

การพัฒนาผลิตภัณฑ์สปา ตำบลบางระกำ อำเภอบางเลน จังหวัดนครปฐม: กรณีศึกษา
เบื้องต้นเถาวัลย์เปรียง เถาเอ็นอ่อน และว่านนางคำในลูกประคบสมุนไพร
Development of the Spa Products in Bangrakam Subdistrict, Banglen
District, Nakhon Pathom Province: Primary Case Study of *Derris scandens*,
Cryptolepis buchanani and *Curcuma aromatica* in Herbal Compress

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บทคัดย่อ

การวิเคราะห์องค์ประกอบทางเคมีเบื้องต้นของสารสกัดน้ำเถาวัลย์เปรียง เถาเอ็นอ่อนและว่านนางคำ พบว่า สมุนไพรทั้งสามมีสารต้านอนุมูลอิสระ และเฉพาะเถาวัลย์เปรียงเท่านั้นที่พบฟลาโวนอยด์ การศึกษาฤทธิ์ผ่อนคลายกล้ามเนื้อของลูกประคบสมุนไพรกับกลุ่มผู้ทดสอบเฉพาะโดยใช้แบบสอบถามความพึงพอใจ 5 ระดับ และมีข้อเสนอแนะปลายเปิด พบว่า ผู้ทดสอบรู้สึกผ่อนคลายกล้ามเนื้อหลังใช้ลูกประคบสมุนไพรสูตรที่มีเถาวัลย์เปรียงและเถาเอ็นอ่อน ซึ่งมีความแตกต่างอย่างมีนัยสำคัญทางสถิติที่ 0.05 ($p < 0.05$) ในขณะที่สูตรที่มีว่านนางคำผสมเถาวัลย์เปรียงและเถาเอ็นอ่อน ตามลำดับ มีแนวโน้มช่วยเสริมฤทธิ์ผ่อนคลายกล้ามเนื้อได้รวมทั้งให้ความชุ่มชื้นและความนุ่มเนียนกับผิวหลังการประคบอีกด้วย สำหรับความพึงพอใจคุณภาพโดยรวมของสูตรลูกประคบสมุนไพรทั้งหมด จะเห็นว่า ผู้ทดสอบพึงพอใจสูตรที่มีเถาวัลย์เปรียง เถาเอ็นอ่อนและว่านนางคำเป็นส่วนประกอบทั้งหมด อย่างไรก็ตาม ควรใช้เครื่องมืออิเล็กทรอนิกส์ (electromyogram) วัดการทำงานของกล้ามเนื้อด้วย เพื่อยืนยันผล การทดสอบการออกฤทธิ์ผ่อนคลายกล้ามเนื้อให้น่าเชื่อถือยิ่งขึ้น

คำสำคัญ: ลูกประคบ เถาวัลย์เปรียง เถาเอ็นอ่อน ว่านนางคำ ตำบลบางระกำ อำเภอบางเลน จังหวัดนครปฐม

Abstract

The preliminary phytochemical analysis of *Derris scandens*, *Cryptolepis buchanani* and *Curcuma aromatica* aqueous extracts showed free radical scavenging activity and only *D. scandens* was found that containing flavonoids. The herbal compress, comprising of *D. scandens*, *C. buchanani* and *C. aromatica* as an active ingredient, was studied on relieving of muscular pains and aches in the purposive sampling using a 5-Heidonic scale satisfactory questionnaire with an opening comment. For the results, it was found that the volunteers perceived to relieve a muscular tension after treatment of the herbal compress formula that containing *D. scandens* and *C. buchanani* with a statistical difference at 0.05 ($p < 0.05$). While the formulae containing *C. aromatica* / *D. scandens* and *C. aromatica* / *C. buchanani* trended to be a synergism as a tendolysis activity. Moreover, *C. aromatica* also exhibited as a skin softener and a moisturizer. Generally, all volunteers pleased with the quality of the herbal compress formula that comprising entirely *D. scandens*,

C. buchanani and *C. aromatica*. However, this activity should be further confirmed by using an electromyogram as the scientific equipment for determination of muscular contractility.

