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Formulation of Gel Peel Off Catechins Mask from Gambir (*Uncaria gambir* (Hunter) Roxb) with the PVP K-30 Concentration Variation

Henni Rosaini[1], Indra Makmur[1], Etika Ayu Lestari[1], Wahyu Margi Sidoretno[2], Rina Desni Yetti[1]

[1]Departement of Pharmaceutics School Science (STIFARM) Padang, West Sumatera 25147, Indonesia
[2]Departement of Pharmaceutical and Food Analyses, Faculty of Medicine and Health Science, Abdurrab University, Indonesia

Corresponding Author: Henni Rosaini

ABSTRACT

Gambir has effectiveness as an antimicrobial and antioxidant. Compounds that act as antimicrobials and antioxidants in gambier are catechins. The purposes of this study are 1) determine the capability of catechins formulated in the form of peel off gel mask preparations 2) determine the PVP K-30 concentrations effect on the physical properties of catechin peel off gel masks from gambir. The peel off gel mask formula was designed into four formulas with the same active substance concentration of 6%, except for F0 without the active substance as a control. The variations of PVP K-30 concentrations added were 3%, 4% and 5%. The function of PVP K-30, PVA 10%, propilenglycol 10%, nipagin 0.18 and nipasol 0.02 addition were as gelling agents, as film-forming, as humectant, as preservatives, respectively. While, distilled water and ethanol 70% were as solvents and essential citrus was as deodorizers. Based on the research results and the physical properties evaluation of peel off gel mask preparations shows that catechins can be formulated in the form of peel off gel masks. Also, the variations of PVP K-30concentration have an influence on the physical properties of peel off gel mask preparations. Concentration of PVP K-30 contained in the maxillary gel peel off preparation can reduce the color intensity and increase the pH and drying time. Different result was found in the spread power test. The increasing of PVP concentration K-30 can reduce the spread of the gel peel off catechin mask preparation from gambir.

Keywords: Formulation, peel-off gel mask, catechin, gambir, PVP K-30

INTRODUCTION

The skin is the outermost layer covering the entire body and protects the internal organs of the body. As the first layer, facial skin is the most sensitive part among other skin types. Facial skin is considered an important part of beauty because facial skin is the first part seen by the eye. Seeing healthy facial skin is one of the desires of many people, especially women. Using cosmetic can maintain the health, fresh and radiant facial skin (Susanti, 2015).

Cosmetics are materials specially made to beautify, improve and change the appearance of person. Cosmetics are also the most popular choice among women around the world to treat skin or body for beautifying and slowing down the aging process. Also, they are very helpful in maintaining skin moisture. Cosmetic preparations for application to the face are available in various forms, one of which is a mask in the form of a gel peel off (Surtiningsih, 2005).

Peel off gel mask is a practical gel-shaped cosmetic preparation when it was applied to facial skin within a certain time. The mask will dry out and form a film layer. It can be removed immediately without needing to rinse. Peel off gel masks are in

great demand because they can remove dirt and dead skin cells, keeping the skin clean and feeling fresh. Peel off gel masks can also restore skin freshness and softness with regular use. It can reduce fine wrinkles on facial skin. The masks contain antioxidantscan reduce fine wrinkles and prevent premature aging (Basuki, 2007).

Antioxidants are compounds that can prevent and slow down cell damage caused by free radicals through inhibition of oxidation reactions by binding to the free radicals and the highly reactive molecules (Winarsi, 2007).

Gambier (Uncaria gambir (Hunter) Roxb) is one of Indonesian plants proven containing antioxidant activity. It also has antimicrobial activity. Compounds acting as antimicrobials and antioxidants in gambier are catechins (Aditya & Ariyanti, 2016).

One of the ingredients added to the peel off gel mask is PVP K-30. It can increase the elasticity of the film formed by PVA (Noviani et al., 2016). Good elasticity will provide convenience in applying and will be easier to remove from the face after dry (Lucida et al., 2017). PVP K-30 is also used as a suspension and dispersant which can slow down deposition by increasing viscosity and dispersing a substance easily. As a result the substance becomes more homogeneous (Rahim & Noviandi, 2014).

Based on the background, it is important to do a research about formulation of gel peel off katekin mask from gambir (Uncaria gambir (Hunter) Roxb) with the PVP K-30 concentration variation.

