

## Development of Innovative herbal steam cabinets for Thai traditional medicine

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### Abstract

The research introduces the development of innovative herbal steam cabinets designed for Thai traditional medicine. The primary objective is to investigate the requirements of herbal steam patterns, leading to the creation of an efficient herbal steam cabinet specifically tailored to Thai traditional medicine practices. The research findings reveal three distinct patterns for the herbal steam cabinet. In the first pattern, participants undergo herbal steam three times for 10 minutes each, interspersed with two breaks where they sit and rest for 3 minutes each, resulting in a total duration of 36 minutes. The second pattern involves two sessions of herbal steam lasting 15 minutes each, followed by a 15-minute break for sitting and resting, also totaling 36 minutes. The third pattern varies based on the doctor's diagnosis, with herbal steam lasting for 20 minutes. Consistently across all patterns, the herbal steam is maintained at a temperature range of 42-45 °C. The herbal steam cabinet, constructed from natural pine wood and adhering to the dimensions of 120 cm width, 120 cm length, and 200 cm height in accordance with Ministry of Public Health standards, effectively accommodates all three patterns. Efficiency tests of the herbal steam cabinet highlight distinct temperature variations among the patterns. Pattern 1 exhibits the highest average temperature of 43.95 °C and the lowest average temperature of 41.74 °C. Pattern 2, on the other hand, records the highest average temperature of 43.96 °C and the lowest average temperature of 40.58 °C. Lastly, Pattern 3 demonstrates the highest average temperature of 42.93 °C and the lowest average temperature of 42.28 °C, respectively.

**Keywords:** Herbal steam cabinets, Temperature control, ESP 32 board, Efficiency

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## Introduction

Following the Thai Traditional Medicine Professions Act of 2013, Thai Traditional Medicine involves medical processes related to examination, diagnosis, treatment, disease prevention, and the promotion and restoration of human health. Herbal steam therapy, a method utilized in Thai Traditional Medicine, serves therapeutic purposes for various diseases, health promotion, and aesthetic purposes. This practice applies to both genders and involves herbal steam rooms, herbal steam cabinets, and herbal steam tents. In the healthcare system, particularly in hospitals promoting Thai Traditional Medicine and integrative medicine, herbal steam cabinets meeting specific standards are provided at general hospitals, regional hospitals, and community hospitals. One such facility is the Onkarak Hospital, located in Amphoe Onkarak, Nakhon Nayok Province, which has been elevated to community hospital status, serving a population within Health Region 4 under the Ministry of Public Health.

In response to the COVID-19 pandemic, the usage of communal herbal steam cabinets has been restricted in adherence to government disease prevention measures. As a result, single-unit herbal steam cabinets have become the primary means of providing herbal steam therapy, presenting a challenge in meeting the demand for this service. The continuous usage has led to a decline in operational efficiency, necessitating constant monitoring of temperature control and duration. To address these challenges and meet the increasing demand for herbal steam therapy, the researchers propose the development of a single-unit herbal steam cabinet that incorporates three operational functions. These functions include the first, maintaining a temperature of 42-45 degrees Celsius for 10 minutes, repeated three times; the second, maintaining a temperature of 42-45 degrees Celsius for 15 minutes, repeated twice; and the third, tailored to the physician's diagnosis with an adjustable temperature of 42-45 degrees Celsius and a duration of 10-15 minutes. The cabinet design adheres to safety standards outlined for Thai Traditional

Medicine and integrative medicine services in hospital settings.

This innovation aims to enhance the efficiency of herbal steam therapy services, ensuring the safety and well-being of patients while complying with government health regulations. The proposed single-unit herbal steam cabinet will contribute to the continued delivery of traditional medicine practices in the evolving landscape of healthcare.

## Objectives

1. To study the needs of the herbal steam treatment model for Thai traditional medicine.
2. To develop an herbal steam cabinet for Thai traditional medicine.
3. To test the efficiency of herbal steam cabinets for Thai traditional medicine.

