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THE EFFECTIVENESS OF THE HERBAL STEAM BOMB RECIPE OF MR. SOMKID CHUAYNUKUL, A FOLK HEALER IN PA BON DISTRICT, PHATTHALUNG PROVINCE, ON THE MUSCLE FLEXIBILITY AMONG VOLUNTEERS

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ABSTRACT

Increased muscle strength can be achieved through strength and flexibility training. The objective of this research study is to investigate the effectiveness of Steam Bomb on body flexibility and to examine the satisfaction of volunteers with steam treatment using the herbal steam bomb product formulated by Mr. Somkid Chuaynukul, a traditional healer in Pa Bon district, Phatthalung province. The study involved 30 volunteers, divided into an experimental group of 15 and a control group of 15. The control group received regular steam treatment, while the experimental group received steam treatment using the Steam Bomb product. Muscle flexibility levels were compared before and after the test and between the groups by using the Sit and Reach Test. The results showed that both the control and experimental groups had significantly increased average muscle flexibility after

using herbal steam treatment, with a statistical significance at the $p<0.05$ level. However, the two groups had no significant difference in average muscle flexibility after the fifth trial. Therefore, it can be concluded that steam treatment with the Steam Bomb product is as effective as regular steam treatment. The satisfaction assessment of the volunteers revealed that they were highly satisfied with various aspects of the Steam bomb treatment, including muscle flexibility, relief of body aches, product fragrance, and respiratory effects. This study can add value to herbal products and serve as a guideline for future health business ventures such as fitness centres, spa, etc.

Keywords: *Effectiveness, Muscle flexibility, Herbal steam bomb*

INTRODUCTION

Musculoskeletal system-related diseases are common problems, frequently found among working-age individuals in labour-intensive jobs, athletes, and people who exercise. Muscle pain often results from abnormal working postures, such as bending and raising the head repeatedly while working, lifting objects incorrectly, staying in the same position for prolonged periods (e.g., sitting at a computer), doing housework, or engaging in strenuous sports without stretching muscles. If muscle pain is left untreated for a long period, it can lead to chronic muscle pain, affecting sleep, mental health, and physical condition, thereby reducing body flexibility.

There are various treatment approaches for muscle pain, such as Medication, Surgery, Muscle stretching, Acupuncture, Traditional Thai massage, Herbal compresses, and Herbal steam therapy. However, treatments involving medication, like muscle relaxants, may cause stomach ulcers. Herbal steam therapy consists in using easily accessible local Thai herbs such as Turmeric, Curcumin, Tamarind, Soap Pod, and Lemongrass which are boiled until steaming. Steam, essential oils, and various substances from herbs enter the body through the respiratory system and skin. This process increases blood circulation, reduces pain, relaxes muscles, enhances muscle flexibility and makes the skin radiant. (Preecha Nootim et al., 2022).

A literature review revealed that regular steam and Thai herbal steam can improve the flexibility of the shoulder joints, lower back muscles, and hamstring muscles. The group receiving Thai herbal steam showed better lower back and hamstring muscle flexibility than the group receiving regular steam alone (Sirintip Kumfu et al., 2017). Studies on the effectiveness of herbal steam therapy for muscle pain relief found that volunteers who received either herbal steam or regular steam showed a statistically significant reduction in muscle pain levels compared to before treatment. Comparing the differences between the groups, it was found that the muscle pain levels before and after treatment did not significantly differ. (Preecha Nootim et al., 2022).

