Types of Blood donations</b>		
Voluntary	367	90.4
Replacement	39	9.6

Table 2 shows blood group and types of donations by new blood donors. Among 460 new blood donors, about 33.9% were blood group B, followed by 33.8% ("blood group O"), 23.4% ("blood group A"), and 8.9% ("blood group AB"). A large proportion (90.4%) volunteered for donation, while 9.6% were as replacement among new blood donors.

### *Knowledge on TTIs*

Table 3 shows total knowledge level of new blood donors regarding TTIs. A high percentage of new blood donors had low knowledge (87.7%) while 12.3% of new blood donors had high knowledge regarding TTIs.

**Table 3.** Knowledge and Attitude levels towards TTIs.

Levels	Frequency (n)	Percentage (%)
<b>Knowledge</b>		
High	50	12.3
Low	356	87.7
<b>Attitude</b>		
Positive	400	98.5
Negative	6	1.5

### *Attitude towards TTIs*

Table 3 shows attitude level towards TTIs of new blood donors. Almost all new blood donors (98.5%) had a positive attitude towards TTIs, while only a few new blood donors (1.5%) had a negative attitude.



**Table 4.** Detailed attitude towards TTIs.

Detailed Attitude towards TTIs (n=406)	Frequency (Percentage)				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
HIV, Viral Hepatitis B, Hepatitis C, and Syphilis cannot infect those who have only been promiscuous once*	234 (57.6)	63 (15.5)	28 (6.9)	18 (4.4)	63 (15.5)
It is important to use a condom for promiscuity	2 (0.5)	4 (0.9)	15 (3.7)	70 (17.2)	315 (77.6)
It is not necessary to avoid tattooing to prevent TTIs*	212 (52.2)	61 (15)	33 (8.1)	27 (6.7)	73 (17.9)
It is necessary to vaccinate against Viral Hepatitis B	9 (2.2)	12 (2.9)	18 (4.4)	66 (16.3)	301 (74.1)
Even my spouse has viral Hepatitis B or C, and if I don't have either of those or it is necessary to donate blood, I will do so*	111 (27.3)	56 (13.8)	27 (6.7)	43 (10.6)	169 (41.6)
It is needed to have safe blood for blood donation	4 (0.9)	4 (0.9)	1 (0.3)	57 (14.0)	340 (83.7)
It is necessary to remind anyone infected with Syphilis, HIV, or Hepatitis B or C not to donate blood	16 (3.9)	4 (0.9)	8 (1.9)	77 (19.0)	301 (74.1)
It is necessary to notify the blood bank if anyone has HIV, Hepatitis B, or Hepatitis C and has donated blood	14 (3.5)	9 (2.2)	25 (6.2)	66 (16.3)	292 (71.9)
Before making a blood donation, anyone must answer all of the questions for the blood donor	9 (2.2)	4 (0.9)	4 (0.9)	63 (15.5)	326 (80.3)
Any blood donor can donate blood if they do not answer all of the questions asked of them prior to donating blood*	214 (52.7)	51 (12.6)	12 (3.0)	32 (7.9)	97 (23.9)
It is necessary to come and see the test results after donating blood	16 (3.9)	13 (3.2)	1 (0.3)	57 (14.0)	319 (78.6)

\* Negative Statement

A detailed attitude towards TTIs is described in table 4. More than half of new blood donors answered "strongly disagree" with the following negative statements: "HIV, Viral Hepatitis B, Hepatitis C, and Syphilis cannot infect those who have only been promiscuous once (57.6%)", "It is not necessary to avoid tattooing to prevent TTIs (52.2%)", and "Any blood donor can donate blood if they do not answer all of the questions asked of them prior to donating blood (52.7%)". About 41.1% of new blood donors answered

disagree (both of "strongly disagree" and "disagree") on "Even my spouse has viral Hepatitis B or C, and if I don't have either of those or it is necessary to donate blood, I will do so". A significant percentage of new blood donors (83.7%) answered "strongly agree" on "It is needed to have safe blood for blood donation".

## DISCUSSION

Over than half of new blood donors in this present study were under the age of 20 and male. Blood donors can be between the ages of 18 and 65 according to the world health organization (WHO) if they meet the required physical and hematological criteria and provide consent [10]. The present study's findings are supported by the findings of WHO and study in Iran that more male and young people in low- and middle-income countries donate more blood than in high-income countries [11, 12]. It is necessary to investigate why fewer females donate blood. In terms of marital status, this study's findings contrast with two studies conducted in Iran, which found that the preponderance of new blood donors were single and that could be due to more active status of single people, and blood donation awareness should be conducted among married couples [12, 13].

The most donated blood groups in this study were "blood group O" and "blood group B," which are supported by a Japanese study that people with "blood group O" seem to be more willing to donate blood than those with other blood groups, and an Indian study that people with "blood group B" are the most commonly blood donations group [14, 15]. These results could be explained by people's belief that individuals of all blood groups can be medically transfused with blood group "O" [14]. This result is also consistent with the finding from Ministry of Health, Philippine that a most notable blood group among blood donations is "blood group O". [16]. Regarding type of blood donation, a high percentage of voluntary type of this present study is contrast with the study in Ethiopia where there is low percentage of voluntary blood donor [17]. Due to low levels of TTIs, regular voluntary blood donors are essential for the safe transfusion and supply of blood [18]. All blood donors should be encouraged to establish blood services that are entirely voluntary.

The finding this present's study is supported by the study in Malaysia that the majority of new blood donors had low knowledge [19]. This result is inconsistent with the findings in Ethiopia, where less than half of blood donors had above-average knowledge levels [17]. The current study's findings contrast with a study in India by means of good overall knowledge among new blood donors [20]. Another study in Hong Kong found that blood donors generally have good knowledge regarding blood safety [21]. The difference between these studies could be due to the age and education background of blood donors, with those with a medical background having more knowledge on blood donation. Another reason could be a lack of health education and

awareness about blood donation in the Myanmar community.

In terms of attitude towards transfusion transmissible infections, this present study revealed a positive attitude among new blood donors, which is supported by a Nigerian study among health care workers [22]. Although the study population and geographic area are not the same in these two studies, both found a positive attitude towards blood safety. A positive attitude towards transfusion transmissible infections is critical in ensuring safe transfusion therapy. The attitude of new blood donors towards the statement that if they do not have viral Hepatitis B or C and their spouse does not have these viruses, they will donate blood if necessary revealed negative. This finding can be attributed to the low level of knowledge in this study, who should be educated and trained on safe blood donation.

This present study is the first study which was conducted among new blood donors to assess their knowledge and attitude towards TTIs in Myanmar, which could be useful for both related health authorities in developing and implementing the necessary health education and awareness program for the community, as well as researchers in conducting future research. This study only included new blood donors who came to MGH's blood bank, limitation of generalization may be occurred.

## CONCLUSION

Although a high percentage of low knowledge was found in this present study among new blood donors at blood bank of Mandalay general hospital in Myanmar, there was a positive attitude towards transfusion transmissible infections. Adequate knowledge can result in a positive attitude, which can lead to good practices. This study's findings will be extremely effective to Myanmar's Ministry of Health in developing and implementing a strategy for safe blood transfusion. It is necessary not only to establish a blood bank in the community, but also to educate the community concerning blood transfusion safety and the prevention of TTIs, because education has a significant impact on people's attitude. It is recommended to conduct more education programs aimed at raising awareness in the community.

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# Anti-hyperlipidemic Property of Cinnamon Stomachic Mixture: A Pilot Study

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**Introduction:** Cinnamon stomachic mixture, one of the Thai traditional herbal recipes, is in the National herbal drug lists in Thailand. It has long been prescribed for treating flatulence and dyspepsia. As already known, cinnamon demonstrated the potential for reducing blood lipid and glucose. In this pilot study, we investigated the anti-hyperlipidemic property of cinnamon stomachic mixture.

**Materials and methods:** The open-label, one single arm, prospective, pilot study was conducted at Ampur Muang District Primary Care Center, Prapokkloa Branch, Chanthaburi province, Ministry of Public Health, Thailand. Cinnamon stomachic mixture was produced from the GMP certified pharmaceutical company (Thongtong Osoth). The quality control was performed at Faculty of Pharmacy, Mahidol University. Subjects were recruited with specific inclusion and exclusion criteria. Blood chemistry including complete blood count were investigated for evaluation of the safety. All subjects were advised to take 2 tablespoons of the mixture after mealtime, 3 times daily for total 2 months. At the end of the first and second months, all subjects were asked to follow up with physical examination, blood chemistry tests, the same as done at the beginning. The anti-hyperlipidemic effects of the cinnamon stomachic mixture were assessed as the primary outcome.

**Results:** Based on our results, the decreasing of total blood cholesterol and triglyceride, before and after herbal recipe ingestion, was detected, but no statistical difference was observed. Other blood chemistry and complete blood count were not statistically changed. Interestingly, the statistical difference with p value = 0.034 was found in AST level, at 2 months.

**Conclusion:** Cinnamon stomachic mixture could reduce total cholesterol and triglyceride level, but not significant. The potent hepatoprotective property of cinnamon stomachic mixture is shown in this investigation. However, more clinical studies are still needed to be assure of the lipid lowering property of cinnamon stomachic mixture in patients with dyslipidemia.

