



Synerisis and Cycling Test the Sendok Leaf Extract Gel (Plantago Mayor L.) with Optimization of Variations of Gelling Agent Carbomer 940 Concentration

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Abstract

The purpose of this study was to determine the effect of the concentration of the gelling agent Carbomer 940 on the gel of daun Leaf Extract (Plantago major L.). The method used is the experimental method. The extraction method used is maceration with 96% alcohol. The design in this study is the manufacture of a gel formulation of sendok Leaf extract (Plantago major L.) with the concentration of the gelling agent Carbomer 940 and the syneresis test. Syneresis test results show that all formulas do not occur syneresis. The results of the cycling test showed that the sendok Leaf (Plantago major L.) extract gel was not affected by storage temperature. The conclusion of this study shows the effect of variations in the concentration of the gelling agent Carbomer 940 on the quality of gel.

Keywords: *Synerisis test, Cycling test, Gel, Sendok leaves*

Introduction

The use of traditional plants as medicine is the main choice for some Indonesian people, this is because drugs derived from plants have a cheaper price, are easier to obtain and have low side effects [1]. Sendok leaves (Plantago major L.) are very easy to grow and categorized as weeds, but after commercialization efforts for herbal, many harvests are carried out from nature, even in some areas they have begun to be cultivated [2]. Sendok Leaf Extract (Plantago major L.) has several pharmacological activities, one of which is anti-inflammatory. The chemical content which has anti-inflammatory properties, namely aucubin [3].

The chemical content of aucubin is obtained through the extraction process. Extraction is the process of separating compounds in solution based on differences in their solubility. The selection of the extraction method is very important because the extraction results will reflect the success rate of the method used.

The extraction method used is the maceration method by modifying the remaceration. The purpose of remaceration is to get a lot of active substances because by using a new solvent the absorption is stronger to attract the active substances in the leaves.

The advantages of the maceration method are that the tools used are simple and low cost.

The gel is able to provide a cool feeling on the skin so that it feels comfortable when applied to the intended area and the preparation is easy to dry to form a film that is easily washed off with water. The use of spoon leaves as an anti-inflammatory can be facilitated by formulating it in a gel preparation. The high water content in the gel base can cause hydration of the stratum corneum so that it will facilitate drug penetration through the skin [4].

The physical and stability of the gel are determined by the gelling agent and humectant used. The composition of the gelling agent must be considered so as to produce preparations that have good stability and physical properties [4]. The gelling agent used, Carbomer 940, is a gel-forming agent that is safe to use because it is non-toxic and non-irritating, while the humectants used are glycerin and propylene glycol.

The purpose of this study was to determine the concentration of the gelling agent Carbomer 940 which resulted in the optimal formula and to determine the effect of variations in the concentration of the gelling agent Carbomer 940 on the quality of the gel preparations of Sendok Leaves (Plantago major L.) extract.

Material and Method

The materials used were sendok leaf extract (*Plantago major* L), carbomer 940, Triethanolamine (TEA), Propolengglycol, glycerin, Methyl paraben, 96% ethanol, aquadestilata.

The extract sendok leaves (*Plantago major* L) obtained from cultivated plants in Dusun Parakanpanjang, Desa Sukamanah, Kecamatan Cigalontang, Kabupaten Tasikmalaya. After going through the process of wet sorting, washing, chopping, drying and dry sorting, then put simplicia into a vessel, add 96% ethanol solvent using a ratio of 1:10. Stir until all simplicia is moistened with solvent. Soak for 3x24 hours. Every 1x24 hours replaced with a new solvent. Then the resulting filtrate filtered using filter paper and the volume of the filtrate is measured. The collected filtrate heated using a rotary evaporator at a temperature of 60°C until the solvent used evaporates and produces the desired thick extract.

