

# Development of Sheet Mask with an Extract Golden Sea Cucumber (Golden Stichopus V) and Gel Aloe Vera (Aloe vera L.) for Facial Treatment

Rahmatul Qodriah<sup>1</sup>, Swasono R. Tamat<sup>2</sup>, Siti Umrah Noor<sup>3</sup>

<sup>1, 2, 3</sup>Faculty of Pharmacy Pancasila University, Jakarta, Indonesia

**Abstract:** *The extract of golden sea cucumber and aloe vera gel contains collagen and salicylic acid which can be used as anti-inflammatory and improve skin moisture. The purpose of this study is to obtain a mask solution containing a combination of golden sea cucumber dust and aloe vera gel that provides anti-inflammatory and moisture effects. Five formulations of mask solution containing 1; 2; 4; 8; 10; % Of sea cucumbers and 5% aloe vera gel. Mask solution evaluated physical and chemical quality and anti-inflammatory test is done by invitro method using Bovine serum albumin (BSA) protein denaturation. Physical stability test was performed for 3 months and volunteer safety test using elimination test, humidity test was performed for 3 hours in the forearm area with parameter of increasing moisture content. The resulting mask solution showed physical stability for 3 months, at a concentration of 8.145mg / mL can inhibit protein denaturation by 50% (IC50), and provide significantly different moisture compared to blanket solution without sea cucumber*

**Keywords:** Golden sea cucumber (Golden stichopus V), aloe gel (Aloe vera L), Mask sheet, Antiinflammatory, Corneometer

## 1. Introduction

Natural conditions, pollution, and lifestyle that become daily today can affect the condition of facial skin. Facial skin exposed to sunlight and pollution can make skin dull, black spots, and acne. Acne is formed due to inflammation of sweat glands (sebaceous glands) caused by natural conditions, pollution or lifestyle.

Healthy facial skin and clean is the desire of almost everyone, so nowadays increasingly mushrooming facial skin care services. One facial skin care is Facial. Facial is a series of activities to clean the face to get clean and fresh facial skin, through the stages of cleaning the skin of the dirt, exfoliation of dead skin cells by using scrubs, steaming to open the pores of the face to easily lift pimples and blackheads, masks to give nutrition on the face and make the face more fresh, and the last stage is the provision of moisturizer to keep skin moisture

Currently the use of a powder mask containing synthetic active substances such as vitamin C and vitamin E. When applied, powder mask suspended first into the water to then smeared all over the face. With technological advances there is a type of mask called mask sheet (mask sheet). This mask sheet consists of a mask and membrane solution attached to the face and is used for a single use. Membrane-based rayon-shaped sheet with holes in the eyes, nose and mouth. In the packaging, the mask sheet has been saturated with a solution containing the active ingredient and the polymer

The use of synthetic active ingredients in masks is widely available in the market, but people are now more sensitive to using natural materials because they are thought to have little side effects. Examples of synthetic active ingredients in the mask are kaolin, dimethicone, and glycolic acid. For example, black pore pack products contain oil absorbing powder which is used to reduce oil production in the face.

Another example, synthetic antioxidants and collagen synthesis used on products manufactured in Japan are used to moisturize facial skin

Some natural ingredients are known to have the benefit of reducing the production of oils on the cotton and egg yolk, as lifting dead skin cells using natural ingredients such as lime and green tea, as well as moisturizers used sea cucumbers, avocados, tomatoes, or aloe vera,

According to hasan sea cucumber gold can be used as a cell growth factor that is accelerate wound healing because it contains fatty acids such as salicylic acid, myristic acid, palmitat, stearat, oleat, and linoleate. The study reported that the use of a sea cucumber extract between 100-200 mg / mL gave a good anti-inflammatory effect, ie in decreasing edema in rat legs previously carrageen-induced. According to Harsen, aloe vera gel provides a moisturizing effect, with 0.5% w / w concentration at one use, and gives the same effect at a concentration of 0.1%; 0.25%; and 0.5 w / w on twice-daily use for two weeks. Total Epidermal Water Loss Value (TEWL) does not change, which means that aloe vera gel can prevent dehydration in the skin.