**Keywords:** anti-hyperlipidemic property; Cinnamon stomachic mixture; hepatoprotective effect

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## INTRODUCTION

Cinnamon stomachic mixture, one of the Thai traditional herbal recipes, is in the National herbal drug lists in Thailand. It has long been prescribed for treating flatulence and dyspepsia. This herbal recipe is composed of several kinds of herbal plants, for example, the barks from *Cinnamomum zeylanicum*, the fruits from *Amomum verum*, the barks from *Cinnamomum bejolghota*, the dried flowers from *Syzygium aromaticum*, and the roots from *Glycyrrhiza glabra*. From all these components, *Cinnamomum zeylanicum* plays a vital role with its therapeutic active compound in this recipe. *Cinnamomum zeylanicum* (as called Cinnamon) is the plant in the genus of *Cinnamomum* which has generally two main varieties [1]. The part used in this recipe is obtained from the inner bark of this tree with cinnamaldehyde as the primary constituent, approximately 65-80%. In traditional medicine, cinnamon has the medicinal properties for digestive ailments. Other important activities include anti-inflammatory, antimicrobial, antioxidant, and antidiabetic agents [2]. *Amomum verum* is in the family of Zingiberaceae containing approximately 10% of essential oil, such as camphor, myrcene, and limonene [3]. The therapeutic properties of its fruit include antimalarial and immunomodulatory effects. *Glycyrrhiza glabra*, in the family Fabaceae, has many properties for treating various kinds of illness, such as heartburn, chronic bronchitis with intense coughing and secretion, and supporting health. The secondary metabolites of this plant root have about 20 triterpenoids and nearly 300 flavonoids, which glycyrrhizin and glycyrrhetic acid are the main components [4]. The traditional uses of *Glycyrrhiza glabra* are chronic inflammatory conditions of air passage and cough, including antiulcer activity [5]. *Cinnamomum bejolghota* is in the family of Lauraceae. The bark of this plant, containing the essential oil, alpha-terpineol, and cineole, has the medicinal properties for treating syncope, palpitation, and flatulence [6]. *Syzygium aromaticum*, known as clove, is in the family of Myrtaceae. It is used as the antioxidant and antimicrobial agents, with its therapeutic property for treating nausea and vomiting, flatulence, and bowel disorders. It is the main source of phenolic molecules [7]. As named, this cinnamon stomachic mixture is composed of *Cinnamomum zeylanicum* and *Cinnamomum bejolghota* at the proportion of 1600 mg to the total herbal weight of 4100 mg (w:w ~ 40:100).

From previous study, the cinnamon stomachic mixture is effective and safe for treating the patients with

functional dyspepsia, similar to simethicone [8]. However, the clinical research as an anti-hyperlipidemic recipe has never been studied. As already known, cinnamon demonstrated the potential for reducing blood lipid and glucose [9,10,11]. With the highest percentages of cinnamon in this recipe, we hypothesized that cinnamon stomachic mixture could reduce the blood lipid, and this prompted us to investigate the anti-hyperlipidemic property of cinnamon stomachic mixture in this pilot clinical study.

## MATERIALS AND METHODS

### **Production of cinnamon stomachic mixture**

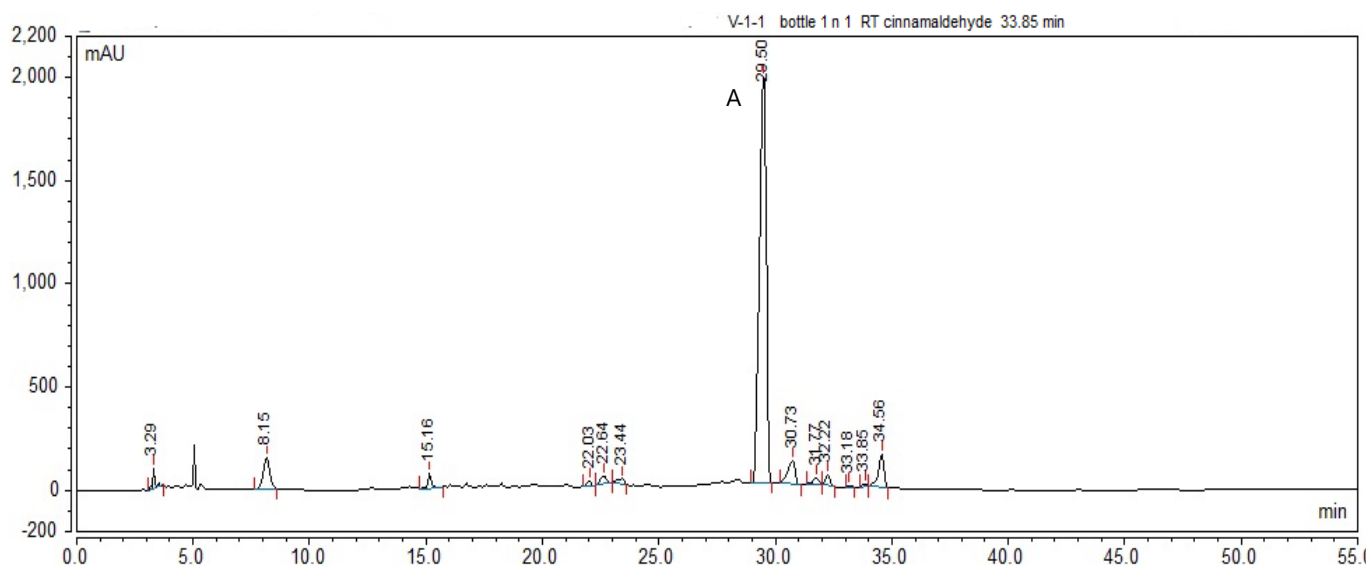
All herbal plants were purchased from a well-known Thai Herbal Pharmacy in Bangkok (Vejpongsoot), and the cinnamon stomachic mixture was produced from the GMP certified pharmaceutical company (Thongtong Osoth). The mixture was derived from 40 grams of dried cinnamon, 20 grams of *Amomum verum*, 35 grams of *Cinnamomum bejolghota*, 25 grams of *Glycyrrhiza glabra*, and others in small amount. They were boiled together in 450 ml distilled water. After boiling, the crude was got rid by passing the mixture through the clean cloth before bottling the solution into each 100 ml plastic bottle and labeling for the experiment.

### **Quality control of cinnamon stomachic mixture**

To address the chemical components and evaluate the herbal formula, high performance liquid chromatography (HPLC) was performed at Faculty of Pharmacy, Mahidol University. The herbal biomarkers used as the standard for this mixture was cinnamaldehyde. Gradient elution of 1% acetic acid in water and 1% acetic acid in acetonitrile were used in the mobile phase in this study. In addition, the heavy metal measurement and bacterial contamination of the cinnamon stomachic mixture were also performed.

### **Study designed**

This is the open-label, one single arm, prospective, pilot study which conducted at Ampur Muang District Primary Care Center, Prapokkloa Branch, Chanthaburi province, Ministry of Public Health, Thailand. All volunteers provided the written informed consent. The study was approved by the Institutional Review Board's Ethics Committee at Prapokkloa Hospital, in accordance with the Declaration of Helsinki, Good Clinical Practice guidelines, and applicable local laws. The study was approved with the NO. CTIREC 090/60.



**Figure 1.** HPLC chromatogram of cinnamon stomachic mixture. (A- cinnamaldehyde)

### **Volunteers and Treatment protocol**

The eligibility criteria for the study were: 1) age between 20-80 years of any sex; 2) fasting blood sugar less than 126 mg/dL; 3) total cholesterol level over 200 mg/dL; 4) LDL level less than 190 mg/dL; 5) Thai CV risk score less than 10; 6) urine pregnancy test negative; 7) willing to sign the informed consent. The exclusion criteria were: 1) those who are taking lipid-lowering drugs; 2) decline of renal and liver functions; 3) those who had history of allergy to herbal medicine; 4) have breast feeding; 5) continuously consuming alcohol; 6) history of recent cancer, coronary artery diseases (CAD), cerebrovascular diseases (CVD), and hepatitis.

This study was prospective, open-label, one single arm, pilot study. The total number of subjects was 18 persons in this one single arm, starting from July 2018 through October 2019. After subject was recruited in the study, physical examination was performed and blood was drawn for studying the lipid profiles (cholesterol, triglyceride, LDL, HDL), renal function test, (BUN, creatinine, eGFR), liver function test (AST, ALT, alkaline phosphatase, albumin, globulin), uric acid, urine exam, complete blood count (CBC), including urine pregnancy test for those who were in the reproductive period. All subjects were advised to take 2 tablespoons of the cinnamon stomachic mixture after mealtime, 3 times daily for total 2 months. At the end of the first and second months, all subjects were asked to follow up with physical examination, blood chemistry tests, the same as done at the beginning.

### **Outcome measurement**

The anti-hyperlipidemic effects of the cinnamon stomachic mixture were assessed as the primary outcome of this study. For the efficacy, the comparison between the first and the third lipid profiles of each volunteer was analyzed.

### **Safety and adverse events monitoring**

For safety, complete blood count and blood chemistry were evaluated before enrollment and every 4-week cycle, total for 2 times. All the adverse events were recorded, reported, and graded using the Terminology criteria for Adverse Events, version 4.0. Those with the adverse events over or equal to grade 3 were considered as severe events and had to stop the trial.

### **Statistical analysis**

Data were analyzed by descriptive statistics, mean  $\pm$  SD, Paired t-test, compared before and after treatment with cinnamon stomachic mixture. The p-value of less than 0.05 was considered statistically significant.

## **RESULTS**

### **HPLC chromatogram of cinnamon stomachic mixture**

In this study, the content of marker compound; cinnamaldehyde, in cinnamon stomachic mixture sample was quantified by High Performance Liquid Chromatography (HPLC). The result showed that the content of cinnamaldehyde was  $2.11 \pm 0.02$   $\mu$ g/ml, as demonstrated in Figure 1.

**Table 1.** Age analysis of the 18 volunteers in this study with the oldest one at 76 years old, and the youngest one at 32 years old.