The research team recognise the benefits of herbal steam therapy. It is particularly interested in the herbal steam formula developed by Mr. Somkid Chuaynakul, a traditional healer with over 20 years of experience using herbs to treat various conditions. Mr. Somkid, based in Khok Sai Subdistrict, Pa Bon District, Phatthalung Province, inherited this herbal knowledge from Phra Ajarn Udom Ketsri. The herbal steam formula is known to treat conditions such as numbness, aches and pains and allergies. The ingredients in this herbal formula include Cassumunar ginger (*Zingiber zerumbet* (L.) sm.) Kaffir lime (*Citrus hystrix* D.C.) Wan Sao Long (*Amomum bifiorum* Jack) Camphor (*Cinnamomum camphora* (L.) J. Presl.) Borneol (*Dryobalanops aromatica* Gaertn.) Blumea (*Blumea balsamifera* (L) D.C) Acacia concinna (*Acacia concinna* (Wild.) D.C.) Tamarind (*Tamarindus indica* L.) Turmeric (*Curcuma longa* L.) Lemongrass (*Cymbopogon citratus* (D.C.) Stapf) and Phlai (*Zingiber cassumunar* Roxb.)

The research team has developed Mr. Somkid's herbal steam formula into a Steam bomb product designed for ease of use, convenience, and optimal properties. The product has good cohesion, forms well, has a smooth surface without cracks, is not rough to touch, has a brown colour, medium and even dispersion, no bubbles, and dissolves well with an average dissolution time of 3.00±1.19 minutes. It has a strong herbal fragrance that lasts for 30 minutes.

The effectiveness of the Steam bomb on body flexibility was studied using the Sit and reach test, and volunteer satisfaction was evaluated. This research can lead to commercial and social applications while preserving and revitalizing traditional herbal medicine for future generations.

METHODOLOGY

To study the effectiveness of regular steam therapy and the using the Steam bomb product in the steam therapy process for body flexibility of volunteers.

Volunteer Selection Criteria

The effectiveness assessment will involve 30 healthy volunteers. The selection criteria for volunteers are as follows:

Inclusion Criteria

Male and female volunteers aged between 20-45 years. No infectious skin diseases or severe skin conditions. No history of allergies to herbs or heat from herbal steam therapy. Systolic blood pressure between 120-139 mmHg and diastolic blood pressure between 80-89 mmHg.

Exclusion Criteria

Volunteers with the diseases such as heart disease, kidney disease, COVID-19, and severe respiratory infections, etc. Volunteers with contraindications for herbal steam therapy according to the guidelines of Thai traditional medicine practices in state health services by the department of Thai Traditional and Alternative Medicine. Volunteers with open wounds or inflamed wounds.

Termination Criteria

Volunteers who experience allergic reactions to the product during the research. Volunteers who request to withdraw from the project.

Testing Procedure

This study has been approved by the Human Research Ethics Committee of Thaksin University, with certification number COA No. TSU 2022_151 REC No.0319. After selecting volunteers according to the criteria, the researchers will explain the details of the herbal steam bomb product, its benefits, and contraindications. The 30 volunteers will be divided into two groups by drawing lots, with 15 people in each group. Volunteers with even-numbered last digits will be in the control group and receive regular steam therapy, while those with odd-numbered last digits will be in the experimental group and receive steam therapy using the steam bomb product. Volunteers' medical history will be taken, and physical examinations will be conducted before and after the herbal steam therapy. The information will be recorded in a medical history form. Before the experiment, both the control and experimental groups will have their muscle flexibility assessed using the Sit and Reach Test with a standing trunk flexion meter. The test involves the volunteer sitting upright with straight legs extended forward and knees locked. The soles of the feet are placed flat against the flexibility meter, with the feet spaced according to the volunteer's hip width. The arms are then raised and extended forward with palms together, reaching as far forward as possible and holding for 3 seconds before returning to the starting position. (figure 1) The test will be conducted twice, and the highest flexibility value will be recorded.

The control group will then receive regular steam therapy, and the experimental group will receive steam therapy with the steam bomb product. (figure 2) The steam temperature will be controlled between 42-45 degrees Celsius, and each session will last 30 minutes, with steam therapy conducted every other day for a total of 5 sessions. Each session will include two rounds of 15 minutes each, with a 5-minute rest in between. Steam therapy will be performed 3 times per week for 2 weeks. If a volunteer experiences issues such as asthma, chest tightness, or difficulty breathing during steam therapy, the session will be terminated immediately. Muscle flexibility will be assessed after each steam therapy session for the control and experimental groups.

