

## **Formulation and Physical Stability Test Evaluations of Golden Sea Cucumber Extract Gel (*Sticopus Hermanii*) as Anti Periodontitis using Variations in Base Concentration**

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### **ABSTRACT**

The prevalence of periodontitis is still quite high, which is about 74.1%. Periodontitis therapy is currently a combination of root debridement and antibiotics is still not satisfactory, especially for severe periodontitis and systemic diseases. Golden sea cucumber is a natural ingredient of marine life containing proteins and active ingredients that function as antibacterial, anti-inflammatory and antioxidant. The goal in this study was to test the formulation and physical stability of the gold sea cucumber extract gel preparation (*Sticopus Hermanii*) as an anti-periodontitis using variations in gel base concentrations. Gold sea cucumber extract gel with HPMC is tested formulation, stability, pH and viscosity. Stability test at weeks 0, 2, 4, 6, 8 checked for changes in consistency, color, odor stability testing using climatic chamber pH test using pH meter. Viscosity test is performed in Week 1. Measurements by using LVDV-E type Brookfield viscometers with spindles The best stability test is obtained on formulas with HPMC 5%, the highest pH obtained on formulas with a CMC base of 3% and obtained at the measurement of the 8th week is 8. The results of the optimasi test resulted in a concentration of 5% HPMC that met organoleptic, pH, stability and viscosity tests.

**KEYWORDS:** golden sea cucumber, stability test, viscosity test, periodontitis, gel.

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### **INTRODUCTION**

Periodontitis is the second highest disease in the oral cavity after dental caries, which is an infectious disease found in surrounding tissues and tooth supports. Symptoms of periodontitis the presence of bleeding, tooth pain, pain when continuing the tooth will lose attachment to periodontal tissue so that it becomes shaken, and in the end the tooth will date. The prevalence of periodontitis in the world is reported to range from 20%-50% and the prevalence in Indonesia is still high. Data from health ministry of Indonesia shows the percentage of periodontitis cases in Indonesia at 74.1%. The date of the teeth will result in disruption of the process of chewing food, aesthetics, confidence and quality of life. Periodontitis therapy is currently a combination therapy of root debridement and antibiotic Standard treatment of periodontitis scaling and root planing is often less satisfactory results so that alternative treatments are needed in order to provide optimal results.

Golden Sea cucumber (*Sticopus Hermanii*) is known to contain a lot of GAG, a polysaccharide that is very useful in the wound healing process. Golden sea cucumber contains glycosaminoglycans, one of which is hyaluronic acid which plays an important role in cell adhesion and migration as well as regulation of cytokine production in local inflammatory responses. Glycosaminoglycans can increase Transforming Growth Factor- $\beta$  (TGF- $\beta$ ) which is a growth factor that affects increased fibroblast migration in collagen proliferation and deposition. Transforming Growth Factor- $\beta$  (TGF- $\beta$ ) has a role to stimulate fibroblasts, increasing the extracellular matrix of collagen. (Indrawaty, 2011)

Gel preparations are generally a semi-dense preparation that is clear, translucent and contains active substances, is a colloidal dispersion has strength caused by tissues that bind to each other in the dispersed phase (Ansel, 1989). Gel-forming substances are used as binders in granulation, protective colloids in suspension, thickeners for oral

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preparations and as suppository bases. Widely gel preparations are widely used in pharmaceutical, cosmetic and food products as well as in some industrial processes. In cosmetics, namely as preparations for skin care, shampoos, fragrance preparations and toothpaste (Herdiana, 2007).

The stability of a drug is very important and must be considered in pharmaceutical preparations. This is important considering that drug preparations are generally made in large quantities and require storage for a long period of time. A drug if stored for a long time can be decomposed and result in the dose received by the patient is reduced, so it must be selected a condition so that the stability of the drug becomes optimal and known factors that affect the stability of a new drug.