## Scop of Study

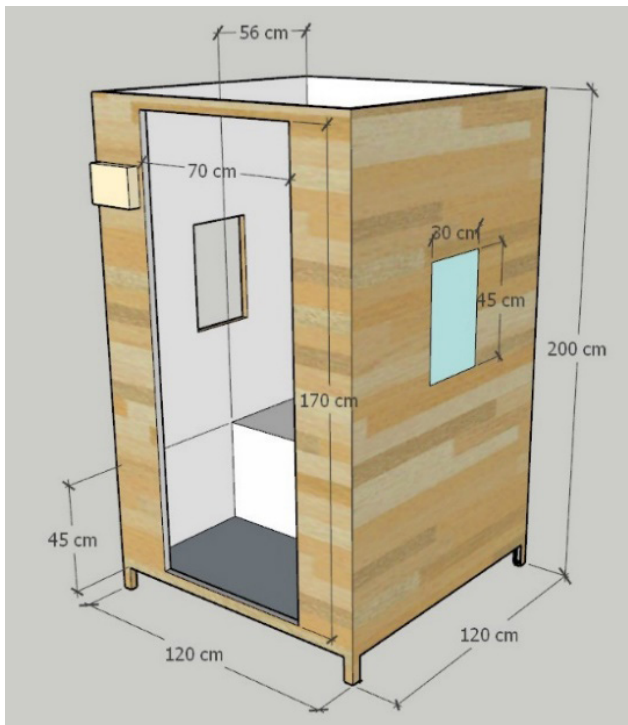
Research and development of herbal steam cabinets for Thai traditional medicine. The researcher focused on studying the needs of the herbal steam treatment model. Herbal steam cabinets have been developed. There are 3 functions to control the herbal steam treatment. Function 1: Temperature 42-45 degrees Celsius, time 10 minutes, 3 times. Function 2: Temperature 42-45 degrees Celsius, time 15 minutes, 2 times. Function 3 according to the Doctor's diagnosis: Temperature 42-45 degrees Celsius, time 10 - 15 minutes, to have standards of use according to the standards of hospitals promoting and supporting Thai traditional medicine and integrated medicine.

## Research Methodology

The Development of Herbal Steam Cabinets for Thai Traditional Medicine operations is divided into 2 parts, The first part is the design and construction of the herbal steam cabinet, and the second part is the control system for the herbal steam cabinet. The steps for conducting research are as follows.

### A. Designing and Constructing an Herbal Steam Cabinet for Traditional Thai Medicine

Design and construction of herbal steam cabinet It is made from natural pine wood and has a width of 120 centimeters, a length of 120 centimeters, and a height of 200 centimeters. The front door is 70 centimeters wide and 170 centimeters long, with a mirror attached to the front door that is 30 centimeters wide. centimeters and 45 centimeters in length. The size of the handle for opening and closing the herbal steam cabinet door is hexagonal, with dimensions of width of 11 centimeters, length of 25 centimeters, and height of 5 centimeters. Figure 1 shows the design herbal steam cabinet by Autocad program and Figure 2 shows the herbal steam cabinet that was created.



**Figure 1.** Structure design of herbal steam cabinet by Autocad program



**Figure 2.** The operation of the herbal steam cabinet

### B. Herbal steam cabinet operation control system

The herbal steam cabinet control system has the following methods of operation.

1. Test the temperature inside the herbal steam cabinet. By using heat with the boiler until it turns into steam. After that, the steam will be sent through the steam pipe to the herbal steam cabinet, causing the internal temperature. The herbal steam room has temperature changes and there is a method to test it by using a temperature measuring multimeter to measure the temperature inside the herbal steam room.

2. Test the operation of the sensor for measuring the temperature inside the room by using the DS 18B20 sensor by writing a display control program on the computer. By using the Arduino language program.

3. Control system using a microcontroller Perform experiments and test the operation of the circuit. Writing programs to control the operation and debugging and writing programs to control the operation of the system. After that, it is used to design printed circuit designs. Etching print plates, testing, improving, and making corrections. By using the ESP32 LCD board, size 20X4 is used for display.

4. Development of a control system for herbal steam cabinets Using testing circuits and writing control programs, including improving and modifying programs by using tools obtained from control system design.

5. Determining the efficiency of the herbal steam cabinet control system By using methods to test the accuracy of the control system that has been created, which has a temperature display. By using a multimeter that can measure the temperature value,

compare it with the display of the herbal steam cabinet control system on the LCD screen.