Keywords: herbal compress; *Derris scandens*; *Cryptolepis buchanani*; *Curcuma aromatica*; Bangrakam subdistrict, Banglen district, Nakhon Pathom Province

1. INTRODUCTION

Bangrakam subdistrict is located in Banglen district, Nakhon Pathom Province and also has 15 villages which cover about 30 square kilometers. The landscape is a low plan area and there is the Ta Jeen River flowing through. The principal career of people who inhabit in the community is an agriculturist, and also an employee and an owner are subordination [1]. Some housewife and older have gotten together the united groups, such as a spa group, following their attention and aptitude to propose for main or supply earning. In addition, major customers of the spa group are inhabitants who have pains and aches after routine. After our group has organized the spa group's workshop, we found that many products which were used for massage and distributions have been mostly available from elsewhere. This affect gets them to have a little income. Thus, the members have required the manual preparation of the spa products and the herbal compress is the first choice product.

The herbal compress is a spa product containing a variety of fresh or dried herbs that are known to remedy deformed tendon, ached and a tired muscle, to relieve a swell and inflammation, and also to treat dermatitis. All herbs are mixed and packed in a calico as a ball, after steamed, and it's taken to compress on the organ. The action of remedy is the releasing of active compounds from herbs *via* a stored heat inside a ball [2]. Probably, three herbs, *Derris scandens*, *Cryptolepis buchanani* and *Curcuma aromatica*, could be interestingly used as an important ingredients in the herbal compress.

Derris scandens (Roxb.) Bent. (family: Leguminosae), knew as Thao Wan Priang, is one of the alternative medicinal plants commonly used in Thailand [3], [4]. *D. scandens* is a woody vine growing throughout Southeastern Asia. Its natural leaves are similarly sorted as a feather. The flower is a pale pink likely as a bean flower. The fruit of *D. scandens* is a sheath. There are two kinds of *D. scandens*, red and white, that show similar properties. Normally, the white kind is popular used because the red one is difficultly available. In Thai traditional medicine [5], *D. scandens* stem was widely used instead of tea leaves for drinking with treatment of expectorant, antitussive, diuretic, antidysentery, ache, beriberi and cachexia. Biologically, *D. scandens* aqueous extract displayed anti-inflammatory activity both *in vivo* and *in vitro* experiments [6], anti-free radical scavenging activity [7], [8], anticancer [9] and diabetes [10]. In addition, it was found that a 400 mg/day dosing of *D. scandens* extract was used for immunostimulating activity [11]. Recently, the Department of Medicinal Sciences has successfully research of the *D. scandens* extract to cure back and joint pains [12]. Moreover, it would be further promoted to be an inflammatory medicine instead of a steroidal drug from the foreign countries. Most chemical constituents, which had been reported, were free and glycoside isoflavones [13], [14], [15], such as chadalone (1), derriscandenoside A-E (2-6), derriscannoside A-B (7-8) and *etc* (Figure 1).

Cryptolepis buchanani Roam. & Schult (family: Asclepiadaceae) are commonly called in Thai name as Thao En On. It is distributed throughout hot deciduous forests of Southeastern Asia including Thailand. Its botany is a woody vine with inner white latex, a yellow flower, a double sheath and a single leaf [3]. Ethnologically, *C. buchanani* was used as a medicine [16] for anti-diarrhoeal, anticulcerative, anti-inflammation, cough treatment and antibacterial activity, by drinking of the stems or leaves aqueous extracts. Its pharmacology had

been reported such as anti-inflammatory activity [17], [18], whose cause was muscular and joint pains and arthritis, immune stimulating activity [16], [19], [20], antifungal activity against a human dermatophytic fungi [21], antibacterial [22], [23] and cardiac [24] activities. The major chemical constituents [22], [25], [26], [27] were found in this plant, were cardenolide glycosides i.e. cryptosin (**9**) and cryptanosides A (**10**), and alkaloids such as buchananine (**11**) together with keto fatty acids [28] (Figure 2).