METHODS OF THE RESEARCH

Tools

rotary evaporator (BUCHI Rotarspor R 200), mortar (Pyrex Iwaki®), stamper (Pyrex Iwaki®), spatula, stirring rod (Pyrex Iwaki®), petri dish (Pyrex Iwaki®), 60 F254 silica gel plate, beaker glass (Pyrex Iwaki®), erlemeyer (Pyrex Iwaki®), evaporating cup (Pyrex Iwaki®), measuring cup (Pyrex Iwaki®), dropper pipette (Pyrex Iwaki®), funnel (Pyrex Iwaki®), buchner funnel, horn spoon, scale analytic (PrecisaXB 220A), slide (Pyrex Iwaki®), pH meter (Hanna).

Materials

The materials used in this study are Gambir (Uncaria gambir (Hunter) Roxb), polyvinylpyrrolidone (Merck), polyvinylalcohol (Merck), propylenglycol (Merck), 70% ethanol (Bratachem), methyl paraben (Merck), propyl paraben (Merck), aquadest, citrus essences.

Work procedures

Samplings

The sample used in this study was gambier (Uncaria gambir (Hunter) Roxb) obtained from the Pesisir Selatan area.

Samples Preparation

In this study, gambier was used obtained directly from the southern coastal area. The cleaned and dried gambir was mashed by pounding or blending until it becomes powder. Gambier sample powder is stored in a dry and tightly closed container.

Test the purity of the isolates

The catechin isolate was dissolved in methanol, then spotted on 60 F254 silica gel. The comparison (standard) catechin was also spotted next to the catechin isolate and let it dry. Put the plate into the vessel containing Toluen P: ethyl acetate P: methanol P: formic acid P (4: 6: 1: 1) which has been previously saturated and close it tightly. Then remove the silica plate and allow it to dry. Observe the spots on the plate in visible and shortwave ultraviolet (254 nm) light. Measure and record the distance of each spot from the dot then determine the value of Rf. (Ministry of Health of the Republic of Indonesia, 2017).

Isolate the catechins from gambir

About 100 grams of the gambir powder was weighed and macerated with ethyl acetate solvent. The sample is immersed for the first 6 hours, stirring occasionally, then let stand for 18 hours.

Maserate is evaporated with a rotary evaporator and added with distilled water, also heated at a temperature 70°C. The result was filtered using a buchner funnel with a vacuum, and was cooled in the refrigerator until forming a paste. After this process, it is filtered again using a Buchner funnel and dried in an oven at a temperature of 50°C.

Table 1. Preparation of Catechin Peel Off gel mask from Gambir

Materials	Formula (%)			
	F0	F1	F2	F3
Catechins	-	6	6	6
PVA	10	10	10	10
PVP K-30	3	3	4	5
Propylenglycol	15	15	15	15
Metyl Paraben	0,18	0,18	0,18	0,18
Propyl Paraben	0,02	0,02	0,02	0,02
Ethanol 70%	13	13	13	13
Citrus essensial	2 tetes	2 tetes	2 tetes	2 tetes
Distilled water	100	100	100	100

The tools and materials were prepared. The catechins were dissolved with 70% ethanol. While the PVA was expanded with hot distilled water (M1). The PVP K-30 was stirred in Erlemeyer by adding a little distilled water (M2). Nipagin and nipasolwere dissolved into propylenglycol in a separate container (M3). The M1, M2 and M3 were mixed into crushed mortar until homogeneous. The mixture was added by catechins gradually until homogeneous. On the crushing process, the distilled water and 2 drops of essential citrus was still added gradually until homogeneous.

Evaluation of peel off mask preparation

1. Organoleptic Test

Organoleptic tests are carried out to see the physical appearance of the preparations by observing the shape, color and smell (Rahmawanty, et al., 2015).

2. Homogeneity Test

Homogeneity testing is investigated by applying a peel-off gel mask to a glass object or transparent material, then observing the composition of coarse or inhomogeneous particles and recording them. The preparation must show a homogeneous order and should not show any coarse grains (Rahmawanty, et al., 2015).

3. pH Test

The pH test was carried out to see the acidity level of the preparation. The test is conducted by using a pH meter that has previously been calibrated with a standard solution of pH 4-7. About 1 g of the gel peel off catechin mask formulation from gambier (Uncaria gambir (Hunter) Roxb) was dissolved with aquadest to 100 mL and immersed by the pH meter electrode. Then the result test was shown. The preparation must meet the pH criteria skin i.e. in the interval 4.5-6.5(Andini, et al., 2017).

4. Irritation Test

The irritation test is investigated by applying a formulated peel off gel mask on the hands skin. The mask is applied to the back hand and waited for 15 minutes to see the irritation reaction such as swelling, itching and arising a redness effect on the skin (Zhelsiana, et al., 2016).