Gelling by adding hot aquadest (temperature 80°C) into a mortar of 10 times its weight for 30 minutes with the addition of variations in the concentration of gelling agent carbomer 940 until it

is fully dispersed and swells. Then drop 5 g of TEA little by little, stir until homogeneous. Dissolve 0.05 g of methyl paraben with hot aquadest (temperature 80°C) into the gel base, stir until homogeneous. Add 0.25 g of spoon leaf extract dispersed with 25 g of propylene glycol, in a separate container put into a gel base, stir until homogeneous. Add 50 g of glycerin to the gel base, stir until homogeneous. Add hot aquadest (temperature 80°C) little by little until the volume is 250 g and a gel mass is formed^[5].

The syneresis test was carried out by putting 10 grams of gel preparation into the ointment pot and then storing it at a temperature of $\pm 10^{\circ}\text{C}$, observations were made at 24, 48, and 72 hours, observing whether or not shrinkage occurred^[6].

The cycling test was carried out by storing the gel at 4°C for 24 hours and then transferred to an oven at 40°C for 24 hours. The time during storage of these 2 temperatures is considered 1 cycle. The stability test was carried out for 3 cycles, then look at the organoleptic and pH of the gel^[6].

Results

Table 1: Syneresis test results

Replication	Negative Control	F I	F II	F III	F IV
I	Not occur Syneresis	Not occur Syneresis	Not occur Syneresis	Not occur Syneresis	Not occur Syneresis
II	Not occur Syneresis	Not occur Syneresis	Not occur Syneresis	Not occur Syneresis	Not occur Syneresis
III	Not occur Syneresis	Not occur Syneresis	Not occur Syneresis	Not occur Syneresis	Not occur Syneresis

Negative Control: Formulation without gelling agent

F I: Formulation with a gelling agent concentration of 0.75%; F II: Formulation with a gelling agent concentration of 1%; F III: Formulation with a gelling agent concentration of 1,25 %; F IV: Formulation with a gelling agent concentration of 1,5 %

Table 2: Organoleptic test results after cycling test

Organoleptic Test	Negative Control	F I	F II	F III	F IV
Color	Green Brown	Green Brown	Green Brown	Green Brown	Green Brown
Smell	Typical Sendok Leaves	Typical Sendok Leaves	Typical Sendok Leaves	Typical Sendok Leaves	Typical Sendok Leaves
Form	Liquid	Liquid	Liquid	Thick	Thick

Negative Control: Formulation without gelling agent

F I: Formulation with a gelling agent concentration of 0.75%; F II: Formulation with a gelling agent concentration of 1%; F III: Formulation with a gelling agent concentration of 1,25 %; F IV: Formulation with a gelling agent concentration of 1,5 %

Table 3: Results of Homogeneity Test after cycling test

Replication	Negative Control	F I	F II	F III	F IV
I	Homogen	Homogen	Homogen	Homogen	Homogen
II	Homogen	Homogen	Homogen	Homogen	Homogen
III	Homogen	Homogen	Homogen	Homogen	Homogen

Negative Control: Formulation without gelling agent

F I: Formulation with a gelling agent concentration of 0.75%; F II: Formulation with a gelling agent concentration of 1%; F III: Formulation with a gelling agent concentration of 1,25 %; F IV: Formulation with a gelling agent concentration of 1,5 %

Table 4: pH test results after cycling test

Replication	Negative Control	F I	F II	F III	F IV
I	8	6,5	6,3	6	4,8
II		6,5	6,5	6	5,5
III		6,6	6,5	6	4,5
Average	8	6,5	6,43	6	4,93

Negative Control: Formulation without gelling agent

F I: Formulation with a gelling agent concentration of 0.75%; F II: Formulation with a gelling agent concentration of 1%; F III: Formulation with a gelling agent concentration of 1,25 %; F IV: Formulation with a gelling agent concentration of 1,5 %

Discussion

The results of the syneresis test based on table 1 show that there is no syneresis in the gel which is indicated by the absence of shrinkage of the gel caused by some of the liquid coming out. The higher the level of syneresis, the softer the texture.

Table 2 shows that the components in the gel during storage did not experience a reaction between one material and another so that there were no signs of reaction from changes in color, odor and gel form.