Curcuma aromatica Salisb, commonly known as Wann Naang Kham (or wild tumeric), belongs to the family Zingiberaceae. It is an erect perennial species herb scattering throughout the tropical and subtropical regions of the world and is widely cultivated in Asia countries including Thailand. Its rhizome is a light yellow and possesses a camphoraceous odour [3]. Historically, *C. aromatica* rhizome was used as an antibiotic against various microbial infections, tonic, carminative, rash, infected and blued skin and improvement of complexion. The root of *C. aromatica* has been also used as expectoration and chronic gonorrhoea. The bioactive potential activities were reported to exert various activities such as antibacterial and antifungal activities [29], healing for wound, inflammation [30] and muscular contraction [31]. The active compounds were found in *C. aromatica* rhizome contained largely curcuminoids, curcumin (**12**), demethoxycurcumin (**13**) and bis-demethoxycurcumin (**14**) (Figure 2) as antioxidant and whitening agents [32]. Mainly, volatile oil composed of camphor, borneol, caryophyllene oxide, camphene, curcumadione and curcumol [33], [34], [35], [36].

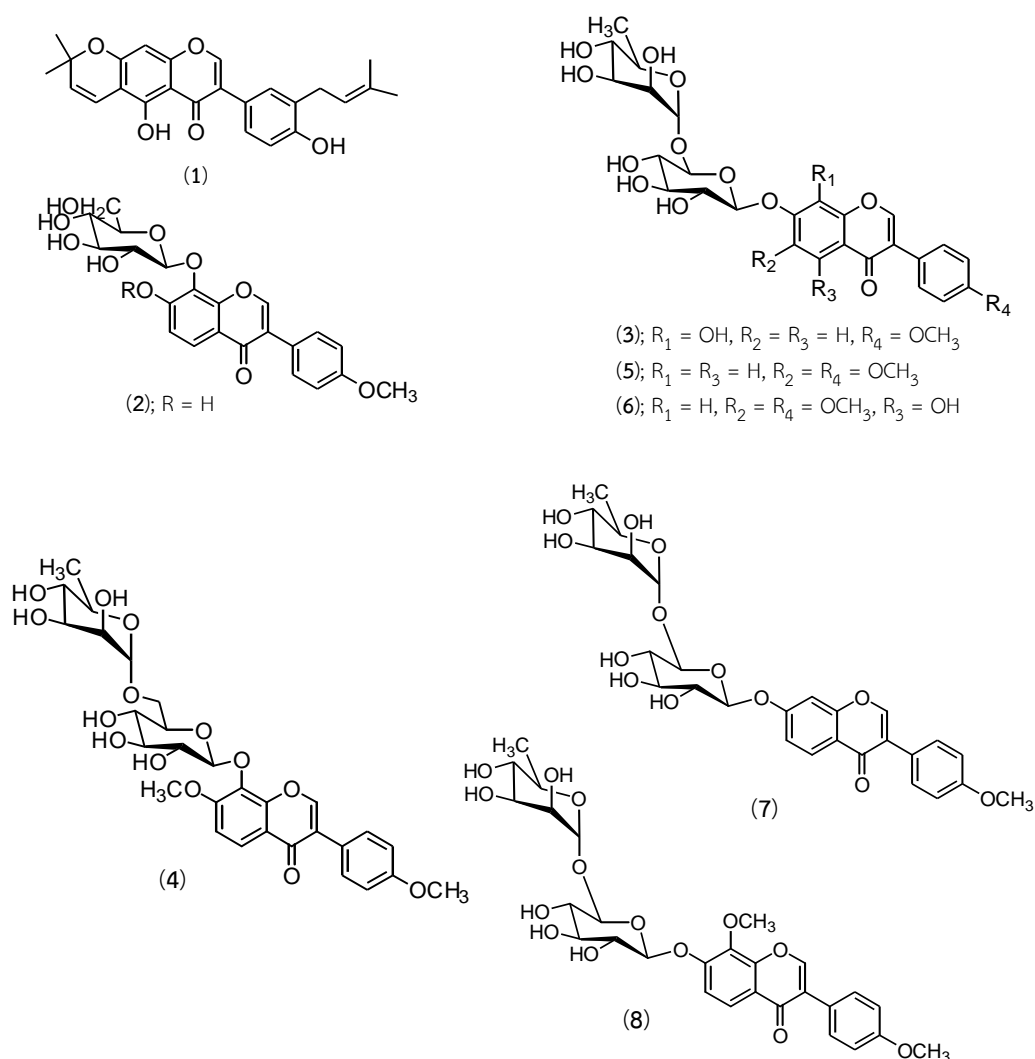


Figure 1: Active constituents from *D. scandens*

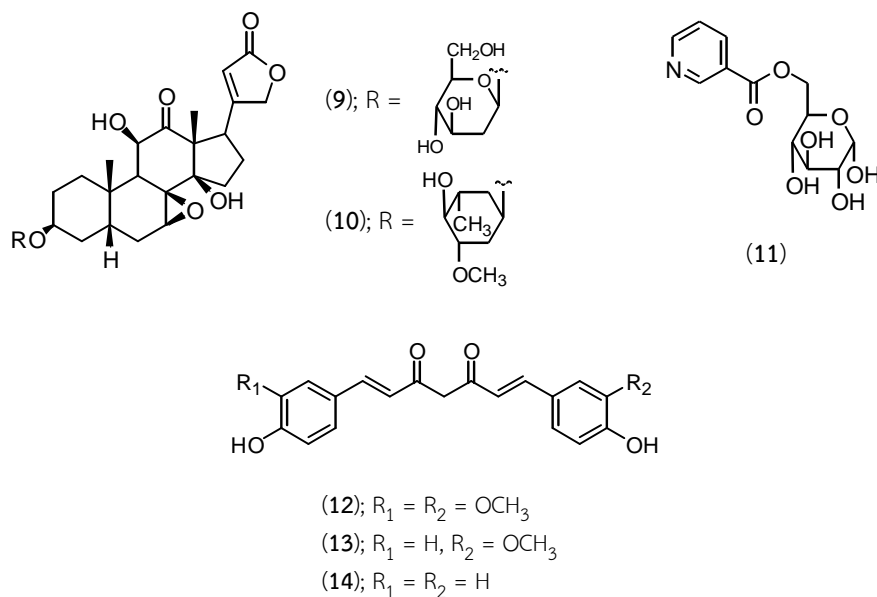


Figure 2: Active constituents from *C. buchanani* and *C. aromatica*