5. Spreadability Test

A total of 1 gram of gel peel off preparation is placed on a glass with size 20x20 cm and covered with another glass. Then a weight is placed on it until it reaches a weight of 100g and its diameter is measured after 1 minute. This test aims to determine the speed at which the gel spreads on the skin on its application. The dispersion requirements are 5-7 cm (Rahmawanty, et al., 2015).

6. Drying time test

The time of the preparation test for dry was carried out by applying 0.1 gram of face mask on the back hand evenly over an area of 2.5 x 2.5 cm. The time required for the preparation to dry was counted by a stopwatch. The times were measured starting from the applying the face mask until a dry and elastic layer formed elastic that can be exfoliated without leaving a gel mass (Andini, et al., 2017).

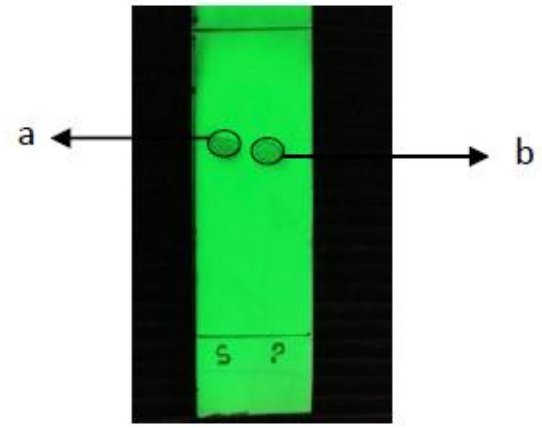
7. Hedonic Test

The hedonic test was carried out by giving a form to 10 panelists. Panelists will be asked for their personal responses regarding likes or vice versa (dislike) in terms of color, shape and aroma. Besides that, the panelists were also asked for their willingness to express their responses, like or dislike regarding a peeling gel mask preparation of catechin isolates from gambier (Uncaria gambir (Hunter) Roxb) (Sumiyati & Ginting, 2017).

RESULTS AND DISCUSSION

The evaluation result of peel off mask

The samples used were catechin isolates and the comparison used was pure catechins. Based on the results of thin layer chromatography (TLC), the sample produced 1 spot with an Rf value of 0.66. While the Rf value result obtained by the catechin comparators was0.64. The precise Rf value produced by the sample and the comparators proved that the catechin isolates had the same levels with the comparators. These results concluded that the catechin isolates obtained RF value as required by the standards listed in the Indonesian Herbal Pharmacopoeia II Edition (2017). It states that the Rf value of the sample and comparison is 0.60.



Information:
a = Sample spot
b = Comparion spot
S = Sample
P = Comparison

The organoleptic test results of the peel off gel mask to identify the color in the F0 formula were transparent because there was no addition of catechin isolates. F1 is brownish yellow, F2 is slightly yellowish, and F3 is yellowish. The different color resulted due to the variation concentration of PVP K-30 addition. The higher the PVP K-30 concentration added, the lower the color intensity or the lighter the color. The form identification of the four variations indicates that all formulas are in gel form. The odor identification showed that all formulas smelled of orange. This was not influenced by the addition of PVP K-30 variations concentration. F2 is a formula without preservatives showing the absence of microbial growth because it contains 70% ethanol which is a disinfectant and contains active substances having effectiveness as anti-microbes (Aditya & Ariyanti, 2016). Therefore catechin isolates can be formulated in peel off gel masks without adding nipagin and nipasol preservatives.

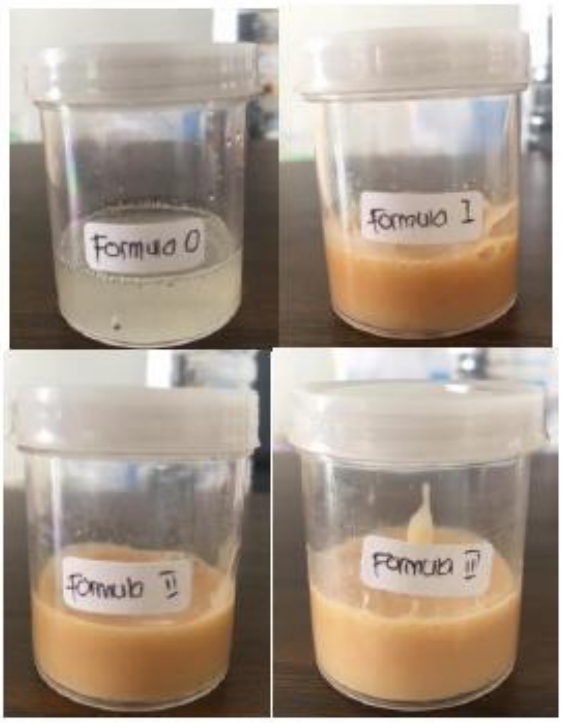


Figure 1. The catechin peel off mask formulation from gambir

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The homogeneity test aims to determine the homogeneous and non-homogeneous structure of the preparations shown by coarse grains. The result of this test to the catechin peel off gel mask preparations from Gambir showed that all preparations did not have any coarse grains when applied to transparent glass. This result represented that the preparations have a homogeneous structure. Also, based on the observation result, all the preparations produced form a perfect gel mask mass.