Age Characteristics	Years
Mean age	50.33
Median age	50.50
Standard deviation	10.81
Minimum age	32
Maximum age	76

### Volunteer characteristics

During the study period, 18 volunteers were enrolled for participation. All volunteers strictly complied with the protocol, with no deviation. The mean age in this study is shown in Table 1. The oldest person was 76 years old, while the youngest one was 32 years old. Mean age and standard deviation were  $50.33 \pm 10.81$  years old. There were 14 females, accounting for 77.8%, and 4 males, accounting for 22.2%, recruited in this research. This data obviously exhibits the tendency that female has more frequent hyperlipidemia than male.

**Table 2.** Characteristics of 18 volunteers in this study, comparing before and after 2-month treatment.

Characteristics	Mean $\pm$ SD (before)	Mean $\pm$ SD (after)	p-value
<b>BMI</b>	26.60 $\pm$ 3.99	26.40 $\pm$ 4.35	0.353
<b>Cholesterol</b>	229.07 $\pm$ 15.31	219.21 $\pm$ 21.69	0.171
<b>Triglyceride</b>	132.86 $\pm$ 60.61	124.79 $\pm$ 42.61	0.367
<b>LDL</b>	165.74 $\pm$ 16.96	168.29 $\pm$ 25.38	0.650
<b>ALT</b>	21.86 $\pm$ 12.45	18.14 $\pm$ 7.03	0.071
<b>AST</b>	19.50 $\pm$ 5.03	17.43 $\pm$ 0.90	<b>0.034*</b>
<b>Hemoglobin</b>	13.29 $\pm$ 1.28	13.19 $\pm$ 1.16	0.646
<b>WBC</b>	7.05 $\pm$ 2.43	6.81 $\pm$ 2.24	0.343
<b>Platelet</b>	255.21 $\pm$ 26.07	255.857 $\pm$ 32.169	0.919

BMI= body mass index; cholesterol= total cholesterol; LDL=low density lipoprotein; ALT=alanine aminotransferase; AST=Aspartate transaminase; WBC=total white blood cell count

\* Significant p-value < 0.05

Table 2 demonstrated the characteristics of all volunteers in this study. Most of them had overweight and obesity, with mean BMI before and after treatment at 26.60 kg and 26.40 kg, respectively, but no statistical difference. In Thailand, BMI over 25 is considered as obesity, whereas BMI over 23 is considered as overweight. Complete blood count, including

hemoglobin, total white blood cell count (WBC), and platelet count showed no difference before and after the study. Based on our results, the decreasing of total blood cholesterol, before and after herbal recipe ingestion, was detected, but, surprisingly, no statistical difference was observed. This evidence was also occurred in triglyceride level. Interestingly, statistical difference with p-value = 0.034 was found in AST level, at 2 months. The ALT level was declined after 2-month therapy, but no difference was detected. LDL level and renal function test was not statistically changed in this study group.

### Side effects and adverse events

In this pilot study, the adverse events related to the cinnamon stomachic mixture were not detected. All physical examination and laboratory investigations of all volunteers recruited, especially liver function and renal function tests were within normal limit at the end of the study.

## DISCUSSION

This herbal recipe, cinnamon stomachic mixture, is commonly found in the market, as it is announced in the Thai National Herbal Drug Lists. It has long been used for treating flatulence and dyspepsia. However, this is the first pilot study of cinnamon stomachic mixture demonstrated as lipid lowering herbal regimen. The products used in this study had quality control by using HPLC. In HPLC, the spikes of cinnamaldehyde in this recipe are derived from *Cinnamomum zeylanicum*, and *Cinnamomum bejolghota*, respectively. The products were safe for ingestion, as we found no bacterial nor heavy metal contamination.

In terms of lipid profiles, our results showed that cinnamon stomachic mixture could decrease the total cholesterol and triglyceride level, but no statistical significance. A number of interventions on lipid profiles have been performed using cinnamon. From previous double-blind, randomized-controlled trial with two parallel groups in non-alcoholic fatty liver (NAFLD) patients taking 2 capsules of cinnamon per day, equally to 1500 mg of cinnamon, for 12 weeks could reduce blood total cholesterol, and triglyceride [12]. Significant improvement of liver function tests, such as AST, ALT, and GGT, was also recognized in this clinical trial. In fact, it showed that cinnamon could be effective in improving NAFLD characteristics, as well. Other research group performed the phase I clinical trial evaluated for the efficacy and safety of cinnamon. Their results demonstrated no significant side effects and toxicities, similar to our study. In addition, they also revealed the

beneficial anti-hyperlipidemic and blood pressure lowering effects of cinnamon among healthy adults [13]. The effects of cinnamon consumption on lipid profile in patients with T2DM were also investigated. After 3 grams per day of cinnamon for 8 weeks, the levels of fasting blood glucose, HbA1c, triglyceride, weight, BMI, and body fat mass decreased significantly compared to baseline, but not in placebo group [14]. Moreover, from a systemic review and meta-analysis, the effects of cinnamon supplementation significantly reduced blood triglycerides and total cholesterol concentrations without any significant effect on LDL and HDL [15]. Quite similar results on lipid lowering effects were also obtained and reported in another research group [16]. The possible mechanism of cinnamon reducing lipid profiles might be from cinnamate, a phenolic compound found in the inner bark of cinnamon. This compound lowers cholesterol level in high fat fed rats by inhibiting hepatic HMG Co-A reductase activity. It can also suppress lipid peroxidation by enhancement of hepatic antioxidant enzyme activity [17]. As known, HMG Co-A reductase is an enzyme that regulates the cholesterol biosynthetic pathway. Thus, inhibition of this enzyme can reduce blood cholesterol level [18].

In addition, liver enzyme, especially AST, was significantly reduced with p value at 0.034, comparing to ALT with p value at 0.071. This hepatoprotective result is similar to previous reports. The cinnamon extract reduced the toxicity of CCl<sub>4</sub> and preserved the hepatic tissue in rats [19]. As mentioned earlier, significant improvement of liver enzyme, such as AST, ALT, and GGT was seen in patients taking 1500 mg of cinnamon for 12 weeks [12]. This hepatoprotective property might come from the antioxidant activity of the cinnamon [20].

## CONCLUSION

The ability of cinnamon in reducing blood sugar is well-known, however, the lipid lowering property of cinnamon is needed to be investigated. Based on our report, cinnamon stomachic mixture could reduce total cholesterol and triglyceride level, but not significant. The potent hepatoprotective property of cinnamon stomachic mixture is shown in this investigation. However, more clinical researches are still needed to be assure of the lipid lowering property of cinnamon stomachic mixture in patients with dyslipidemia.

**Conflicts of Interest:** Declare of no conflict of interest

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# The Benefits of 4-Sided Behavioral Modification Strategy on Cardiovascular Risk Factors in the National Alliance for Tobacco Free Networks, Thailand

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**Background:** Non-communicable diseases (NCDs) are the critical cause of morbidity and mortality in Thailand. Medical treatment and lifestyle modifications are indicated to control the disease. However, the efficacy of lifestyle modification programs is still not clearly revealed. Objective: To estimate and report on the effectiveness of health-risk behavior modification programs, called the "Change 4 Health" Strategy, on health outcomes in the National Alliance for Tobacco Free, Thailand.

**Methods and Materials:** "Change 4 Health" programs use mnemonics to change four bad habits: A-Avoiding Alcohol, B-Body Movement, C-Cessation, and D-Diet. Results aimed to retrieve the summary and secondary data from the database. Thailand's National Alliance for Tobacco Free (THPAAT) offers basic, easy-to-follow behavior workshops. We reviewed 1,815 quality records and qualitative data from 20 Bangkok primary care units. Changes in health risk behaviors were tracked 1 and 3 months after "Change4Health" was implemented. Changes in cardiovascular risk factors, alcohol intake, smoking cessation, exercise, and eating behaviors and diets were statistically significant at p-value 0.05.

**Results:** THPAAT's "Change 4 Health" technique helped populations quit smoking, improve their dietary habits, exercise more, and reduce alcohol consumption by 45%, 47.8%, 11.8%, and 15.8%, respectively. One-third (31.3%) reported weight loss. Nearly one-fifth (16.3%) reduced their waist circumference. These effects were linked to eating and smoking (p-value <0.01). Smoking cessation and exercise reduced blood pressure monitoring by 15.3%. Dextrostix found that glucose levels improved by 55.2%, which was strongly linked to eating behavior. One-third of LDL values dropped after eating and smoking cessation (p-value <0.01). Reducing alcohol consumption improved health indicators (body weight, waist circumference, blood pressure, blood sugar, and LDL) by 15.85% (p-values >0.05).

**Conclusion:** A health-risk behavior modification program called Change 4 Health (Avoid Alcohol, B-Body movement, C-Cessation, D-Diet) improved health indexes among participants. However, smoking cessation and diet changes appeared to be the most effective way to change physical parameters, including body weight, Waist circumferences, and have some effect on blood sugar and lipid level.

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## INTRODUCTION

According to the World Health Organization (WHO) [1], the most common cause of death in low- and middle-income countries (nearly 71%) is due to non-communicable diseases (NCDs). The leading cause is cardiovascular diseases (like heart attacks and stroke). Bundhamcharoen, K [2] confirmed that NCDs are increasing. These are an economic burden to all countries, including Thailand. Several studies were conducted. For instance, Thanarung P, et al [3] found that 18.8% of the population in Nong Hai Village had NCDs. The most common was high blood pressure, 7.9 %, followed by diabetes, chronic kidney failure, and ischemic heart disease, 5.5%, 2%, and 1%, respectively. The same results were shown in many studies [4-6]. The problematic situation of NCDs reflects that more specific and effective disease prevention and control are needed.

