การตั้งตำรับเจลผสมสารสกัดเนระพูสี

Gel Formulation containing *Taccaceae chantrieri* ANDRE Extract

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บทคัดย่อ

ตำรับเจลจากสารสกัดเนระพูสีพัฒนาโดยการใช้สารก่อเจลชนิดต่างๆ ทั้งยังหาปริมาณสารก่อเจลที่เหมาะสม โดยสารก่อเจลที่ใช้เป็นแบบกึ่งสังเคราะห์ และแบบสังเคราะห์ที่ประกอบด้วย ไฮดรอกซีโพรพิว-เมททิวเซลลูโลส และกลุ่มคาร์โบเมอร์ ตำรับเจลที่ใช้แบบสังเคราะห์ที่ความเข้มข้นร้อยละ 0.500 โดยน้ำหนัก เป็นสารก่อแจลที่ให้ลักษณะทางกายภาพของเจลที่ดีที่สุด เมื่อทำการทดสอบความคงตัวตำรับเจลที่ใช้แบบสังเคราะห์ ที่ความเข้มข้นร้อยละ 0.500 โดยน้ำหนัก ที่ผสมสารสกัดเนระพูสีร้อยละ 1.000 โดยน้ำหนัก ยังคงสภาพเจลที่ดี ไม่ก่อให้เกิดการแยกชั้น หรือเปลี่ยนสภาพเป็นของเหลว เมื่อนำไปวิเคราะห์ด้วยเครื่องแยกของเหลวความดันสูง (HPLC-ELSD) พบว่ามีสารสกัดเนระพูสีเหลืออยู่ประมาณร้อยละ 0.570 – 0.580 โดยน้ำหนัก

คำสำคัญ: สารสกัดว่านค้างคาวดำ, ตำรับเจล, เครื่องแยกของเหลวความดันสูง

Abstract

The gel formulation of *Taccaceae chantrieri* ANDRE Extract (Tacca extract) was developed by various gel makers. The semi-synthetic and synthetic of hydroxypropyl methylcellulose and carbomer were used as a gel maker. The best gel formulation was synthetic gel maker at the concentration 0.500% w/w that gave the best physical appearance. After stability testing, synthetic gel maker at the concentration 0.500% w/w with 1.000% w/w Tacca extract show no seperation and liquidity. Then, this del formution with Tacca extract was deteced with HPLC-ELSD. The concentration 0.570 – 0.580 % w/w was left after detected with HPLC-ELSD.

Keywords: Tacca extract, gel formulation, HPLC-ELSD

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Statement and significance of problem

Gels are semi-solid liquid dosage form widely used in cosmetic products, cosmeceutical and pharmaceutical. Gels consist of liquid compartment and gelling agent. They contain hydrophilic colloid inflation in certain concentrations. They can be classified to two types including hydrophobic gel and hydro gel. A characteristic of gels are clear, smooth, non irritant, maintain good performance and easy to absorp[1]. Further, gel formulas are suitable for oily skin and sensitive skin types than cream, emulsion and ointment. Its due to oily skin and sensitive skin types are charecterized by inflammation and pain that easy noticeable by acne[2]. The preparation hydrogel containing gelling agent(s), alcohol(s), surfactant(s), humectant(s), preservative, purified water, and active ingredient(s). To prepare gel properties need to be selected for the best gel-making ingredient for making gel suitable with active ingredient or other components.

Taccaceae chantrieri ANDRE (Tacca) is Thai herb which contain wide rang of pharmaceutical activitties, including anti-inflammatory and immunological effect[3]. This herb has also used as a hair treatment in hill tribe person[4]. It has been used in China as folk medicine to treatment toothache. The active substance in its rhizome namely saponin, had the anti-inflammatory effect[5]. Saponin is thermal sensitive. During soaking and blanching, portions of saponins are dissolved in water and lost in the soaking, washing, and blanching liquors[6]. This study interested in the development of gel formula with Tacca extract in order to gain good gel properties that easily to absorp. This study also dertermine yield of Tacca extract in gel formula by HPLC-ELSD machine.

Objectives

- To develop gel base formula by using difference gelling agent
- To study the stability of gel formula with *Taccaceae chantrieri* ANDRE extract
- To determine amount of *Taccaceae chantrieri* ANDRE extract after added in gel formula by HPLC-ELSD analysis

Materials and methods

Plant extract: The rhizomes of *Taccaceae chantrieri* ANDRE were washed, ground, and dried to derived find powder. The power was subjected to maceration by 95% ethanol and partition by *n*-butanol to gave crude Tacca extract. Then, crude Tacca extract was dried by evaporation and lyophilization.

Gel formulation: Hydroxypropyl methylcellulose (HPMC), carbopol®940 polymer (940), carbopol®Ultrez™10 polymer (10), and carbopol®Ultrez™21 polymer (21) were used as a gelling

agent. The propotion of the foemulation was show in Table 1. Each ingredient was dispersed in 75 °C. The formula was neutralized by triethanolamine when it cool down. The best gel formulation will added 1.000% w/w Tacca extract as a active ingredient.