As according to, people have currently preferred to use the herbal compress for relieving muscular aches and pains. Also, many formulae have been prepared depend on herbs in each area [37]. However, its specification must contain at least three herbs, *Zingiber cassumunar* (or Plai), *Curcuma longa* (or Kha Min Chan) and *Cymbopogon citratus* (or Ta Krai), that has been assigned by the Thai Community Product Standard (TCPS) no. 176/2003 [38]. Therefore, the aim of this research is to study and develop the herbal compress formulae, containing *D. scandens*, *C. buchanani* and *C. aromatica* that could be used in following their properties. The useful of this research, we hope that it would be increasing of their efficacy and added product value. Additionally, the local people would have more earn corresponding to the local development planning of Bangrakam subdistrict in 1998 [39] that has been assigned to inhabitants for learning of a research methodology by themselves and to live on one's own toil for sustainable.

2. MATERIAL AND METHODS

2.1 Plant materials

All fresh herbs, *D. scandens* stems, *C. buchanani* stems, *C. aromatica* rhizomes, *Z. cassumunar* rhizomes, *C. longa* rhizomes, *C. citratus* aerial part, *Citrus hystrix* peels, *Tamarindus indica* old leaves and *Acorus calamus* rhizomes, were collected surrounding Nakhon Pathom Province.

2.2 General procedures

The dried and ground *D. scandens* or *C. buchanani* or *C. aromatica*, 20 g, was macerated with water at 60-70 °C during 6 hrs. Then, it was filtered to afford the aqueous extracts of *D. scandens* or *C. buchanani* or *C. aromatica*, respectively.

The R_f value was carried out on TLC aluminum sheet as Kiesel gel 60 (SiO₂), F₂₅₄ (230-400 mesh) of Merck.