From Figure 4, the control circuit of the herbal steam cabinet works for traditional Thai medicine practice, it consists of an input signal from a switch to select the operation of the herbal steam cabinet and a sensor for reading temperature values sent to the processing section to process the work with a microcontroller. Then the measured temperature value will be displayed as

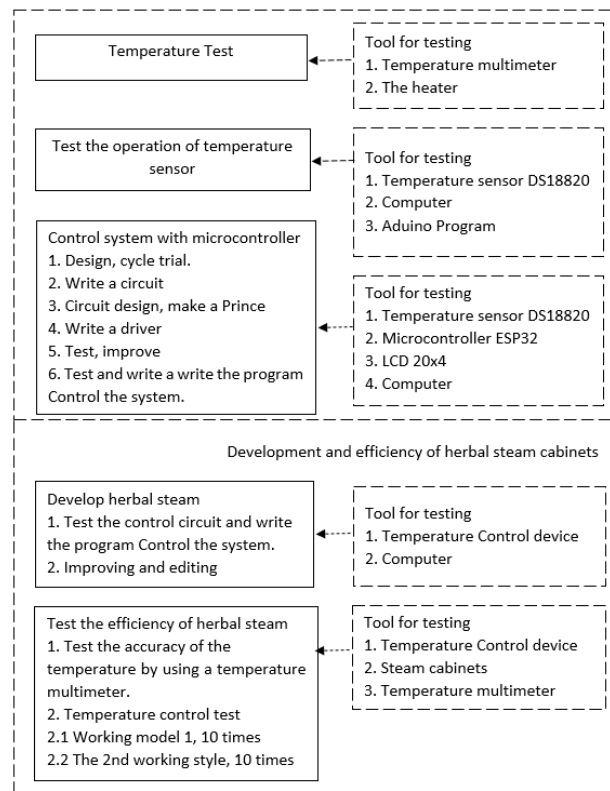


Figure 3. Diagram of operation of the herbal steam cabinet control system

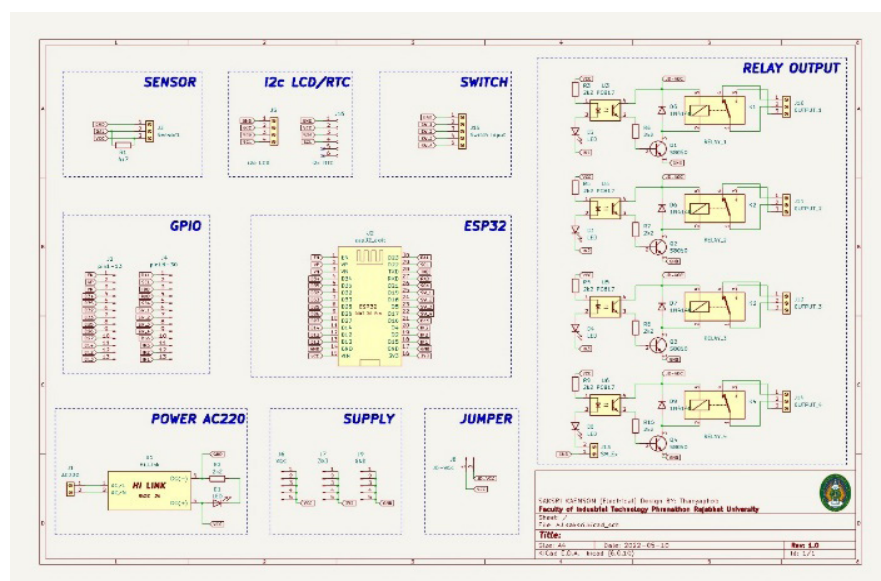


Figure 4. Circuit control system for herbal steam cabinet

an output on the LCD, and display notifications through speakers and control the operation of the control system automatically. As well as controlling safety with an external control switch.

## Results and Discussion

Results of research on the development of herbal steam cabinets For Thai traditional medicine, there are data analysis results in the following order:

### A. Results of the design and construction of the herbal steam cabinet control system.

Result of design and construction of control system for herbal steam cabinet Starting with heating coils, sensors, microcontrollers, Arduino program, and LCD screen are used in designing and building a control system for herbal steam cabinets.