The pH test is carried out to determine the acidity level of the preparation, whether it meets the criteria for skin pH or not with the interval 4.5-6.5. Strong acidic pH of preparation can irritate the skin and strong alkaline pH can cause the skin to be dry and scaly (Rahmawanty et al., 2015). The test results of gel mask peel off catechins from Gambier obtained were5.39 for F0, 5.46 for F1, 5.74 for F2, and 5.92 for F3. These results are in the range of 4.5-6.5 indicating not cause irritation during its application. Till, they are allowed to be used topically. Also, the one-way ANOVA test resulted the significant results of 0.000 (P> 0.05) and showed that the pH of each preparations gave significantly different results.

The irritation test was conducted to know the safety level of the catechin gel peel off mask from Gambier. The irritation test requires several panelists of approximately 10 panelists. Because of the pandemic (Covid-19) condition, this test is not able to be conducted. But, this test can be shown from the pH test of the preparation. If pH obtained was small than 4.5, the preparation can be irritate. Armadany et., al (2015) reported that there is no irritation effect of the peel off gel mask tested and applied on the skin. This result was due to the pH of the peel off gel maker preparation which entered the skin pH range. The four catechin gel mask preparations made from Gambir did not cause any reactions, either redness, itching or burning. Therefore the catechin gel peel off mask from Gambier is safe to use as a topical preparation.

The dry time test aims to find out the times needed for drying the peel off gel mask on the surface of the facial skin and form a film layer to peel it off. The test results obtained were 23.43 minutes, 24.13 minutes, 24.50 minutes, 25.30 minutes, respectively for F0, F1, F2 and F3 preparations respectively. The results of the four preparations met the criteria for a good drying time for the gel peel off mask, namely 15-30 minutes (Andini et al., 2017). Based on the one-way ANOVA test, the significant results of 0.000 (P> 0.05) showed that the drying time of each preparation gave significantly different results. This is due to the effect of increasing the PVP K-30 concentration. Also, PVP K-30 is known as hygroscopic compound which causes the water content in the gel mask increasing and as a result the dry time of the preparation is longer.

The spreadability test was investigated to determine the spreading capability of the catechin gel peel off mask from Gambier when applied to facial skin. The dispersion test results obtained from the four catechin gel peel off mask preparations of Gambier were 6.06 cm for F0, 5.93 cm for F1, 5.83 cm for F2, and 5.66 cm for F3.

Based on the result, it can be seen that F0 has the greatest spreading power compared to F1, F2 and F3. This is because the higher concentration of PVP K-30 used, the thicker the gel mask preparation produced. But all the preparations made still included to the criteria range (5-7 cm) for spreading gel mask preparations. According to a study conducted by Andini et al., (2017) which states that the spreadability is inversely proportional to viscosity (Andini et al., 2017). However, based on the one-way ANOVA test, the significant results were 0.095 (P> 0.05) indicating that the spreadability of each formula was not significantly different.

The preference test was carried out to see the personal responses of panelists regarding the likes or dislike about the catechin-peel off gel mask from Gambir. Approximately 10 panelists are needed for this test. This test is not impossible to carry out in the pandemic (Covid-19) situation.

CONCLUSION

Based on the results of research about the formulation of the gel mask peel off catechin from gambier (Uncaria gambir (Hunter) Roxb) with various concentrations of PVP K-30, the following conclusions can be shown:

1. Catechin isolates can be formulated in the form of a gel peel off mask.
2. PVP K-30 has an effect on the physical properties of the gel peel off mask preparation. The higher the concentration of PVP K-30 contained in the peel off gel preparation can reduce the color intensity of the preparation and increase the pH and drying time. However, the spreadability test showed different results, the higher PVP K-30 concentration could reduce the spreadability of the catechin peel off gel mask preparation from Gambier.

Suggestions

It is recommended for further researchers to test the elasticity of the gel peel off mask and formulate catechin isolates in other mask dosage forms such as cloth masks, cream masks and powder masks.

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