He results of the synergism test based on table 3 that the results of the homogeneity test of the extract gel after the cycling test did not show a change which was indicated by the absence of lumps or separating parts.

Based on table 4, the results of the pH test show that the cycling test can affect the pH of the gel by decreasing the pH. Normality test results with a sig value of 0.124 (> 0.05), then the data is normal, if normal proceeds to the homogeneity test. Homogeneity test results with a sig value of 0.005 (< 0.05) then the data is not normal, if the data is not normal it is continued with the One Way Anova Analysis Test and the Tamhane Post Hoc Test. ANOVA test results with sig. 0.00 (< 0.05) means that there is an influence between variations in the concentration of the gelling agent Carbomer 940 which affects the pH value of the extract gel quality. The results of the Post Hoc Tamhane test with a sig value of 0.038 (< 0.05) means that there is an increase in the variation in the concentration of the gelling agent Carbomer 940 at least two formulas that affect the pH value between formulations.

The results of the syneresis test showed that the negative control formulas, I, II, III and IV showed no syneresis which was indicated by the absence of shrinkage of the gel caused by part of the liquid coming out.

The results of the organoleptic cycling test after accelerated storage at temperatures of 4°C and 40°C for 3 cycles did not change and were stable, both negative controls and formulas I, II, III, IV. This shows that the components in the gel during storage did not experience a reaction between one material and another so that there were no signs of reaction from changes in color, odor and gel form. The results of the homogeneity test after the cycling test did not show any change in the negative control formulas, I, II, III and IV which were marked by the absence of lumps or separating parts. The pH test results after the cycling test on formulas I, II, III and IV as well as negative controls decreased pH. Changes in pH are caused by environmental conditions including light, temperature and humidity [7].

Conclusions

It can be concluded in the gel extract cycling test that in the organoleptic test, the homogeneity and pH of the gel have no effect on temperature so that the gel can be said to be stable.

References

- [1] S. Hamara, "Manfaat Daun Sendok, Ceuli Uncal yang Ampuh Atasi Bronchitis, Hepatitis Hingga Asam Urat," Harapan rakyat.com, 2021. <https://www.harapanrakyat.com/2019/12/manfaat-daun-sendok/>.
- [2] S. Hasanatin Sholihah, "UJI EFEK INFUSA DAUN SENDOK (Plantago major L.) TERHADAP PENURUNAN KADAR GLUKOSA DARAH KELINCI JANTAN," 2008.
- [3] A. R. Kainde, D. H. C. Pangemanan, and B. S. P. Hutagalung, "Uji efektivitas ekstrak daun sendok (Plantago major L.) terhadap waktu perdarahan pada tikus Wistar jantan (Rattus norvegicus)," e-GIGI, vol. 4, no. 2, 2016, doi: 10.35790/eg.4.2.2016.14221.
- [4] H. C. Ansel, Pengantar Bentuk Sediaan Farmasi, 4th ed. Jakarta: UI Press, 1989.
- [5] R. Voight, Buku Pelajaran Teknologi Farmasi. Yogyakarta: Gadjah Mada University Press, 1995.
- [6] E. S. Kuncari, "EVALUASI, UJI STABILITAS FISIK DAN SINERESIS SEDIAAN GEL YANG MENGANDUNG MINOKSIDIL, APIGENIN DAN PERASAN HERBA SELEDRI (Apium graveolens L.)," Bul. Penelit. Kesehat., vol. 42, no. 4, pp. 213–222, 2014.
- [7] M. Ashar, "FORMULASI DAN UJI STABILITAS FISIK SEDIAAN GEL EKSTRAK DAUN BOTTO'-BOTTO' (Chromolaena odorata L) SEBAGAI OBAT JERAWAT DENGAN MENGGUNAKAN VARIASI KONSENTRASI BASIS KARBOPOL," UNIVERSITAS ISLAM NEGERI ALAUDDIN MAKASSAR, 2016.



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