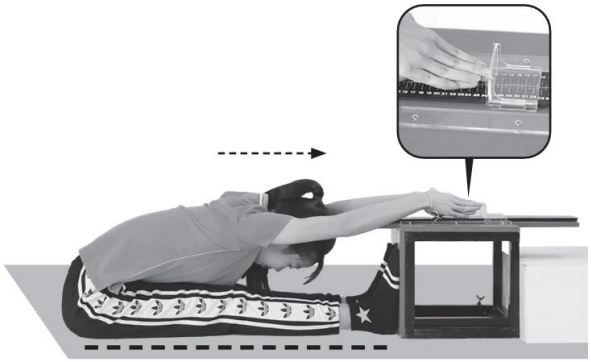

figure 1 Sit and reach test (Source: Handbook of tests and standards for physical fitness of Thai children, youth, and the general population, department of physical education, ministry of tourism and sports)

figure 2 The steam bomb product

Data Analysis Methods and Statistical Analysis Used

The research instruments consist of two parts. Part 1, Experimental tools consist of herbal steam bomb product, automatic blood pressure monitor, flexibility meter (standing trunk flexion meter) and herbal steam tent. Part 2, Data recording forms for collecting personal data consist of personal data of 30 male or female volunteers aged 20-45 years from the Faculty of health and sports science, Thaksin university, Phatthalung campus, Ban phrao sub-district, Pa phayom district, Phatthalung province. This includes gender, age, religion, history of herbal allergies, history of chemical or steroid allergies, chronic diseases, and the use of herbal products. Medical history and physical examination record forms. Muscle flexibility assessment forms, recording data before and after herbal steam therapy every other day for a total of 5 sessions. Satisfaction assessment forms for respondents using the herbal steam bomb product containing herbal extracts from the traditional formula.

Study on satisfaction assessment of volunteers with conventional steam bathing and steam bomb product. Volunteers were assessed for sensory properties including color and fragrance satisfaction levels using a questionnaire scale based on the following criteria; level 5 (very satisfied), level 4 (satisfied), level 3 (neutral), level 2 (dissatisfied) and level 1 (very dissatisfied).

The interpretation of data will be conducted based on the score ranges 1, 2, 3, 4, and 5 and will be translated according to the following standards. Range of satisfaction (highest score - lowest score); mean score between 4.50 - 5.00 indicates highest satisfaction, mean score between 3.50 - 4.49 indicates high satisfaction, mean score between 2.50 - 3.49 indicates moderate satisfaction, mean score between 1.50 - 2.49 indicates low satisfaction and mean score between 1.00 - 1.49 indicates very low satisfaction.

Data analysis methods and statistical analysis used. Research instruments and quality assurance of tools in this study, the researchers used a satisfaction assessment questionnaire for evaluating satisfaction with herbal steam bath products in steam bomb form, divided into two parts as follows: Part 1, Personal data collection form among 30 volunteers aged 20-45 years from the Faculty of Health and Sports Science, Thaksin University, Phatthalung campus, Ban Phrao Sub-district, Pa Phayom district, Phatthalung province. This includes age, gender, religion, history of herbal allergies, history of chemical or steroid allergies, chronic diseases, and the use of herbal products. The questions are closed-ended (checklist format) consisting of 7 items. Part 2, Satisfaction questionnaire for respondents regarding the using of

herbal steam bomb products containing herbal extracts from traditional formulas, consisting of 4 items.

Statistical analysis used the muscle flexibility before and after herbal steam therapy and the satisfaction assessment scores for both control and experimental groups were analyzed using descriptive statistics, percentages, and standard deviation. Statistical analyses included paired t-tests and Two-way repeated measure ANOVA, with statistical significance set at *p-value < 0.05.*

RESULTS AND DISCUSSION

1. Study on the effectiveness of conventional steam therapy and steam bomb therapy on flexibility

General Information of Volunteers from the selected volunteers participating in the research, totaling 30 individuals, it was found that: in the control group, there were 3 males and 12 females, accounting for 20% and 80%, respectively. In the experimental group, all 15 volunteers were females, accounting for 100%. None of the volunteers in both groups had a history of allergies to herbs, chemicals, or steroids, accounting for 100%. Volunteers in both the control and experimental groups had chronic illnesses, with 2 and 1 individuals, respectively, accounting for 13.33% and 6.66%, respectively. Volunteers in the control and experimental groups had a history of using herbal products, with 8 and 10 individuals, respectively, accounting for 53.33% and 66.66%, respectively. (As shown in table 1).