Currently the mask sheet has become a hygienic instant mask, unlike traditional masks that require hand washing after using it. Users only need to attach this mask to the face and be silenced. As well as the use of these mask sheets have various benefits according to the active substances used such as moisturizers and lighters

In this research will be formulated a mask sheet solution containing dry powdered sea cucumber 1,2,4,8,10% and 5% aloe vera gel, and use of 0,35% carbomer as base of gel solution, in order to obtain mask sheet solution that fulfill physical and chemical quality requirements, so that when the sheet mask sheet is immersed in the solution, the active ingredient is completely immobilized. The combination of golden sea cucumber powder and aloe vera gel is expected to

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have a synergistic effect as anti-inflammatory and moisturizing. In this study, the test was performed on mask solution, ie the parameters of physical quality (organoleptic, homogeneity, viscosity), chemical quality test (pH), in vitro anti-inflammatory test, in vivo moisture test,

## 2. Method

Formulated a mask solution containing a combination of golden sea cucumber, 5% aloe vera gel, and using 0.35% carbomer as a gelling agent. In the application, the mask membrane is saturated into a mask solution to form a saturated membrane with a mask solution (hereinafter called a mask sheet).

Against the mask solution, physical and chemical quality parameter tests include organoleptic test, homogeneity, viscosity and pH and effectiveness test as anti-inflammatory and moisturizer because it will be used for facial treatment. The effectiveness test of mask solution as anti-inflammatory is done in-vitro by inhibiting protein denaturation, which in principle uses colorimetric method using UV-VIS spectrophotometer at 660 nm wavelength. Humectant or humidity test is performed by measuring the moisture content of the skin with an in-vivo corneometer tool on 10 volunteers.

## 3. Results and Discussion

### 3.1. Phytochemical screening

Phytochemical screening was conducted on dry powder of sea cucumber to know the secondary metabolite compounds contained therein. Secondary metabolites on Dry powdered sea cucumbers contain flavonoids, steroids, terpenoids and saponins. Dry golden cucumber dry powder contains flavonoids, flavonoids have bonds with sugar groups that cause polar flavonoids, this is evidenced by the color change in dry powdered sea cucumber with Mg-HCl reagent. The formation of green color when dry powder of sea cucumber added by Libermann-Burchard reagent shows that dry powder of sea cucumber contains steroid. Dry golden sea cucumber powder contains terpenoid compound characterized by the formation of a purplish red color when added Libermann-Burchard reagent. Saponins are the dominant compounds produced by sea cucumbers, saponins have a complex glycoside skeleton which, when hydrolyzed, produce a triterpenoid and glycoside. Saponin is easily soluble in water so the metabolite is concentrated in a polar solvent, this is because the glycosides contain OH groups, which are very good soluble in water and other polar solvents

Class of chemical compounds	Dry powder of golden sea cucumber
Alkaloid	-
Flavanoid	+
Steroid	+
Terpenoid	+
Tanin	-
Saponin	+

Informqtion : + (positif), - (negatif)

### 3.2. Test anti-inflammatory activity

In this study, the invitro antiinflammatory activity test with the principle of inhibition of protein denaturation as initial screening in the early stages of development of new antiinflammatory agent (LAD willian). Antiinflammatory activity test was performed to determine the antiinflammatory activity of dry sea cucumber powder and mask solution containing combination of dry powder of sea cucumber and aloe vera gel with diclofenac sodium as positive control.

In this anti-inflammatory activity test, the protein used in the study was Bovine Serum Albumin (BSA). Albumin is the most abundant plasma protein in the human body. This protein can be coagulated by heat then the method of this research using heat at temperature  $\pm 720$  C and see the activity of inhibition of protein denaturation from dry powder of sea cucumber and the combination of dry powder of sea cucumber and aloe vera gel through decrease of BSA absorbance with UV-Vis spectrophotometer at the maximum BSA wavelength is 660nm. The obtained absorbance can then be obtained the percentage of inhibition of protein denaturation.

From the percent data of inhibition of positive control solution (Diclofenac Sodium) and golden sea cucumber dust can be known positive control solution at 3.13 concentration have been able to inhibit protein denaturation, while inhibition of protein denaturation on golden sea cucumber powder at 10ppm concentration. Based on these data, the potential denaturation inhibition of golden cucumber powder is smaller than its positive control. This is due to the golden sea cucumber powder containing other additives.

Percent of inhibition of each series of solution and powder of golden sea cucumber calculated linear regression value. The results of linear regression calculations show positive results, so the inhibition power is proportional to the concentration tested. The greater the concentration tested, the greater protein denaturation inhibition.

Antiinflammatory activity test by the method of inhibition of protein denaturation in some plants, it can inhibit protein denaturation so that has potency of anti-inflammatory activity. Based on this, then this method can be used to test antiinflammatory activity as an initial screening of its potential determination.