The herbal steam cabinet control system Can control work starting from ESP32 Send the logic signal value 0 out of the IN1 pin, causing the PC817 opto to connect to the circuit, causing a bias at the base pin of the transistor, causing the first relay circuit to work, causing the contacts to be opposite to the original position, thus connecting. The circuit at pin 1 and pin 3 causes the heating coil to start working. Then pass the steam into the herbal steam cabinet using a temperature sensor to read the values inside the herbal steam cabinet. After that, it sends temperature values to the microcontroller for display on the LCD screen. Until the temperature reaches 42 degrees Celsius, it sends a logic signal of 0 from the IN2 pin, causing the internal light bulb to turn on, and sends a logic signal value of 0 out

of the IN3 pin, causing a beep signal to be sent to the speaker to start working of the herbal steam cabinet until the internal temperature is 44 degrees Celsius, the circuit will be cut off by sending a logic signal 1 from the IN1 pin, and when the internal temperature is 42 degrees Celsius, the circuit will start working again until the end of time. operation time the internal lamp will turn off and a warning sound will be sent to the speaker to indicate the end of the operation. If a problem occurs inside the herbal steam cabinet, press SW4. It will cause an audible warning signal to appear on the speaker.

### B. Results of determining the efficiency of the herbal steam cabinet for Thai traditional medicine

Results of determining the efficiency of herbal steam cabinets for Thai traditional medicine, are divided into 3 forms, details as follows:

In type 1, take the herbal steam bath 3 times, 10 minutes each time, and come out to sit and rest after taking the herbal steam bath until the 10-minute period has expired. Come out and sit and rest for 3 minutes, including the time for Steam the herbs for a total of 36 minutes, a total of 10 times. This can be shown in the form of a temperature-time relationship graph as shown in Figure 5.

In the second method, take the herbal steam bath 2 times, 15 minutes each time, and come out to sit and rest after taking the herbal steam bath until the 15-minute period has expired. Come out and sit and rest for 5 minutes, including the time spent in Steam the herbs for a total of 35 minutes, a total of 10 times. This

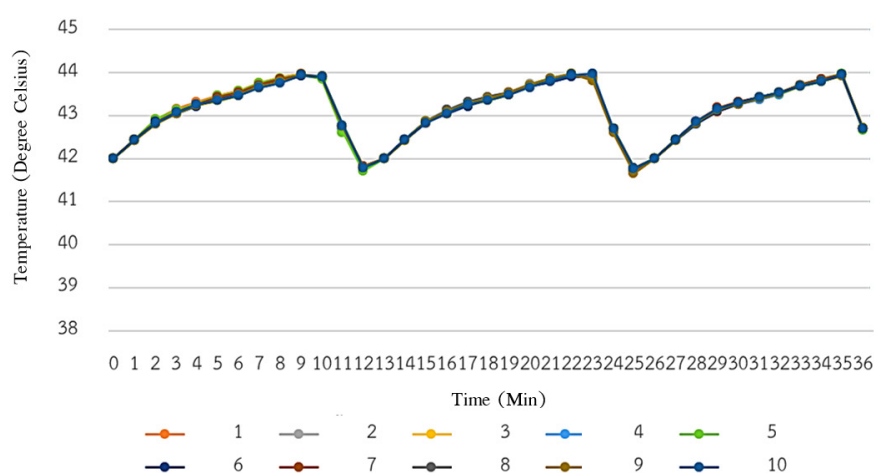


Figure 5. Efficiency of the herbal steam cabinet for Thai traditional medicine in Form 1



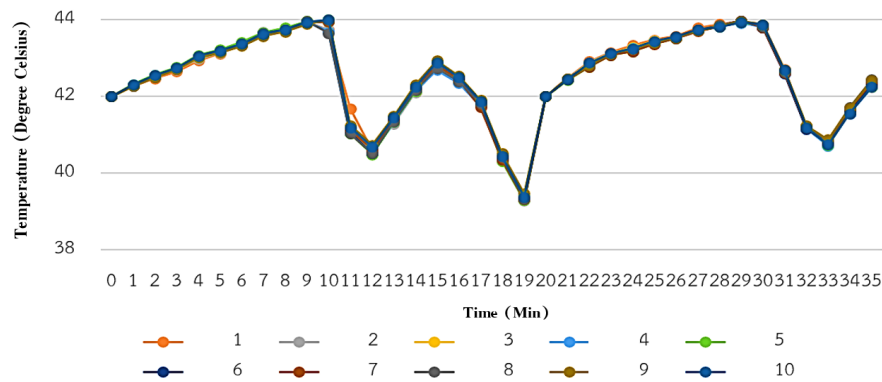


Figure 6. Efficiency of the herbal steam cabinet for Thai traditional medicine in Form 2