Health literacy and risk behaviors modification should be incorporated to control NCDs. Most patients [3-5] had high-risk behaviors, such as insufficient physical activity, smoking, improper diets, and excessive alcohol consumption. Waist circumference and BMI of the population were found to exceed standard 3. Exercising in various forms gives better health outcomes for NCDs [7-9]. Health literacy is essential in controlling NCDs [7, 9-10] moderate-high knowledge gives them good attitudes and health-seeking behaviors. Awareness of risk factors can help to prevent complications among these illnesses.

Ministry of Public Health, Thailand [11] and WHO [2] have set the objective to reduce the level of exposure of individuals and populations to the common risk factors for NCDs, namely tobacco consumption, unhealthy diet, and physical inactivity, and their determinants. Thai Physicians Alliance Against Tobacco (THPAAT), under the supervision of The Medical Association of Thailand. They recognize these problems and then let the team to organizes a campaign project, "Change before sickness" (CHANGE 4 HEALTH), to educate health professionals and the public to protect themselves from chronic non-communicable diseases (NCDs).

This study aimed to find out the quality of health-risk behavior modification programs, including A-Avoid Alcohol, B-Body movement, C-Cessation, and D-Diet on health outcomes of patients whom healthcare providers worked with in "Change before sickness" (CHANGE 4 HEALTH). The outcomes were measured based on secondary summative data, e.g., health parameters, body weight, waist circumference, self-monitoring blood pressure, and daily dextrostix in the CHANGE 4 HEALTH database.

## MATERIALS AND METHODS

Recently, the Thai Physicians Alliance Against Tobacco (THPAAT) developed the program "Change 4 Health" to change four unhealthy habits, using the mnemonic, A-Avoid Alcohol, B-Body movement, C-Cessation, and D-Diet. The healthcare providers in 20 primary care units were trained to break and change unhealthy habits. The research objectives were to compare the successful outcomes (health indexes) after volunteers passed Change 4 Health program as 1) alcohol consumption should be decreased by aim, no more than two standard drinks per day with a maximum of 4 days a week. 2) The four types of exercises (endurance, strength, balance, and flexibility) were recommended, at least 30 mins/day and 600-1,200 METs per week. 3) Tobacco cessation was suggested, using 5 A-technics (Ask, Advise, Assess, Assist and Arrange for follow-up contact) to quit smoking. 4) Dietary controls included consuming the right number of calories, sugar, oil, and salt, less than 6:6:1 teaspoon(s). Reference from Krobthong A, et al. [2021] [12] and networks that conducted workshops from October 2018-August 2019 aimed to improve five health indexes after passing behavioral health modification in 20 primary care units in Bangkok. The workshop was implemented, plus gave educational materials to healthcare providers in primary healthcare units and collected health information to the "Change 4 Health Database". This study aimed to retrieve the summary and secondary data from the "Change 4 Health database" that this database was not tagged to confidential information of participants in records. The researcher extracted the database information in the domains of body weight, waist circumferences, blood pressure, and some of the self-monitoring laboratories (e.g., blood sugar and LDL level from the database. The analysis was divided into two parts. The first part was descriptive data in the count number and frequency. For the second analytic part, the researcher used multiple correlation analysis to look at the trend of Health indexes significantly correlated (p-value less than 0.05) with intervention data that consist of alcohol consumption, exercise, smoke cessation, and diet changes. A total of 1,815 data sets from 20 primary care units included five health indexes data, as previously mentioned reflecting health-risk related to NCDs. Health risk behaviors were initially input by themselves before entering the Change 4 Health program. Under the supervision of well-trained healthcare providers, they input health risk behaviors into the database at 1 and 3 months during the pilot phase. Then the data will retrieve and summarize. Some of the cardiovascular risk

factors were also measured in this study, such as body weight, waist circumference, and blood pressure monitoring. Dextrostix and LDL level in the database was recorded and summarized in some clinics and some patients as their routine check-ups (the researcher did not tag any of their confidential data).

### Statistical analysis

The STATA software version 15, Educational licensed (Chicago, IL) was used for data analysis. The descriptive statistics were reported by Mean  $\pm$  Standard Deviation (SD) and/or median (ranges) depending on data distribution. The count numbers were reported in numerical data and percentages. The p-value  $< 0.05$  was assigned as statistical significance. The correlation between behavioral changing and health indexes use base core command inside the STATA software and correlation coefficient with p-values were reported and p-value less than 0.05 was considered as statistically significant.

## RESULTS

A total of 1,975 summarized records of health data were retrieved. From database records, the author found that 34 patients (1.7%) were lost from the follow-up database, with only 1,815 database records remaining complete for analysis in this study. The overview of demographic data is shown in Table 1. The average age was 53 years, analyzed from the record database. Most patients in this database had NCDs, Hypertension, and other related diseases found in 70.3% of the population. 61.8% were found to be associated with Metabolic Syndrome.

**Table 1. Demographic from the database records**

	Number (n= 1,835)	%
<b>Sex</b>		
Male	1,281	70.6
Female	534	29.4
<b>Age range (years)</b>		
<30	185	10.2
31-50	540	29.8
51-70	879	48.5
>70	210	11.5

**Table 2. Prevalence of NCDs in Database**

	Number	%
<b>NCDs</b>		
None	474	29.7
Diseases	1,122	70.3
<b>Underlying Diseases</b>		
HT, DM, DLP	109	9.7
HT, DM, others	20	1.8
HT, DM	223	19.9
HT, DLP	55	4.9
DM, DLP	40	3.6
HT	356	31.7
DM	134	11.9
DLP	52	4.6
Others	133	11.9
<b>Metabolic Syndrome</b>		
BMI <23	693	38.2
BMI 23-25	322	17.7
BMI 25-30	553	30.5
BMI >30	247	13.6

Abbreviation: NCDs: Non-Communicating Diseases, BMI: Body Mass Index, HT: Hypertension, DM: Diabetes Mellitus, DLP: Dyslipidemia

Alcohol consumption was found in 36.8 %. Beer and Whiskey were the most popular, 44.4% and 39.2%, respectively. Most (42.5%) drank alcohol within the low level, 1-2 day(s) per week. 42.5 % of patients were not doing enough exercise. Only 44.2% did exercise more than three days per week. The most popular type of exercise was walking. Smoking was found in 68.7%. The cigarette was the most popular. The Smoking Index was estimated from the database records. The results showed around 38.3% or one-third of smokers will be categorized as having severe addiction based on their reports, and 24.8% with moderate addiction. The previous attempt at smoking cessation found only 3.8% (46 from 1,185 smokers). Various methods of smoking cessation were used, such as Thai herb tea (*Vernonia cinerea* Less) was the most used for smoking cessation. Unhealthy eating behavior was found; the summarized database showed more than 70% of all loved to eat fried foods, fermented bakery products, and instant food. 27.5%, 21.6%, and 26.7% of patients consumed sugar more than 6, oil more than 6, and salt more than 1 teaspoon(s) of, respectively.

In the "Change 4 Health" database, after participating in the programs, the participants' health risk behaviors changed. Alcohol consumption

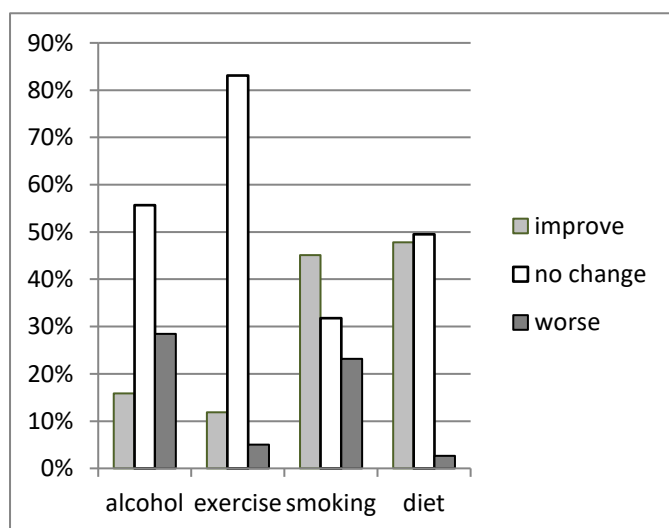
decreased by 15.85%. 11.83% of patients did more exercise. The number of smokers decreased by 45.09% (514 patients). Smoking cessation for more than 3 months was found to be only 3.8%. Eating behavior was improved by 47.82%.

**Table 3. Health risk behaviors**

	Number	%
<b>Alcohol consumption</b>	638	36.8
<b>Body movement, poor</b>	770	42.5
<b>Smoking</b>	1185	68.7
<b>Poor dietary behavior</b>		
Sugar (>6 teaspoons)	277	27.5
Oil (>6 teaspoons)	218	21.6
Salt (>1 teaspoon)	269	26.7

**Table 4. Behaviors changing**

%	Alcohol	Exercise	Smoking	Diet
<b>Improved</b>	15.85	11.83	45.09	47.82
<b>No change</b>	55.69	83.12	31.75	49.53
<b>Worse</b>	28.46	5.05	23.16	2.65



**Figure 1. Behavior changing**

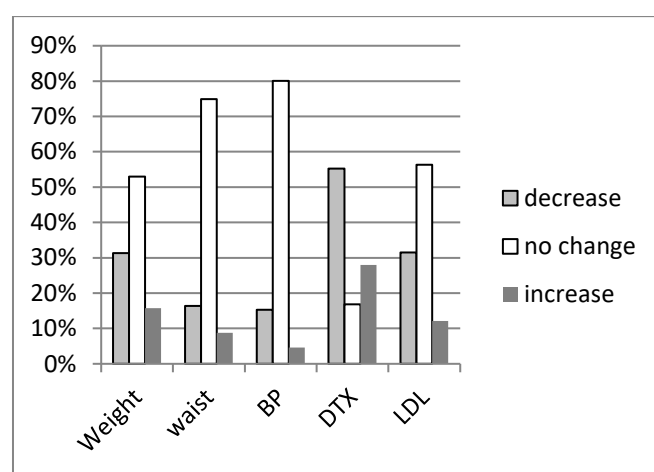
Health indicators had improved, with a decrease in body weight and waist circumference. Of the 568 participants in the database demonstrated they lost weight, only 51 patients lost more than 5%, and 25 patients lost more than 7%. Waist circumference also decreased in 269 patients (16.4%). Blood pressure decreased in 278 patients; 41 patients were found that improve their blood pressure down two steps, and

seven patients were found that HT level 3 became normal. Dextrostix was performed in 518 patients with diabetes; 286 patients (55.21%) had glucose levels (dextrostix) better than the last measurements. The record of LDL level was monitored in 165 patients with dyslipidemia and decreased by 31.5% (52 patients) after the completely engaged program.