In this study, anti-inflammatory activity was shown by the occurrence of protein denaturation inhibition. Protein used in this study is Bovine serum albumin. Albumin is the most abundant plasma protein in the human body, composed of a single polypeptide chain. The function of albumin in the body is, to maintain plasma osmotic pressure to help metabolism, transport oat-drugs, anti-inflammatory, and antioxidants. Albumin is a water-soluble protein that can be coagulated by heat.

he protein denaturation process in this study is influenced by heat. As the temperature rises it can increase the kinetic energy and cause the protein molecules to move or vibrate so quickly that it destroys the molecule. The protein

denaturation process takes place constantly and unchanged, a protein that denatures the protein will decrease its liquid solubility so that it easily settles. Proteins in the body are susceptible to denaturation caused by the formation of free radicals that cause inflammatory mechanisms by stimulating reporting of inflammatory mediators. Result of IC50 value

IC50 value calculation results show the effectiveness of golden sea cucumber dust in inhibiting protein denaturation. IC50 is a concentration when the percentage of inhibition of protein denaturation reaches 50%. The average calculation result of IC50 in positive control solution was 11,40 µg / mL, while in golden cucumber powder solution and mask solution was 76,1424 µg / mL and 8145 µg / mL.

According to Molyneux, a substance is said to be active if it has an IC50 value of less than 200bpj. If the value of IC50 ranges from 200-1000ppm can be said substance is less active, but still have activity. Based on IC50 value from research conducted, it can be seen that IC50 value from dry powder of sea cucumber is bigger than its control, IC50 value for mask solution is bigger than positive control is 8,145mg / mL. This can be caused by the excipient substances contained in the mask solution which can reduce to the powder of golden sea cucumber when tested antiinflammasus with protein denaturation method

Sample	Concentration (MG/ML)	% Inhibition
Mask Solution	1	10,27
	2	25,13
	4	36,23
	8	46,32
	10	58,71

Result percent inhibition of mask solution

### 3.3. Evaluation of mask solution

The combination of dry powdered sea cucumber and aloe vera gel and a blank solution without dry golden cucumber powder was done through observation based on physical stability parameters such as organoleptis, homogeneity, pH, and viscosity. Result of physical evaluation of mask combination of dried powder of sea cucumber and aloe vera gel and solution of blank mask without dry powder of sea cucumber in month 0 Organoleptic observation consisted of assessment of odor, color and homogeneity. The use of colors using color standards, odor rating and homogeneity on a scale. Based on the results of organoleptic observations, it can be concluded that the solution of dry powdered sea gypsum colored powder mask, is homogeneous and smells neutral. The color of the dry golden cucumber powder mask solution is the color of ginseng while the mask solution is clear colored. The color difference is due to the addition of dry golden cucumber yellow powder.

### 3.4. Test the Benefits of Moisture

Test the benefits by measuring the moisture from the skin that has been given a solution of the mask to see the benefits of collagen from dry powder of sea cucumber gold as an occlusive skin moisturizer. Testing the moisture benefits of mask sheet solution using double blind method that is when

the test is done both volunteers and evaluators do not know the preparation of mask solution is tested. Benefits tested for volunteers meeting eligible volunteer inclusion and volunteer exclusion criteria, female volunteers, 25-35 years of age, not yet menopausal, no smoking, healthy skin, no dermatitis, no chronic diseases, and willing to follow the research to completion. At this time many factors that can affect the skin crack, both internal and external factors. Environmental conditions such as temperature and humidity can affect the dryness of the skin. Internal factors such as age, nutrients consumed, and hormones also affect skin dryness. Age 25 years in age criteria used because at this age began to appear signs of premature aging

Volunteer criteria following Skin moisture testing should meet inclusion and exclusion criteria. Inclusion criteria for humidity testing are female sex volunteers, age 25-35 years old, willing to follow test procedures, and not using any topical products during Tests. Exclusion criteria include female volunteers who are not pregnant and breastfeeding, have no skin diseases, are not doing skin care, and are not sensitive to cosmetic products or active ingredients, in this case golden cucumbers and aloe vera.

The number of volunteers in this test is 10 people, the amount is obtained from the calculation using the hypothesis test formula against the average of two groups in pairs. The amount also matches the criteria of volunteer sums for humidity clinical trials ranging from 10 to 30 people (Layden & Rawling 2002)

The moisture-benefit test is performed with the same conditions for all volunteers. Volunteers are freed from the use of topical products for 1 week prior to testing. All volunteers are in the same environment and do the same activities. All volunteers are in a room with a temperature of 250C and an average humidity of 45 ± 5%. Volunteers are prohibited from eating and drinking for 3 hours of Testing. Homogeneous treatment for all volunteers is done so that the data obtained is not biased.