2.3 Phytochemical screening methods

1. *Flavonoids screening* as follows: [40]

- *Flavones, Flavonols and Flavonones:*

A testing method was usually called as a cyanidin reaction. Three or four small pieces of magnesium metal following by 10 drops of *conc.* HCl were added into the extract. The color of solution was observed in order to classify the presence of flavonoids that would specifically display their color, a yellow to a red as flavones, a crimson as flavonols, a green or a blue as a flavonones and a magenta as flavonone glycosides.

- *Anthocyanidins:*

1% HCl was added into the extract and then heated to appear an orange to a bluish red solution as a positive test.

- *Leucoanthocyanidins:*

2 M HCl and 1-propanol were added into an extract and then heated for 15-30 min to afford a red or purple solution as a positive test.

2. *Anti-free radical scavenging screening* as follows:

Each extract was spotted on TLC and then developed in a chamber containing a suitable mobile phase of each aqueous extract, 75% ethanol/ethyl acetate for *D. scandens* extract, 75% ethanol/H₂O for *C. buchanani* and 75% methanol/H₂O for *C. aromatica*, until the mobile phase reached to the solvent front. Then, it was carried off to give a chromatogram and the position of the spot was marked after detection with UV₂₅₄ and 366 nm lamps and further sprayed over with 1.2x10⁻⁴ M DPPH. A positive test showed an off-purple spot whose *R_f* value was calculated as follow:

$$R_f = \text{A distance of compound spot} / \text{A distance of solvent front}$$

2.4 Preparation of the herbal compress

All herbs were cleaned and then sliced into the smaller pieces before incubating at 60-70 °C until dry. Each ingredient of herbal compress formula was weighed following the ratio (Table 1) and then mixed together. A mixture was filled into a calico and tightly packed with a rope yarn to afford the herbal compress as a ball with a diameter of 9 cm.

The efficacy of the tested herbal compress, was steamed for 5 min before using, was compared to a control that were performed by a 5-Heidonic scale satisfactory questionnaire with an opening comment. Statistical data analysis was evaluated by Microsoft office Excel 2007. The sampling method was a purposive sampling [41] for using 10-15 volunteers/formula who had aches and pains.

Table 1: Weight of active ingredients in a variety of herbal compress

Ingredients	Weight (g) / formula						
	control	1	2	3	4	5	6
<i>Z. cassumunar</i> rhizomes	37.5	37.5	37.5	37.5	37.5	37.5	37.5
<i>C. longa</i> rhizomes	15.0	15.0	15.0	15.0	15.0	15.0	15.0
<i>C. citratus</i> aerial part	15.0	15.0	15.0	15.0	15.0	15.0	15.0
<i>Citrus hystrix</i> peels	3.75	3.75	3.75	3.75	3.75	3.75	3.75
<i>Tamarindus indica</i> old leaves	7.5	7.5	7.5	7.5	7.5	7.5	7.5
<i>Acorus calamus</i> rhizomes	7.5	7.5	7.5	7.5	7.5	7.5	7.5
camphor	3.75	3.75	3.75	3.75	3.75	3.75	3.75
<i>D. scandens</i> stems	-	7.5	-	-	7.5	-	7.5
<i>C. buchanani</i> stems	-	-	7.5	-	-	7.5	7.5
<i>C. aromatica</i> rhizomes	-	-	-	7.5	7.5	7.5	7.5

3. RESULTS AND DISCUSSION

The qualities of *D. scandens*, *C. buchanani* and *C. aromatica* were identified by the preliminary phytochemical testing for flavonoids and free radical scavenging activity. Consequently, it was found that the flavonoids screening was only appeared in *D. scandens* aqueous extract [21], [42], while all extracts showed the free radical scavenger constituents (Table 2). We expected that they contained flavonoids and/or phenolic compounds. Mechanically, these compounds (Ar-OH) were reacted with DPPH radical to give the most stable radical (Ar-O[•]). In addition, the radical on the oxygen atom could be delocalized, commonly called as a resonance effect (Figure 3).