**Table 5. Health Index monitoring**

	Weight	Waist	BP	DTX	LDL
<b>Decreased</b>	31.3%	16.4%	15.3%	55.2%	31.5%
<b>No change</b>	53.0%	74.9%	80.1%	16.8%	56.4%
<b>Increased</b>	15.7%	8.8%	4.6%	28.0%	12.1%

BP: Blood Pressure, DTX: Dextrostix, LDL: LDL Cholesterol



**Figure 2: Health Index Monitoring**

**Table 6. Correlation between behaviors changing and health indexes**

	BW	WC	BP	DTX	LDL
<b>Alcohol</b>	0.849	0.093	0.515	0.349	0.06
<b>Smoking Cessation</b>	0.000**	0.000**	0.012*	0.895	0.002**
<b>Exercise</b>	0.012*	0.000**	0.006**	0.490	-
<b>Diet</b>	0.000**	0.000**	0.928	0.000**	0.000**

BW: Body Weight, WC: Waist Circumference, BP: Blood Pressure, DTX: Dextrostix, LDL: LDL Cholesterol, \*p-value<0.05 \*\*p-value<0.01

## DISCUSSION

In the present study, 1,815 summarized data from "Change 4 Health" database is retrieved and studied the benefit of health-risk behavior modification programs on Health Index outcomes (Body weight, Waist

Circumferences, Blood pressure, Dextrostix, and LDL Cholesterol). The parameters of changing the risk behavior of the records who participate in the programs were extracted and analyzed. The study found more than 40% had modified their behavior and success in reducing health risks after joining the program and supervising by healthcare providers in the primary care unit. Most of the basic physical parameters, Body weight and Waist Circumference (WC) and blood pressure, have significant correlations of improvement with changes in habits of eating, exercise, and smoking cessation, except the correlation between diet and blood pressure ( $p$ -value  $>0.05$ ). It's relevant with studied of Wadden TA *et al.* [13]. They studied components of comprehensive lifestyle modification, including diet, physical activity, and behavior therapy to reduce participants' weight. Wadden TA *et al.* found a loss of up to 8 kg. (8 % of weight) in six months and still showed improvements in cardiovascular disease risk factors and quality of life. They demonstrated that if the participant had maintained high levels of physical activity, frequent monitoring of body weight combined to reduce calorie diet was significantly associated with long-term weight loss. Jansen *et al.* [2014] showed that a lifestyle modification program was needed to achieve clinically meaningful weight loss, typically defined as a reduction of  $\geq 5\%$  of initial weight after an intervention. [14] Dalle Grave R *et al.* [2013] also reported that Lifestyle modification therapy for overweight and obese patients combines specific recommendations on diet and exercise with behavioral and cognitive procedures and strategies, successfully to a mean weight loss of 8-10 % after 30 weeks of treatment.[15]

The alcohol consumption did not significantly change after participating in the Change 4 Health program ( $p$ -value  $>0.05$ ). From the simplified laboratory monitor in the Change 4 Health database (DTX and LDL). The author found only changes in the habit of diet consumption correlated with changes in DTX and LDL. The joining in smoking cessation showed a significant correlation with the decline of LDL levels.

Kushima K, *et al.* [1998] conducted cross-sectional data measured in 1989 and longitudinal data (1985 to 1989). Kushima K *et al.* showed the effect of smoking cessation on BMI, blood pressure, and serum lipids; ex-smokers BMI remained at almost the same level as non-smokers. The Blood blood pressure was increased over the short period by both the effect of smoking cessation and the initially increasing in BMI from abstention from smoking. The triglycerides (TG) and atherogenic index (AI) levels tended to decrease. The HDL-cholesterol (HDL-C) level tended to increase over the short period of smoking cessation. Finally, they summarized that

smoking cessation has beneficial effects for health promotion in middle-aged men. [16]. Suwazono Y, *et al.* [2010] showed the participants who stopped smoking had more significant increases in body weight, BMI, systolic and diastolic blood pressure, total cholesterol, high-density lipoprotein cholesterol (HDL), and uric acid. And reported a greater decrease in hemoglobin in the 3 years following smoking cessation than continuing smokers. [17]. However, It is also relevant to the study of Allen SS, *et al.* [1994]. Allen SS and the working group studied abstinent patients and found that systolic blood pressure and heart rate decreased from baseline (while still smoking, before the start of the study) while weight increased. Similarly, HDL increased while LDL decreased, and triglycerides increased.[18].

## CONCLUSION

Implementing a health-risk behavior modification program called "Change 4 Health" (Avoid Alcohol, B-Body movement, C-Cessation, D-Diet) in primary care settings effectively promoted health and improved the health indexes among participants. However, smoking cessation and diet changes appeared to be the most effective way to change cardiovascular risk (CVD) parameters. The present study shows significant differences in physical parameters, including body weight, waist circumference, and some effect on the surrogate parameters (blood sugar and lipid level) after implementing of health-risk behavior modification program. These demonstrate that these CVDs risk factors can be modified and prevented, leading to decreasing metabolic syndrome and cardiovascular disease developments in the future.

**Author Contributions:** All authors confirmed for equally distribution to the manuscript in the following areas: study conceptualization, methodology, data validation and data analysis, results interpretation, original draft preparation, review, and editing. All authors reviewed and approved the manuscript. **KA** responded in PI role, **SAV** worked and responded as Co-author and Corresponding author. **SR, SR, RT** and **KP** worked as Co-authors. This proceeding material and some part of these research study was presented in the poster section in the 13<sup>th</sup> ASIA PACIFIC conference on Tobacco or health APACT 2021, September 3-4, Bangkok, Thailand.

**Conflicts of Interest:** The authors declare no conflict of interest.



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# Factors Influencing Consumers' Attitude Towards Online Buying of Dietary Supplements: A Study on Consumers at LifePlus Store in Mandalay

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**Background:** With technological advancements, the internet has transformed people's lives worldwide. Marketing has been boosted by the creation of online virtual stores. Customers can buy products and services from anywhere in the world, 24 hours a day, 7 days a week, without geographical or temporal constraints.

**Objective:** Although many advertisers realize the power of the Internet, few research studies have been written on the characteristics that drive Mandalay customers to buy dietary supplements online. The aim of this study is to examine the influencing factors of customer attitude towards online purchasing of dietary supplements in Mandalay.

**Materials and Methods:** Data was collected from 'LifePlus' pharmacy, health, and beauty store OTC (over the counter medicine) customers using a self-administered pre-structured questionnaire. The collected data was examined using a quantitative approach descriptive-analytical design. The survey is based on 309 respondents who were willing to participate.

**Results:** According to the findings of the survey, customers' attitudes toward online buying for dietary supplements are influenced by perceived benefits (convenience, time savings, trust, and comparison). The results of the study indicate that factors such as time saving, and trust influence the consumers' attitudes towards online shopping. Furthermore, there is a positive effect on consumers' attitudes towards online shopping of dietary supplements.

**Conclusion:** This study strongly recommends online marketers to enhance timely delivery and trust with online shoppers to increase sales of their product or service other than dietary supplements.

**Keywords:** consumer attitude; dietary supplements; security; time saving, trust.

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## INTRODUCTION

E-commerce sales growth is unstoppable and for good reason, hence online shopping is one of the most popular online activities [1]. Global e-commerce sales are expected to increase 26.7% year-on-year to reach \$4.891 trillion in 2019 [2]. Because Myanmar is also rapidly developing, domestic and foreign telecom companies have distributed low-cost Internet SIM cards to the public, thanks to advancements in internet and mobile technology. As the prices of SIM cards decrease with the Internet, people are getting more connected. Moreover, the spread of the Internet is increasing rapidly and accountable for the development of new sectors in our countries' economy. Among them, online shopping has been one of the significant changes in the economies of nations.

Since 2013, the trend of online shopping in Myanmar is developing day by day and the volume of trade is clearly increasing. An alternative shopping channel has become more convenient and useful than the traditional shopping style. Moreover, it is attracting more and more people to trade more and more products and services online. With the rise of online sellers, the competition between offline and online is also becoming more intense.

Studying consumer helps in obtaining clues to improve or offer goods or services, set prices, create channels, formulate messages, and develop various marketing and advertising things to do [3]. As an alternative way to purchase merchandise, online shopping is becoming more popular and imperative among people who want to stay away from the hassles of traffic and busy roads. Traditionally, to buy whatever consumers want, they must visit the stores.

The distinguishing characteristics between online shopping and traditional shopping are that consumers do not need to go out to buy something, but instead they can determine their choices of goods or services by comparing the items presented on the websites. These attitudes have led to influencing factors that can influence consumer buying behavior [4].

Data from Slice Intelligence shows that the vitamin and supplement category is growing rapidly, with sales increasing 40 percent in 2015. Purchases of vitamins and nutritional supplements online are increasing at such a rapid rate that the category is moving 12 percent faster than the average e-commerce itself. While the vitamin and supplement sector are large online, there is obviously room for brick-and-mortar retailers who dominate offline category sales to better capitalize on

the e-commerce opportunity, which is clearly stealing supplement market share.