The stability evaluation of gold sea cucumber extract gel is a test of the ability to maintain its properties and characteristics when created within the limits set throughout the storage and use period. Testing is done organoleptically, i.e. observing consistency, discoloration, smell and pH on days 1, 3 7, 14 to 56. Stability testing uses a climatic chamber, a device that can be adjusted room temperature and air humidity for 56 days through an accelerated stability test method (Voight, 1994).

## MATERIALS AND METHODS:

### Materials

This research was an experimental investigation conducted in a lab, and the resulting extract was created into a gel formulation. Ingredients used in this study include *Stichopus hermanii* from Madura Island, East Java. Other ingredients include CMC Na and HPMC were obtained from Sigma Aldrich

### Making Shape Preparations of gold teripang extract:

The dry powder of golden sea cucumber is made a form of gel cyan with *hydroxypropyl methylcellulose* (HPMC). The manufacture of sea cucumber extract and fractionation is carried out against the ethanol extract of the sea cucumber body wall. Wet sea cucumbers are removed from the contents of the stomach, washed, cut into small pieces and then weighed wet weight. Sea cucumbers are dried using a *freeze dryer* at a temperature of -85°C with a pressure of 5 mTorr.

Dried sea cucumber is then blended into powder, dried sea cucumber powder is extracted using three types of solvents with a maceration method to produce different fractions, namely n-hexane, ethyl acetate, and ethanol. Maceration with n-hexane is followed by semipolar solvents (ethyl acetate) and ethanol as polar solvents. Each stage is repeated until the solvent is clear. The solvent is evaporated with a *rotary vacuum evaporator* at a temperature of 50°C.

### Procedures for making golden sea cucumber gel:

Binding Materials using CMC Na 3%, HPMC 5%, HPMC 10%) weighed, developed with aquades. Put in a mortar add gradually the stir fastener until homogenous, then plus the sorbitol stirred until homogeneous. The rest of the aquifers are inserted and then stirred with an atamper until a gel is formed. The finished preparation is inserted into a light-protected tube.

### Stability Test

The stability test was conducted in weeks 0,2,4,6,8 covering the color, texture, smell, homogeneity test. The formulas used are HPMC 5%, 10% and CMC. Stability testing uses a *climatic chamber*, a device that can be adjusted room temperature and air humidity for 56 days through an accelerated stability test method.

### Viscosity Test

Viscosity test is performed in Week 1. Measurements are carried out using a LVDV-E type Brookfield viscometer with spindle and corresponding speed. The gel is put in a beaker glass until it reaches a volume of 500 mL, attaching the spindle to the specified limit. The results of the viscosity evaluation orientation show that this evaluation is carried out using spindle no. 3 at rpm 6.

## RESULT

The results of the evaluation of physical stability of gel preparations that include observations of organoleptic, pH, homogeneity, and scatter power in the Golden Sea cucumber gel preparation (*Sticopus Hermanii*) that has been made are as follows:

The stability test was conducted in weeks 0,2,4,6,8 covering the color, texture, smell, homogeneity test

Table 1. Formulation On the manufacture of Gold sea cucumber gel preparations (*Sticopus Hermanii*)

Material	F1	F2	F3
HPMC	5%	7,5%	10%
sorbitol	2	2	2
Tween	5	5	5
Ethanol	10	10	10
Mentha piperitae	4	4	4
Golden sea cucumber extract	0,5	0,5	0,5
Aquadest	Add 100	Add 100	Add 100

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**Table 2. Organoleptic Test Results Week -0**

Formula	Color	Texture	Construction	Homogeneity
I	Brownish Yellow	Soft gel	Distinctive	Homogeneous
II	Brownish Yellow	Soft gel	Distinctive	Homogeneous
III	Brownish Yellow	Gel is a little rough	Distinctive	Homogeneous

**Table 3. Organoleptic Test Results Week 2**

Formula	Color	Texture	Construction	Homogeneity
I	Brownish Yellow	Soft gel	Distinctive	Homogeneous
II	Brownish Yellow	Soft gel	Distinctive	Homogeneous
III	Brownish Yellow	Gel is a little rough	Distinctive	Homogeneous