Table 1 Gel formulation

Formula	Chemical									
(%w/w)	HPMC	940	10	21	PEG 400	PEG	95% EtOH	paraben	99% TEA	DI H_2O
1	0.500	-	-	-	4.000	8.000	60.000	0.220	0.500	Qs.
2	1.000	-	-	-	4.000	8.000	60.000	0.220	0.500	Qs.
3	1.500	-	-	-	4.000	8.000	60.000	0.220	0.500	Qs.
4	2.000	-	-	-	4.000	8.000	60.000	0.220	0.500	Qs.
5	-	0.500	-	-	4.000	8.000	60.000	0.220	0.500	Qs.
6	-	1.000	-	-	4.000	8.000	60.000	0.220	0.500	Qs.
7	-	1.500	-	-	4.000	8.000	60.000	0.220	0.500	Qs.
8	-	2.000	-	-	4.000	8.000	60.000	0.220	0.500	Qs.
9	-	-	0.500	-	4.000	8.000	60.000	0.220	0.500	Qs.
10	-	-	1.000	-	4.000	8.000	60.000	0.220	0.500	Qs.
11	-	-	1.500	-	4.000	8.000	60.000	0.220	0.500	Qs.
12	-	-	2.000	-	4.000	8.000	60.000	0.220	0.500	Qs.
13	-	-	-	0.500	4.000	8.000	60.000	0.220	0.500	Qs.
14	-	-	-	1.000	4.000	8.000	60.000	0.220	0.500	Qs.
15	-	-	-	1.500	4.000	8.000	60.000	0.220	0.500	Qs.
16	-	-	-	2.000	4.000	8.000	60.000	0.220	0.500	Qs.

Physical evaluation: The physical charecteristic of gel formula were evaluated by sensory tests (appearance, color, odor, and compatible). The pH value was also measured. The viscosity was measured by viscometer with RV-6 spindle at 60 rpm.

Temperature stability test: The gel formula with Tacca extract in transparent glass bottom was carried out under freeze-thaw cycle (four cycles). The gel formula was stored in freezer (-20.0 ± 2.0 °C) for 16 h. and room temperature for 8 h. The physical evaluation was test (as describe above).

Photo stability test: The gel formulations were stored at different light source for 7 days (at window room temperature and exposure to sunlight).

HPLC-ELSD analysis: The amount of Tacca extract in gel formula was measured by HPLC-ELSD. The HPLC system was CH_3Cl: MeOH: H_2O (70:25:5 %w/v). The standard was 0, 200, 400, 600, 800, 1000 ppm of Tacca extract in MeOH.

Conclusions

The results of physical charecteristics of gel formula of each gelling agent were showed in Table 2. The best gelling agent was formula 13th that show moderate viscosity, clear appearance, low air bubble in the gel formula.

Table 2 The physical appearance of gel formula

Formula	Gelling agent	Concentration (%w/w)	Physical appearance				
			Compatible	Viscosity	Appearance	Bubble	Odor
1	HPMC	0.500	Homo	+	Turbid	No	Normal
2	HPMC	1.000	Homo	+	Turbid	No	Normal
3	HPMC	1.500	Homo	+	Turbid	No	Normal
4	HPMC	2.000	Homo	++	Turbid	No	Normal
5	940	0.500	Homo	++	clear	+++	Normal
6	940	1.000	Homo	+++	clear	+++	Normal
7	940	1.500	Homo	++++	clear	+++	Normal
8	940	2.000	Homo	+++++	clear	+++	Normal
9	10	0.500	Homo	+	clear	+++	Normal
10	10	1.000	Homo	++	clear	+++	Normal
11	10	1.500	Homo	+++	clear	+++	Normal
12	10	2.000	Homo	++++	clear	+++	Normal
13	21	0.500	Homo	++	Very clear	+	Normal
14	21	1.000	Homo	+++	Very clear	+	Normal
15	21	1.500	Homo	++++	Very clear	+	Normal
16	21	2.000	Homo	++++	Very clear	+	Normal

Homo= Homogeneous

+ = very low viscosity/bubble ++ = low viscosity/bubble

+++ = normal viscosity/bubble ++++ = high viscosity/bubble

+++++ = very high viscosity/bubble

The physical charecteristic of gel formula with 1.000% of Tacca extract showed good texture without bubbles and pule brown color. The stability testing showed in Table 3. After finish the

temperature test under freeze-thaw cycle for four times and photo stability test, the gel formula with Tacca extract showed no difference to normal gel but the color was reduce after exposed to sunlight.

Table 3 The stability test of gel formula with Tacca extract

Cycle	Viscosity	pH	Physical appreance			
			Compatible	Appearance	Bubble	Odor
Gel base	11850	6.58	Homo	Clear	+	Normal
0	15027	6.65	Homo	Opaque	+	Normal
1	15398	6.60	Homo	Opaque	+	Normal
2	15470	6.60	Homo	Clear	+	Normal
3	15633	6.60	Homo	Clear	+	Normal
4	15950	6.60	Homo	Clear	+	Normal

Homo= Homogeneous

+ = very low bubble ++ = low bubble +++ = normal bubble

++++ = high bubble +++++ = very high bubble

The amount of Tacca extract in gel formulas were measured by HPLC-ELSD. The standard Tacca extract showed the retention time at 3.002 – 3.123. The 1.00% w/w of Tacca extract was added into gel formula. After that the gel formula was test the photo stability. The amount of gel formula with Tacca extract that stand at window room temperature was 0.580% w/w. The amount of gel formula with Tacca extract that exposed to sunlight was 0.570% w/w.

Discussion

The hydro-gel is the hydrophilic gel. The carbopol®Ultrez™21 polymer is the best gelling agent cause it easily dispersed and good swelled in hot water. The amount of carbopol®Ultrez™21 polymer at 0.500% w/w was the best of dispersion and swelling that its physical appearance and stability. After stability testing of Tacca extract in gel formula, the amount of extract was decrese case its degrade by light and sunlight. The stability test is the test that accerate 4 times the expiring date of the product. It can garuntee that the Tacca extract still remind in gel formula eventhough it expire.

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