Sales of vitamins and nutritional supplements are so large on the Internet that the revenue generated from these products is almost equal to all the money accrued from purchasing wearables in the last 12 months. The majority of vitamin and supplement purchases are made through Amazon, the Seattle retailer, which accounts for 77 percent of all vitamin and supplement sales made online [5].

The dietary supplements include multivitamins, minerals, traditional or herbal ingredients, amino acid substances such as collagen, which is widely used among adult males and females. Dietary supplements revenues rose from \$8.8 billion in 1994 to \$18.7 billion in 2002, as the use of nutritional supplements has played an important role in American health culture over the past decade. Annual sales of dietary supplements are projected to be close to \$20 billion in 2004 and control half of the market [6].

The attitudes of consumers towards online shopping will decide the enticing variables motivating consumers to buy online, and these variables will help marketers devise their internet marketing strategies, respectively. Since our field of research will be on customers of the 'LifePlus' store and specifically in Mandalay, our research study will be helpful to marketers in general and will particularly be beneficial to Mandalay marketers.

This research would also investigate how the demographics and personal characteristics of customers influence their attitudes towards purchasing supplements online.

## MATERIALS AND METHODS

### *Study Design, study population and study period*

Using a quantitative approach descriptive-analytical design, a structured questionnaire is used to collect data for this study. Participants were recruited using simple random sampling and convenience sampling because selection is based on participants' availability and desire to participate. Over the counter (OTC) pharmacy, health, and beauty store 'LifePlus' consumers will be asked if they would like to participate in this survey and the goal of the study will be explained, as it will take roughly 10 to 15 minutes to complete the questionnaire. Customers who agree to participate in this survey will be given a pre-structured, self-administered questionnaire.

This study was designed to survey 'LifePlus' pharmacy, health, and beauty store customers using socio-demographic characteristics, dietary supplements

purchasing intent, convenience, time savings, trust, and selection freedom to determine the customer attitude toward online dietary supplements purchasing.

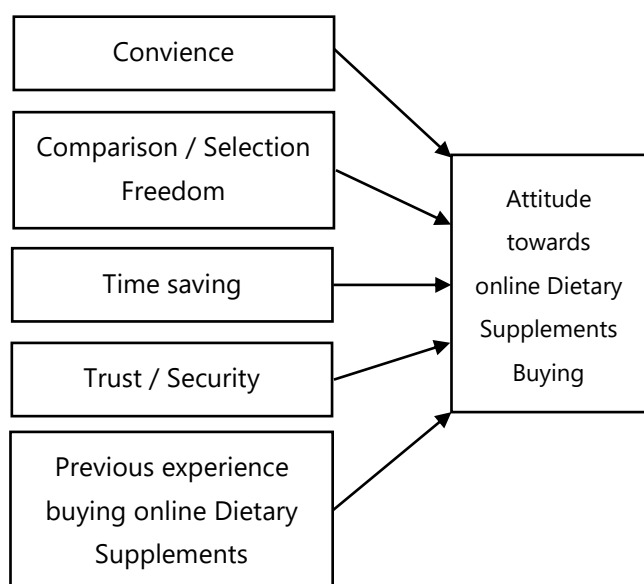
The sample size calculated is 400. In anticipation of a non-response percentage, questionnaires were delivered to 410 respondents for this study.

### Data collection

After gaining approval from authorities in the 'LifePlus' pharmacy, health and beauty store management, qualified clients of over-the-counter medications will be selected for a paper-and-pencil survey. Adults older than 16 were chosen as participants.

Two sections comprised the Questionnaire. The first section of the survey requested demographic information from respondents, including their gender, age, income, level of education, and year of Internet access. The second section compares online shopping's Convenience, Time-Savings, Trustworthiness, and Attitude towards Online Dietary Supplements Purchasing. Because participants are chosen based on their availability and willingness to participate, the convenience sampling approach is utilized.

The questionnaire produces 400 responses evaluated on a 5-point Likert scale: (1 = Strongly Disagree, 2 = Disagree, 3 = Neither Disagree nor Agree, 4 = Agree, 5 = Strongly Agree) [7]. The Questionnaire can be completed in around 10 minutes. There are 34 items testing attitudes regarding purchasing nutritional supplements online.



**Figure 1.** Conceptual framework of the study

### Conceptual Model and Variables

The conceptual framework of this study is extracted from previous empirical studies [7-9]. Based on the theoretical framework, the sample conceptual framework could be constructed (see figure 1).

### Data analysis

A descriptive analysis was conducted using the frequencies and percentages of the categorical variables to describe the overall characteristics of the study participants. We used correlation analysis, as well as single and multiple linear regression analyses, to assess the impact of the factors influencing consumers' attitudes on purchasing dietary supplements online. SPSS version 25 was used to analyze the data. All tests were two-sided, and a p-value less than 0.05 was regarded as statistically significant.

## RESULTS

**Table 1.** Sociodemographic characteristics of participants

Characteristics (n=400)	No.	Percentage
<b>Gender</b>		
Male	191	47.75
Female	209	52.25
<b>Age group (years)</b>		
18 – 25 years	66	16.50
26 – 35 years	169	42.30
36 – 45 years	88	22.00
46 – 55 years	51	12.80
55 and above	26	6.50
<b>Education</b>		
Less than high school	73	18.25
Complete high school	76	19.00
Complete college/university degree	191	47.75
Complete postgraduate degree	60	15.00
<b>Current salary (Kyats)</b>		
Less than 300,000	133	33.25
300,001 – 500,000	99	24.75
500,001 – 1,000,000	116	29.00
More than 1,000,000	52	13.00
<b>Ever bought online</b>		
Yes	309	77.25
No	91	22.75

**Table 2.** Descriptive statistics for the likert-scale questionnaire of convenience, time saving, comparison, trust, previous buying experience and attitude

Items	Mean	SD
<b>Convenience</b>		
Convenience is my main reason for shopping online	3.85	0.87
If I shop online, I do not need to go to a shop	3.54	0.64
It is more convenient to shop through the Internet than the traditional retail shopping	3.54	0.64
If I shop online, I can shop in privacy of home	3.77	0.58
If I shop online, I can save myself from market crowd	4.00	0.79
If I shop online, there is no embarrassment if I do not buy	3.62	0.63
<b>Time saving</b>		
Online shopping takes less time to purchase.	4.08	0.73
If I buy goods or services via online because it saves time	4.00	0.68
I do not like to spend much time on shopping.	3.69	0.61
If I shop online, I can take as much time as I want to decide	4.08	0.73
If I shop online, I can save myself from chaos of traffic	4.00	0.68
<b>Comparison / Selection freedom</b>		
It is easy to choose and make comparison with other items/services while shopping online	3.84	0.77
Selection of goods/services available on the Internet is very broad	4.23	0.80
Online sites help to compare various brands	4.15	0.77
If I shop online, I can get detailed product information online	4.23	0.80
If I shop online, I can easily compare price through different online shopping sites	4.15	0.77
If I shop online, I can compare the same product on different online shops	4.15	0.77
It is easy to choose and make comparison with other items/services while shopping online	3.84	0.77
Selection of goods / services available on the Internet is very broad	4.23	0.80
<b>Trust / Security</b>		
I feel secure to purchase things via online	3.40	1.13
I feel that online shopping sites have adequate security features	4.00	0.95
I trust that I will get exactly what I ordered through online shopping	3.41	1.12
I feel that online transaction is safe and secure	3.61	0.91
The detailed product information mentioned on the online shopping sites is trustworthy	3.70	0.90
I feel secure to purchase things via online	3.40	1.13
<b>Previous Online Buying Experience</b>		
If you need any health foods within the next 12 months, do you plan to make your purchase online from the	3.83	1.03
Will you recommend your friends to buy health foods online from the Internet?	4.13	0.80
To improve health, and prevent disease	3.38	1.15
To beautifying skin	4.00	0.96
To improve brain	3.38	1.15
To buy for others	3.77	0.84
<b>Attitude</b>		
Shopping online is fun and enjoyable.	3.84	1.02
Online shopping makes my shopping easy.	3.68	0.90
I find that online shopping is compatible with my lifestyle	3.92	0.95
I like to shop via online	3.77	0.84
I think online shopping is useful for me.	3.81	0.88



### ***Socio-demographic characteristics of respondents***

Regarding gender, the distribution of respondents is well balanced, 47.75 percent of the total of 400 responders are male, while 52.25 percent are female. Most respondents are between 26 and 35 years old, while many respondents are between 26 and 35 years old. Also, younger persons may purchase online more frequently than older individuals. Many responders (47.8 percent) hold university degrees, followed by 19 percent with a high school diploma. The respondents' income in the range of 100,000 to 300,000 Kyats was the highest. This may be because most students who study on campus fall under this income range. They were next followed by those with incomes between 500,001 and 1,000,000 Kyats. Out of 400 respondents, 309 (77.25%) have previously shopped online, while only 91 have never done so (see Table 1) for the following reasons: (1) they wish to physically inspect the merchandise was the most prevalent reason with 10.5%, followed by (2) concern about fraud and (3) unfamiliarity with the online purchasing process at 4.3%, (4) 2% said online shopping is time consuming, and (5) not being familiar with the online purchase method at 1.8%.

### ***Assessment of attitude towards online shopping of dietary supplements***

The respondents' mean values for the attitude indicated that they agreed with the statements. The overall mean value of the respondents' attitudes about internet purchasing is favorable (3.80). People believe that shopping online simplifies their shopping experience. They also appreciate online shopping and believe that it provides them with many benefits. Moreover, they consider online buying fit with their lifestyle.