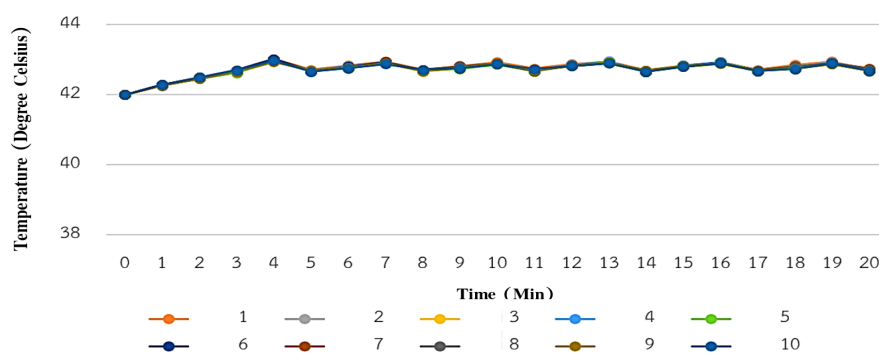


Figure 7. Efficiency of the herbal steam cabinet for Thai traditional medicine in Form 3

can be displayed in the form of a relationship graph. of temperature and time as shown in Figure 6.

Figure 5, finding the efficiency of the herbal steam cabinet. For Thai traditional medicine, in the 2nd form, it will start working at a temperature of 42 degrees Celsius for 15 minutes and will rest for 5 minutes and then start working for another 15 minutes until the end of the period, 2 times for a total of 35 minutes. To control the working system of the herbal steam cabinet in type 3 according to the doctor's diagnosis. Take the time to steam the herbs, 1 time, 20 minutes, at a temperature of 43 degrees Celsius, a total of 10 times, while the herbal steam cabinet is working with a maximum temperature of 43.02 degrees Celsius, a minimum temperature of 42.26 degrees Celsius. The average maximum temperature was 42.93 degrees Celsius and the average minimum temperature was 42.28 degrees Celsius.

In the third model, according to the doctor's diagnosis, take the herbal steam bath 1 time, using 20 minutes, at a temperature of 43 degrees Celsius, a total

of 10 times. This can be shown in the form of a relationship graph. of temperature and time as shown in Figure 7.

Figure 7, finding the efficiency of the herbal steam cabinet. For Thai traditional medicine, type 3, according to the doctor's diagnosis, take the herbal steam bath 1 time using 20 minutes at a temperature of 43 degrees Celsius.

## Conclusion

This research is the development of an herbal steam cabinet for Thai traditional medicine. Using natural pine wood, size 120x120x200 centimeters and has a door and glass in front. Complete with a hexagonal handle and a hole for the steam pipe. There is a temperature control system with a microcontroller displayed on the LCD screen. Tests were conducted in 3 formats. The results of the research were as follows.

In type 1, take the herbal steam bath 3 times, 10 minutes each time, and come out to sit and rest after completing the herbal steam bath for 10 minutes,

come out and sit and rest for 3 minutes, including the time for Steam the herbs for a total of 36 minutes, 10 times, with a highest temperature of 43.98 degrees Celsius, a lowest temperature of 41.66 degrees Celsius, an average of the highest temperature of 43.95 degrees Celsius, and an average of the lowest temperature of 41.74 degrees Celsius.

In the second method, take the herbal steam bath 2 times, 15 minutes each, and come out to sit and rest. After completing the herbal steam bath for 15 minutes, come out and sit and rest for 5 minutes, total time for Steam the herbs for a total of 35 minutes, 10 times, with a maximum temperature of 44.01 degrees Celsius, a minimum temperature of 40.49 degrees Celsius, an average of the highest temperature of 43.96 degrees Celsius, and an average of the lowest temperature of 40.58 degrees Celsius.

In the 3rd form according to the doctor's diagnosis, the time to steam all herbs, 1 time, 20 minutes, at a temperature of 43 degrees Celsius, a total of 10 times, with a maximum temperature of 43.02 degrees Celsius, a minimum temperature of 42.26 degrees Celsius, an average of a maximum temperature of 42.93 degrees Celsius, and the average minimum temperature was 42.28 degrees Celsius.

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