Table 2: Preliminary phytochemical analysis of *D. scandens*, *C. buchanani* and *C. aromatica* aqueous extracts

Active constituents	Tested results		
	<i>D. scandens</i>	<i>C. buchanani</i>	<i>C. aromatica</i>
Flavones, Flavonols and Flavonones	+	-	-
Anthocyanidins	+	-	-
Leucoanthocyanidins	-	-	-
Anti-free radical scavengers	+ ($R_f = 0.45-0.55$)	+ ($R_f = 0.7-0.85$)	+ ($R_f = 0.6-0.8$)

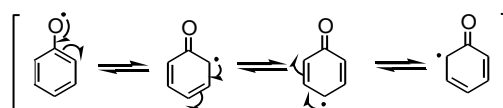
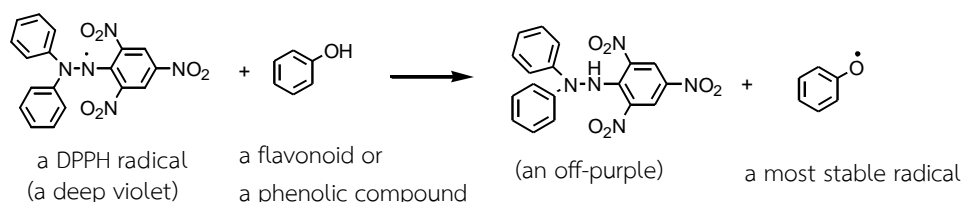


Figure 3: Reaction between DPPH radical and anti-free radical compound

Comparatively, the herbal compress (formulae 1-6) consisting of *D. scandens*, *C. buchanani* and *C. aromatica* were tested for their effects with the control formula containing rhizomes of *Z. cassumunar* [43] and *C. longa* [44] with anti-inflammation and relieving for aches and pains, *C. citrus* peels for treatment of nausea [45], *T. indica* leaves for anti-itching [46] and camphor [44], *A. calamus* rhizomes and *C. citratus* aerial part [47] for an aroma. The effects were tested with the specified volunteers and then evaluated by using the 5-Heidonic scale satisfactory questionnaire with an opening opinion. For the results (Table 3), it was found that both formulae 1 (3.50 score) and 2 (3.48 score) comprising *D. scandens* and *C. buchanani*, respectively, showed to relieve muscular aches and pains with a statistical difference at 0.05 ($p < 0.05$). The volunteers preferred the formulae 4 (3.10 score) and 5 (3.40 score), containing *C. aromatica/D. scandens* and *C. aromatica/C. buchanani*, respectively, by comparison with the formula 3 (3.07 score) that included only *C. aromatica*. This means that *C. aromatica* could be inclined to a synergism of *D. scandens* and *C. buchanani*. In addition, *C. aromatica* also provided a good skin softening and moisturizing effects. In general, the herbal compress composing of *D. scandens*, *C. buchanani* and *C. aromatica* especially formula 6 ($p < 0.05$), that had three herbal components, which showed higher quality than control.

Table 3: Satisfactions of the herbal compress formulae using a 5-Heidonic scale questionnaire

Items	Satisfactions / the herbal compress formula						
	control	1	2	3	4	5	6
to relieve aches and pains	3.00 ^{a, b}	3.50 ^a	3.48 ^b	3.07	3.10	3.40	3.33
aroma	3.07 ^c	3.10	3.07	3.83 ^c	3.33	3.40	3.40
skin moisturizer	3.26	3.47	3.10	3.33	3.40	3.27	3.54
skin softener	3.38 ^d	3.47	3.69	3.26	3.50	3.20	3.83 ^d
average	3.18	3.39	3.34	3.37	3.33	3.32	3.53

^{a, b, c, d} were a statistical difference of 0.05 ($p < 0.05$)

4. CONCLUSION

D. scandens and *C. buchanani* in herbal compress should be used for a muscular relaxation, while *C. aromatica* trended to be a synergism including skin moisturizer and softener. Unfortunately, these results were evaluated from small amounts of the available volunteers. Thus, it should be accurately confirmed by using an electromyogram which is the scientific equipment. Furthermore, we have continually attempted for research to develop the herbal compress which leading to its standard in the future.

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