### ***Assessment of convenience factors on attitude***

The overall mean (3.72) indicates that consumers have a favorable view of the convenience of online buying. The respondents agreed with all convenience factor statements with mean values greater than 3. People among them were more concerned with avoiding market crowds and sought to avoid the crowdedness of internet buying. A busy lifestyle, severe weather, and commuting on vast traffic routes are compelling consumers to believe that shopping is unnecessary. They enjoy internet shopping since they do not have to worry if they decide not to buy the item.

### ***Assessment of time saving factors on attitude***

Time savings is another aspect that influences consumers' attitudes towards internet shopping. Saving time is essential in all parts of life, including shopping. Online purchasing requires significantly less time than traditional shopping. Therefore, an increasing number of Mandalay residents prefer internet purchasing to traditional buying. The respondents agreed, with a mean score of 3.99, that time is a significant and influential element in their attitudes regarding online buying. Consumers do not wish to spend time in stores purchasing goods. People in Mandalay are becoming increasingly dissatisfied with traffic congestion and scorching heat, so they don't want to waste time going shopping. Therefore, people prefer to purchase online since they believe it allows them to avoid the turmoil of heavy traffic and the oppressive heat outside.

### ***Assessment of comparison/selection freedom factors on attitude***

The ability to select, compare, and contrast products and services is one of the most important aspects of online buying. It provides consumers with the ability to select and compare brands or goods while buying online. Six statements with Likert Scale questions were posed and examined to determine the influence of this element on internet shopping. The mean values for these statements are provided in the table (2).

The overall mean value is 4.13, indicating that the selection flexibility factor influences consumers' attitudes toward online purchasing. Consumers are always interested in comparing products across stores. They have the freedom to choose, compare, and compare the products and services they intend to acquire when they shop online. This is the primary reason Mandalay customers prefer to shop online.

### ***Assessment of trust/security factors on attitude***

Trust is a sensitive issue that most online shoppers are concerned about. Most of the online shoppers' dislike taking risks, which might have a negative impact on consumers' perceptions of online buying. The mean values of five statements including Likert Scale questions were examined and displayed in the table (2).

This element's total mean value is also 3.62, indicating that the trust factor influences customers' opinions regarding online buying. Most consumers believe that internet buying is the most susceptible to technological deception. They refused to agree on the dependability of their internet shopping because most of them did not feel safe purchasing items online.

## Regression analysis of factors predicting attitude towards online buying of dietary supplements

**Table 3.** Regression analysis summary for all factors predicting attitude towards online buying

Predictors	b	SE	t	p
(constant)	0.256	0.183	1.397	0.163
Convenience	0.362	0.103	3.158	0.002*
Time saving	0.566	0.105	5.379	<0.001*
Comparison	0.292	0.100	2.902	0.004*
Trust	0.591	0.077	7.678	<0.001*
Previous experience	0.217	0.093	2.330	0.020*

\*\* Significant at the 0.05 level (2-tailed).

A multiple linear regression was calculated to predict attitude based on convenience, time saving, comparison, trust and previous online buying experience (see Table 3). A significant regression equation was found ( $F(5, 308) = 22.343$ ,  $p < 0.001$ ), with an adjusted  $R^2$  of 0.457. Participants' predicted attitude is equal to  $0.256 + 0.362$  convenience +  $0.566$  time saving +  $0.292$  comparison +  $0.591$  trust +  $0.217$  previous experience. The adjusted R-squared is 0.457, indicating that all factors could jointly explain 45.7 percent of the variation in consumers' attitude. That mean all factors are making a significant contribution to the prediction of attitude towards online buying of dietary supplements. Moreover, the beta coefficient value of the trust factor is (beta=0.591,  $t=7.678$ ,  $p<0.001$ ), which is the highest value that has the most impact on the online purchasing behavior of customers. In addition, time savings and convenience rank second and third, respectively, among the variables influencing the online purchasing attitude of LifePlus store customers in Mandalay.

## DISCUSSION

A descriptive-analytical study was conducted at Over the counter (OTC) pharmacy, health, and beauty store 'LifePlus' consumers to investigate the factors influencing consumers' attitude towards online buying of dietary supplements. This survey included 400 LifePlus customers in total. The factors (i.e., convenience, time saving, comparison/selection freedom, trust/security, previous buying experiences) were investigated on attitude towards online buying using regression analysis. We concluded, based on the data, that trust is the most

important and attractive element among five factors, because safety concerns are crucial following time savings, the second most influential factor, followed by the convenience of online shopping, which is also significant.

Trustworthiness is a crucial element in online shopping. It has been discovered that suspicion exists regarding the security characteristics of online buying websites. Also relevant is the quality of the things they ordered via internet shopping. Most consumers believe that online purchasing is the form of shopping where they are most likely to be misled by technology [10]. Thus, consumers' attitudes toward online purchasing are substantially influenced by their trust in online sellers. The study indicated that internet shoppers are concerned about the trust issue, among other factors. Therefore, businesses should utilize a high-security system that allows for more secure website transactions [11]. Moreover, to build consumer confidence, businesses must improve their brand reputation, as corporate reputation is tied to the quality of services offered. In addition, businesses must provide shoppers with some assurance that they can trust their products and services. For instance, corporations are required to offer a money-back guarantee on their items if consumers are dissatisfied with the products or services they get [12]. It demonstrated that the corporation cares about its clients, which will boost consumers' trust in the company. Concurrently, marketers should engage in trust-building activities such as posting a privacy statement, communicating in real-time with customers, promoting their good reputation, and referring to other trusted websites.

In terms of time savings, people believe online buying is more efficient than traditional shopping. People in Mandalay do not wish to spend a great deal of time shopping. In addition, online buying is flexible, allowing consumers to shop whenever and wherever they choose. There is a relationship between the importance of time savings to online shoppers and their attitudes towards online buying. Companies that offer online product or service counseling, product reviews, and quick delivery will be advantageous for shoppers who lack sufficient time to complete these transactions [11].

People in Mandalay are becoming increasingly interested in escaping the chaos of the market crowd, as well as the heavy traffic and hot temperatures on the roadways. They believe that online purchasing is more convenient than traditional shopping in this regard [13]. In addition, people prefer internet buying because they believe they can protect their privacy. In addition, online

shopping is appealing to them because there is no need for concern and no shame if they choose not to purchase the things.

According to the survey results, comparison is one of the most influential factors on customers' attitudes toward online shopping. It gives a variety of resources for individuals to compare the products they wish to acquire. It is possible to compare not only the price but also the comprehensive specs of the product [12]. In addition, this analysis revealed that selection freedom is a motivating element.

This study explored the elements that influence a customer's attitude regarding purchasing dietary supplements online. It is prudent to concentrate on a single topic at a time. However, the complexity of internet technology indicates that academics will need to continue studying this topic to stay up with the latest advancements [14]. Each year, new IT characteristics and capabilities are introduced, necessitating that users likewise update their systems and infrastructure.

## CONCLUSION

Online shopping is growing increasingly popular among customers in Mandalay. Understanding the needs of online shoppers has become a problem for advertisers. Understanding the attitude of customers regarding online buying, strengthening the elements that encourage customers to shop online, and concentrating on the factors that inspire customers to shop online will aid marketers in gaining a competitive advantage. Therefore, to boost the volume of online sales in Mandalay, it is essential to understand the attitudes and intentions of the locals.

In conclusion, providing customers in Mandalay with the confidence to shop online and the comfort to use while shopping online has a direct positive effect on their attitude toward online shopping. This indicates that a more favorable attitude about internet shopping will increase purchasing intent. Therefore, marketers should strive to raise consumers' positive attitudes to increase their intent to purchase, which will increase the sales of digital items.

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## Case Report

# A Case report of Endocrine Therapy On refractory ER-Positive Metastatic Ovarian Cancer to Axillary lymph-node - Is there a role?

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Ovarian carcinoma is the leading cause of death in gynaecological malignancy. It is important to differentiate between metastatic ovarian cancer to the axillary lymph-nodes with metastatic breast cancer to the axillary lymph-nodes as each treatment differs. We started endocrine therapy on a 58-year-old lady with ER-positive metastatic ovarian cancer to the axillary lymph-node as the wound was refractory to chemoradiation therapies. Endocrine therapy is easy to administer and has a low toxicity profile with reasonably good outcome. It should be considered in patients who are refractory to chemotherapy, non-tolerable and in palliative cases.

**Keywords:** Aromatase inhibitor, Anastrozole, Endocrine therapy, ER, Metastatic ovarian cancer, PR, Ovarian Ca.

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## INTRODUCTION

Mortality from ovarian cancer only decreased slightly in the past thirty years because most patients presented at a later stage (FIGO stages III or IV) [1]. Metastatic ovarian carcinoma to axillary is very rare [2]. Accurate diagnosis is important as the treatment and prognosis differ significantly. Current management of advanced ovarian cancer includes cytoreductive surgery followed by combination of chemotherapy consisting of a platinum salt (carboplatin or cisplatin) with Taxane group (paclitaxel or docetaxel); complete remission rate is 20% to 60%, depending on the extent of residual disease [3]. Responses to second line chemotherapy is

brief and associated with toxicity with poor long-term survival [4]. Hormonal therapies are attractive option due to their limited toxicity profile and ease of administration [5]. We are here to discuss a unique case of ER-positive ovarian carcinoma metastasize to axillary lymph node, which was resistance to chemoradiation, and roles of endocrine treatment based on current evidence.