Table 1 General Information of Volunteers (n=30)

General Information	Control group (n=15)		Experimental group (n=15)	
	Number (persons)	percentage	Total (persons)	percentage
Gender				
Male	3	20	0	0
Female	12	80	15	100
Religion				
Buddhist	9	60	7	46.66
Muslim	6	40	8	53.33
History of allergic reactions to herbs				
had allergic reactions	0	0	0	0
never had allergic reactions	15	100	15	100
History of allergic reactions to chemicals/substances				
had allergic reactions	0	0	0	0
never had allergic reactions	15	100	15	100
Chronic illnesses				
Have	2	13.33	1	6.66
Don't have	13	86.66	14	93.33
Ever used herbal products				
Ever	8	53.33	10	66.66
Never	7	46.66	5	33.33

The study evaluated the effectiveness of regular steam therapy (control group) and steam therapy using herbal steam bomb products (experimental group) on the muscle flexibility of volunteers in the study. It was found that in the experimental group, the average muscle flexibility levels before steam bathing sessions 1, 2, 3, 4, and 5 were 3.78±10.07, 5.35±8.90, 6.74±7.70, 7.33±5.79, and 7.65±6.24, respectively. After steam, the average muscle flexibility levels were 6.55±8.23, 7.86±7.67, 8.39±6.95, 9.00±6.12, and 10.25±5.68, respectively. There was a statistically significant increase in muscle flexibility after steam therapy sessions at $p<0.05$.

In the control group, the average muscle flexibility levels before steam therapy sessions 1, 2, 3, 4, and 5 were 2.85±9.54, 5.20±9.86, 5.82±7.25, 7.35±5.78, and 7.65±6.24, respectively. After steam, the average

muscle flexibility levels were 4.60±9.33, 6.47±8.10, 7.25±6.79, 8.90±6.14, and 10.68±6.07, respectively. There was a statistically significant increase in muscle flexibility after steam therapy sessions 1, 3, and 5 at $p<0.05$. For sessions 2 and 4, there was an increase in muscle flexibility, but it was not statistically significant at $p<0.05$, as shown in table 2.

Table 2 Show the average flexibility values of the body before and during the control group (regular steam therapy) and experimental group (steam therapy with herbal steam bomb products)

Volunteers	Time	$\bar{x}$ (before)	$\bar{x}$ (After)	$\bar{x}$ (diferrent)	p-value
Control group	1	3.78 ± 10.07	6.55 ± 8.23	5.16 ± 1.95	0.009*
	2	5.35 ± 8.90	7.86 ± 7.67	6.60 ± 0.86	0.000
	3	6.74 ± 7.70	8.39 ± 6.95	7.56 ± 0.53	0.006*
	4	7.33 ± 5.79	9.00 ± 6.12	8.16 ± 0.23	0.002*
	5	7.65 ± 6.24	10.25 ± 5.68	8.95 ± 0.39	0.000
Experimental group	1	2.85 ± 9.54	4.60 ± 9.33	3.72 ± 0.14	0.030
	2	5.20 ± 9.86	6.47 ± 8.10	5.83 ± 1.24	0.060
	3	5.82 ± 7.25	7.25 ± 6.79	6.53 ± 0.32	0.032*
	4	7.35 ± 5.78	8.90 ± 6.14	8.12 ± 0.25	0.072
	5	7.65 ± 6.24	10.68 ± 6.07	9.16 ± 0.12	0.001**

Note: Mean ± S.D., * significant level at $p < 0.05$, ** significant level at $p < 0.001$