Testing of moisture benefits performed on the inner skin portion, this section was chosen because this section is considered safe for moisture test.

Results Testing the benefits for the solution of dry powdered sea cucumber powder and aloe vera gel can be seen in table. Testing is done by using Corneometer tool with parameters observed is moisture content. Testing was done 2 times, that is, before applied mask solution and 15 minutes after application of mask solution.

Based on the results of the test, it is known that the skin applied by the mask solution has increased the moisture content in the 15th minute after use when compared with the measurement before the use of mask solution.

In the applied sleeve of the solution mask combination of golden sea cucumber and aloe vera gel, the difference of skin water content before and after the use of mask solution of 7,861 units while in the solution of mask blanket without golden sea cucumber the difference of skin water content

before and after use is 3,212. Significant increase in water content occurs in the use of a combination of golden sea cucumber and aloe vera gel. This can be due to a golden sea cucumber containing collagen which is the active ingredient of the moisturizer works well to retain the evaporation of water on the skin. According to the 2005 madin collagen in moisturizing products acting as an active ingredient is occlusive, collagen works inhibiting the evaporation of water on the skin

Differences in the influence of moisture between treatment groups can be known through independent sample test. Based on the test, it is known that the solution of mask combination of golden cucumber powder and aloe vera gel have a real difference with the solution of blank mask without golden sea cucumber. Because p value <0,05 that is with p value equal to 0,005

Significance = 0,005 <  $\alpha$  (0,05) with conclusion there is difference of increase of skin water content between T when after applied solution of mask combination of dried powder of sea cucumber and aloe vera gel with T after application of blank solution without mask of dried sea cucumber powder

### 3.5. Mask Description Stability Test

The stability test is aimed to find out the physical stability of the solution of golden cucumber dried powder mask and the blank solution without golden dried dust stored for 3 months, under different temperature conditions ie room temperature ( $28 \pm 2\text{oC}$ ) and high temperature ( $40 \pm 2\text{oC}$ ). storage time is done organoleptic observation and pH check.

#### Organoleptic Test

The results of organoleptic test of mask solution after storage for 3 months at temperature ( $28 \pm 2\text{oC}$ ) and ( $40 \pm 2\text{oC}$ ) and evaluated every month. Organoleptic tests include the form, smell, and color of the preparation. The tested formula gives the result that the formula has not changed, it is because the golden sea cucumber powder and other additives the compounding solution is homogeneously mixed.

Test homogeneity

The homogeneity test of the mask solution formula is shown by tables V.18 and V.19. after storage for 3 months at temperature ( $28 \pm 2\text{oC}$ ) and ( $40 \pm 2\text{oC}$ ) in monthly evaluation obtained data as listed in table above. the formula tested gives the result that the formula has not changed in its homogeneity from the evaluation of the 0th month to the 3rd month. Thus the formulas can be declared homogeneous after a physical quality parameter test for 3 months.

PH test

The purpose of pH testing so that the preparation of the mask solution made has a pH that is not much different from the pH of the active ingredient .. The results of pH test preparations in the month ranged from 5.35 to 5.43, thus expected to remain stable because pH dosage ranges pH dry powder dry sea cucumber and does not cause irritation to the skin because the facial skin has a pH between 4.5-6.5.

Viscosity test

During the 3 months storage period, the viscosity of the preparation changes. Based on the data, changes in viscosity occurring during the storage period of 3 months at room temperature do not give viscosity difference each month. While at 40oC the value of viscosity increases every month. This is because the distilled water that is on the surface of the preparation has a little evaporation at the storage temperature of 40oC in a long time. With the reduced phase of water in the preparation, the preparation becomes increased viscosity.

## 4. Conclusion

4.1 Mask solution containing Combination of dried powdered sea cucumber and aloe vera gel can be formulated into mask solution to meet the requirements of physical and chemical quality

4.2. Powder and golden sea cucumber solution have anti-inflammatory activity with IC50 value of golden sea cucumber is 76,1424  $\mu\text{g} / \text{mL}$  and mask solution 8145  $\mu\text{g} / \text{mL}$ .

4.3. Has an effect as a better moisturizer than a mask solution without extract sea cucumber

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## Author Profile



**Rahmatul Qodriah** received his pharmacy master degree and pharmacy from the pharmacy faculty of Pancasila University Jakarta Indonesia. During 2015-2017 he worked on cosmetic research contracts. He lives in coconut two cimanggis Depok Indonesia