## Case History

A 58-year-old lady presented with two years history of lower abdominal mass with occasional dull pain. Pelvic examination reviewed 36 weeks size mass with a 2x2 cm mobile axillary node lymph-node. Breast examination was unremarkable. Ultrasound abdomen confirmed a pelvic mass. CT scan showed a left complex ovarian mass with inguinal and right axillary lymphadenopathy. Serum CA 125 was raised at 309U/mls. Pap smear had no evidence of intraepithelial lesion or malignancy. Mammogram with ultrasound breasts showed no suspicious breast lesion. Core biopsy of right axillary lymph-node showed metastasis adenocarcinoma with immune-histochemical staining

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positive for CK7, ER, Negative for CK20. She underwent staging laparotomy and debulking of ovarian tumour. Intra-operatively noted left ovarian mass 25x25cm with a thick capsule. Histopathology was Endometrioid adenocarcinoma, grade 2. FIGO staging: pT1a N0 M1 (Stage IVB). She was offered adjuvant chemotherapy but defaulted. Two years later she came back with worsening, ulcerative right axillary swelling measuring 8cm x 9cm x 13cm. Repeated Ultrasound breast showed a large heterogenous fungating solid lesion extending from axillary to upper quadrant of right breast. Re-staging CT thorax-abdomen-pelvis showed recurrent left ovarian endometrioid adenocarcinoma, with right axillary and right inguinal masses likely metastatic nodes. Repeated wedge biopsy of the lesion showed consistent with metastatic adenocarcinoma with its immunohistochemical staining positive for ER, CK7 and negative for CK 20. She was started on palliative chemotherapy carboplatin, unfortunately, she could not tolerate it. She had 13 fractions of radiotherapy to the right axillary ulcerative lesion which responded poorly. Axillary lesion was debrided for toileting and local control with minimal effectiveness. In view of her poor treatment response, we started her on endocrine therapy, aromatase inhibitor, Anastrozole 2.5mg daily for three months. The lesion showed disease stabilization for the period of treatment. Unfortunately, she passed away after that due to complications from pneumonia.

## DISCUSSION

Ovarian cancer usually presents with intraperitoneal metastases by direct seeding into the peritoneal cavity. Distant metastasis most commonly involves the lung or pleura [6]. Cormio *et al.* reviewed 162 patients with epithelial ovarian carcinoma and reported five cases of extra-abdominal lymphatic spread [7]. Majority causes of axillary metastatic adenocarcinoma in woman is breast carcinoma [8]. There are several ways of determining the origin of tumours. In our case, we had to ascertain that primary cause for the metastatic adenocarcinoma of axillary lymph-nodes were either due to ovarian carcinoma or occult breast cancer. We concluded that it was due to the former based on the followings; Her CA 125 was raised at 309U/mls which was strongly suggestive of ovarian cancer; the presence of primary ovarian tumour; and there was no evidence of breast lump clinically and radiologically. Histopathology of the axillary mass showed metastatic adenocarcinoma which maybe primarily pointed either due to occult breast or ovarian adenocarcinoma, but immunohistochemical staining suggested the latter. The axillary

mass was even refractory to second line chemoradiation. Her prognosis was dismal. Epithelial ovarian cancer can be considered as endocrine related neoplasm [9]. Main advantage of endocrine therapy to second-line chemotherapy is their limited toxicity and ease of administration [10]. It is now confirmed that level of ER and PR status correlate with responses to endocrine manipulation in breast cancer. However, in ovarian cancer, its role is still controversy [11]. Three Consecutive Phase II Trials of Mid-Atlantic Oncology Program explored the efficacy of hormonal treatment in refractory ovarian cancer with tamoxifen, megestrol acetate, aminoglutethimide and noted tamoxifen has the highest response rate with longer survival durations and minimal toxicity [12]. A phase II trial carried out by Bowman *et al.*, investigated aromatase inhibitors for ER positive recurrent ovarian cancer concluded that letrozole can produce disease stabilization [13]. Symth *et al* studied 42 ER-positive recurrent ovarian cancer patients receiving letrozole 2.5 mg/d orally, out of the 33 patients with measurable lesions, 9% achieved partial-response and 42% maintained stable disease state for 12 weeks [14]. We started her on Tab Anastrozole 2.5mg OD. She had disease stabilization for 4 months while she was on Anastrozole (see figure 1 and 2) but unfortunately, she passed away after that due to complication of pneumonia.

## CONCLUSION

High index of suspicion is needed for the diagnosis of metastasis primary ovarian cancer to the axillary lymph-node. Endocrine therapy is a reasonable choice of treatment for those patients on palliative, refractory or non-tolerable to chemotherapy. Further studies are needed to better characterize the role of endocrine therapy in ovarian cancer.

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**Figure 1.** Picture taken prior endocrine therapy



**Figure 2.** Picture taken 4 months after endocrine treatment

# Effects of Smoking on the Performance of the International Federation of Muay Thai Associations (IFMA) Youth Muay Thai Championships, Bangkok in 2018

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**Background:** Smoking habit in the youth is a new target of most tobacco companies. This habit can retard development and performance in athletes.

**Objectives:** To find out the prevalence and effects of smoking in the IFMA Youth World Muay Thai Championships, Bangkok 2018, we carried out as a short cohort study during the game.

**Methods:** Seventy-five candidates of the game with their ages ranging between 8 and 17 years, 70 males and 5 females, were interviewed and examined as the ordinary regulation. Furthermore, smoking and CO measurement from forceful expiration were also done in these candidates. They were followed up until the end of the game. Correlation among smoking, level of CO and the performance of the candidates were found out.

**Results:** Forty five of seventy-five or 60% of the candidates reported they did smoke. Twenty of the forty-five smoker candidates, 26.6%, did smoking every day ranging from 1 to 15 times a day. CO measurement among these smoker candidates revealed 1 to 9 ppm. On the other hand, CO measurement showed 0 to 1 in the nonsmoker candidates. Two of the candidates in non-smoking group received Gold Medal Award. In the candidates who could not pass the first round 28/32 or 87.5% were in the smoking group with CO in their force expiration over 5 ppm. Furthermore, none in the smoking group could pass the final contest.

**Conclusion:** Prevalence of smoking habit in candidates of the IFMA Youth Muay Thai Championships 2018 was very high. Smoking has negative effect on their performance of the game.

**Keywords:** CO measurement, IFMA, Muay Thai, Performance, Tobacco Smoking, Youth

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## INTRODUCTION

Anti-smoking is one of the campaigns which are implemented among ASEAN Countries. The operation was also carried out in every part of Thailand. The Medical Association of Thailand is one of the outstanding organizations in anti-smoking activities.

The International Federation of Muay Thai Associations (IFMA) started as a small federation with several enthusiastic countries more than two decades ago [1]. It was officially inaugurated in 1993. Furthermore, in 1998, IFMA was recognized by the Olympic Council of Asia. This organization consisted of 130 member countries worldwide with 5 continental federations. IFMA Youth World Muay Thai Championships is operated annually, and the host country is selected by the board committee of IFMA. Thailand hosted the IFMA Youth World Muay Thai Championships, Bangkok 2018.

This study was carried out with the aim to find out the prevalence and the effects of smoking on the performance of the IFMA Youth Muay Thai Championships, Bangkok in 2018.

## MATERIALS AND METHODS

The study was carried out as a short cohort study during the game. There were 152 countries with 350 candidates participated in the game. The contest was classified in 26 classes according to sex, age, and weight of the candidates. However, the candidates of some countries could not be enrolled in the study. Therefore, only 75 candidates, 70 males and 5 females with their ages ranged between 8 – 17 years old, were included in our study. All participants underwent 1) history taking including smoking experience and consumption, 2) physical examination and 3) Carbon monoxide (CO) measurement using Smokerlyzer, Bedfont Scientific Ltd, England. Correlation among smoking, level of CO and the performance of the candidates were found out. Descriptive analysis was used in the study.

## RESULTS

Forty five of seventy-five or 60% of the candidates reported that they did smoking. Twenty candidates, 26.6%, did smoke every day ranging from 1 to 15 times a day. CO measurement among the smoker candidates revealed 1 to 9 ppm. On the other hand, CO measurement showed 0 to 1 in the nonsmoker candidates. Two of the candidates in non-smoker group received Gold Medal Award. In the candidates who could not pass the first round 28/32 or 87.5% were in the

smoker group with CO in their force expiration over 5 ppm. Furthermore, none in the smoker group could pass the final contest and none of them received Gold Medal Award.

## DISCUSSION

Smoking habit with a certain amount of tobacco consumption was rather high among young athletes in the IFMA Youth World Muay Thai Championships, Bangkok 2018. This data could be compared to some study reveal new trend in tobacco and drinks consumption among young athletes [2]. In habitual smoker oxidative stress and inflammation were elevated during basic training [3]. Smokers reported significantly more wheezing and sputum production during exercising than non-smokers which could lessen their performance [4]. In the IFMA Youth Muay Thai contest, Bangkok, we found similar finding which could compare to other report. Many authors also reported negative effects of smoking on physical performance of young population using FEV<sub>1</sub> [5-15]. They suggested that smoking was a significant risk factor. However, their reports have many confounding factors. In our study, the direct negative effect of smoking on athletic performance was clearer shown. Our enrolled athletes were rather unique. They were youth Muay Thai athletes which have similarity in training and physical factors. Only smoking habit and the present of carbon monoxide were only the different factors between the groups.

More activities on anti-smoking must be carried out in the youth. Sponsorship of tobacco industry should be prevented [16]. Furthermore, tobacco consumption in the youth usually results in an endless addiction [17]. Our result revealed negative effect of heavy smoking in the performance of the candidates, even though the number of the enrolled candidates was rather small.

The weak points of the study were 1) most of the enrolled candidates were male, 2) the sampling out of the candidates could not be done as some of the staffs coaches did not agree to allow their candidates to be enrolled, 3) the time of history taking was too short as all candidates must be transferred to the registration point on time and 4) the number of the enrolled candidates was rather small (75/ 350 or 21% were enrolled)..

## CONCLUSION

In this short cohort of the candidates of IFMA Youth World Muay Thai Championships, Bangkok 2018, smoking revealed negative effect on the performance of these athletes.

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