Table 3 Show the mean flexibility levels of muscle before and after sessions 1 and 5 between the control group (regular steam therapy) and the experimental group (steam therapy with herbal steam bomb products)

Group	After sessions 1	After sessions 5	P-value
Steam therapy with herbal steam bomb	3.78 ± 10.07	10.25 ± 5.68	0.001**
Regular steam therapy	2.85 ± 9.54	10.68 ± 6.07	0.014*

Note: Mean ± S.D., * significant level at $p < 0.05$, ** significant level at $p < 0.001$

Table 4 Comparison of the mean flexibility levels of muscles after the 5th steam therapy session between the control group (regular steam therapy) and the experimental group (steam therapy with herbal steam bomb products)

	Control group	Experimental group	*P*-value
After the 5th steam bath session	10.68±6.07	10.25±5.69	0.855

Note: Mean ± S.D., * significant level at $p < 0.05$, ** significant level at $p < 0.001$

Comparing muscle flexibility levels using the Sit and reach test before and after each steam therapy session from table 3, it was found that the experimental and control groups, receiving steam therapy with herbal steam bomb and normal method for 5 sessions respectively, had average muscle flexibility levels before the 1st and after the 5th session of 3.78 ± 10.07 and 10.25 ± 5.68 respectively for the experimental group (steam therapy with steam bomb), and 2.85 ± 9.54 and 10.68 ± 6.07 respectively for the control group (normal steam therapy). The differences were statistically significant at $p < 0.05$.

In comparing muscle flexibility levels using the Sit and reach test before and after each steam bath session from table 4, it was found that the experimental and control groups, receiving steam therapy with herbal steam bomb and normal method for 5 sessions respectively, had average muscle flexibility levels after the 5th session of 10.25 ± 5.69 and 10.68 ± 6.07 respectively. The difference was not statistically significant. (*p-value* = 0.85)

2. Study on satisfaction of volunteers with traditional steam therapy and steam bomb products
The evaluation of satisfaction after using steam bomb products found that for the group receiving steam therapy with steam bomb products, when evaluating satisfaction, it was found that in terms of satisfaction with herbal steam therapy, it can help participants feel relaxed, decrease muscle soreness, and increase body flexibility, with the highest average score of 5.06 ± 1.16. Regarding the scent of steam bomb products,

the herbal steam therapy scent was natural and suitable for users, with an average score of 4.66 ± 0.48. Steam bomb product decreases muscle soreness, with an average score of 4.66±0.48. After herbal steam bomb therapy, the product helped in deep breathing and relaxation, with an average score of 4.46 ± 0.51. Conversely, the evaluation of satisfaction after traditional steam therapy found that in terms of satisfaction with herbal steam therapy, it can help participants feel relaxed, decrease muscle soreness, and increase body flexibility, with the highest average score of 5.06 ± 1.16. Regarding relaxation and improved breathing after herbal steam baths, the average score was 4.93 ± 0.25. Herbal steam therapy also can help to decrease muscle soreness, with an average score of 4.86 ± 0.35. The scent of steam therapy was natural, with an average score of 4.66 ± 0.48. Overall, the satisfaction assessment for both groups was highly satisfied and did not differ significantly statistically. (table5)

Table 5 Average satisfaction score of volunteers for steam bomb and conventional steam therapy

Items evaluated	Satisfaction level with the product			
	Experimental Group		Control Group	
	Mean±SD	Result	Mean±SD	Result
1. Herbal steam help you feel relaxed, reduce muscle soreness, and improve body flexibility	5.06±1.16	Very satisfied	4.66±0.48	Very satisfied
2. After herbal steam therapy, the product can reduce body aches.	4.66±0.48	Very satisfied	4.86±0.35	Very satisfied
3. The scent of the steam bomb herbal product is natural and suitable for users.	4.66±0.48	Very satisfied	4.73±0.45	Very satisfied
4. After steaming with herbs, the product help improve breathing and relaxation	4.46±0.51	Very satisfied	4.93±0.25	Very satisfied

The comparative study of the effects of herbal steam bomb therapy and regular steam therapy on the flexibility of volunteers with low to moderate muscle flexibility, totalling 30 individuals divided into two groups: one receiving herbal steam bomb (15 individuals) and the other regular steam therapy (15 individuals), it was found that the average muscle flexibility of volunteers in both groups increased significantly at a statistical significance level of $p<0.05$. When comparing the muscle flexibility between the group receiving herbal steam bomb and the group receiving regular steam, there was no statistically significant difference. This is because the herbal formulas used in both groups were based on traditional herbal recipes by Dr. Somkid Chuaynukul. Still, the products were modified into steam bomb format, incorporating additional components such as baking soda, mineral oil, wheat flour, and sea salt into steam bomb product. That is convenient to use and easy to prepare for herbal steaming. The increased muscle flexibility observed in both experimental groups resulted from the thermophysiological effects of heat application. As the skin temperature increases, blood vessels dilate, enhancing blood circulation in the heated area, which relaxes muscles and increases muscle flexibility. This finding aligns with the study by Chompoonuch Supapvanich et al. (2016), which investigated the effects of herbal steam on muscle pain, showing that the steam promotes heat transfer, reduces body temperature, and induces relaxation by promoting sweating, which helps in heat dissipation and relaxation, thereby improving blood circulation. Moreover, the aroma of herbal steam can induce more relaxation than steam alone. For instance, the aroma of lavender essential oil helps relieve muscle soreness and reduce pain, while lemongrass aroma aids in muscle relaxation, consistent with the research by Hwang Jin Hee et al. (2011) on the combined use of heat therapy and physical therapy for pain relief, flexibility improvement, sleep quality, and depression in elderly women with osteoarthritis. In their study, using a lavender-scented compress on knee joints significantly reduced knee pain, alleviated depression, increased knee flexibility, and improved sleep compared to the control group. Therefore, the essential oils from herbs are another reason both groups showed increased muscle flexibility.

The satisfaction evaluation among volunteers from both groups revealed that participants were satisfied with various aspects of herbal steam. This includes muscle flexibility, relief from body pains, the aroma of

the products, and the highest-level impact on the respiratory system. These findings are consistent with a study on the knowledge and attitudes influencing herbal steam practices in temples in Mueang district, Ubon Ratchathani province. Most service users felt relaxed in their muscles and reported improved sleep quality after herbal steam therapy (Wilawan Bunon et al., 2017).

CONCLUSION

Personal factors were evaluated, and it was found that age, gender, and history of herbal use influenced the decision to participate as volunteers in herbal steam bath programs in both sample groups. This finding aligns with Methi Sootthasil et al (2017), who found a positive correlation between gender and educational level with herbal product use. Specifically, females and those with a bachelor's degree showed the highest level of herbal usage behaviour.

In studying muscle flexibility before and after steam therapy, it was found that the control and experimental volunteer groups had significantly increased muscle flexibility after steam, with a statistical significance level of $p<0.05$. However, there were no significant differences in muscle flexibility before and after the fifth trial for between the volunteer groups. Therefore, it can be concluded that steam bath products, both standard and steam-bombed, are equally effective in enhancing muscle flexibility. Thus, herbal steam bombs can be an option for post-exercise. Regarding satisfaction assessment among volunteers, both groups expressed satisfaction with various aspects of the herbal steam therapy, including muscle flexibility, relief from bodily pains, aroma of the products, and their impact on the respiratory system at the highest level. This study and product development can create value for herbal medicine formulations and guide future health business ventures such as spas and fitness and wellness centres.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

AUTHOR'S CONTRIBUTIONS

Taraporn Suntorn, Piyanuch Suwannarat, Sirirat Sriraksa, Chutikan Keanwrit, Seeham cheleng and Wannur-adila Maleah designed the study, gathered the research data, and conducted the analysis. Piyanuch Suwannarat, Taraporn Suntorn and Supatra Promin revised the draft of the manuscript and approved the final version to be published.

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