**Table 4. Organoleptic Test Results Week -4**

Formula	Color	Texture	Construction	Homogeneity
I	Brownish Yellow	Soft gel	Distinctive	Homogeneous
II	Brownish Yellow	Soft gel	Distinctive	Homogeneous
III	Brownish Yellow	Gel is a little rough	Distinctive	Homogeneous

**Table 5. Organoleptic Test Results Week -6**

Formula	Color	Texture	Construction	Homogeneity
I	Brownish Yellow	Soft gel	Distinctive	Homogeneous
II	Brownish Yellow	Soft gel	Distinctive	Homogeneous
III	Brownish Yellow	Gel is a little rough	Distinctive	Homogeneous

**Table 6. Week 8 Organoleptic Test Results**

Formula	Color	Texture	Construction	Homogeneity
I	Brownish Yellow	Soft gel	Distinctive	Homogeneous
II	Brownish Yellow	Soft gel	Distinctive	Homogeneous
III	Brownish Yellow	Gel is a little rough	Distinctive	Homogeneous

**Observations of Sineresis**

Formula	Before Storage		After Storage	
	Sineresis	Homogeneity	Sineresis	Homogenitas
I	-	Homogeneous	-	Homogeneous
II	-	Homogeneous	-	Homogeneous
III	-	Homogeneous	-	Tidak Homogeneous

**Observation of pH Gel Preparation**

PH measurements are intended to provide a sense of comfort and so as not to irritate the oral mucosa. According to SNI pH requirements, dental preparations are between 4.5 – 10.5. It is adjusted to the pH in the mouth. The pH of the preparation is determined by weighing 2 grams of gel preparations, then diluted with CO2-free water to 20 mL, then pH measurements with pH meters are carried out. The pH meter electrode is washed with aquades and dried, the electrode is calibrated with a pH 7 buffer solution then washed with aquades and dried again. The electrode is dipped in the preparation and recorded the number indicated by the tool. Tests are performed on Sunday, 0.2, 4,g and 8th during storage

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Table 7. Test Results of pH of golden sea cucumber gel preparations in weeks 0, 2, 4, 6, 8

Formula	pH				
	Sunday -0	Sunday -2	Week-4	Week-6	Week-8
I	7	7.15	7.18	7.20	7.25
II	7	7.15	7.18	7.21	7.22
III	7	7.24	7.6	7.68	8

### Viscosity Test Results

The results of the viscosity evaluation orientation show that this evaluation is carried out using spindle no. 3 at rpm 6. Formulation of golden sea cucumber mouth gel (based on the results of gel base optimization, hpmc selected base

Table 8. Viscosity Test Result of gold sea cucumber extract gel with gel base

Formula Basis HPMC	1%	1,5%	3%
Replication 1	28.000 Cps	143.000 Cps	138.000 Cps
Replication 2	29.000 Cps	158.000 Cps	180.000 Cps
Replication 3	33.000 Cps	143.000 Cps	181.000 Cps
Replication 4	34.000 Cps	156.000 Cps	180.000 Cps
Replication 5	34.000 Cps	143.000 Cps	180.000 Cps
Replication 6	35.000 Cps	158.000 Cps	180.000 Cps
Replication 7	35.000 Cps	198.000 Cps	180.000 Cps

Table 9. Viscosity Test Results of gold sea cucumber extract gel with HPMC gel base

Material	F1	F2	F3
HPMC	5%	7,5%	10%
Sorbitol	2	2	2
Tween	5	5	5
Ethanol	10	10	10
Mentha piperitae	4	4	4
Golden Sea cucumber Extract	0,5	0,5	0,5
Aquadest	Ad 100	Ad 100	Ad 100

### DISCUSSION

In the process of making preparations intended as anti-periodontitis Golden Sea cucumber (*Sticopus Hermanii*) has been selected as a preparation in gel form with all considerations. In principle, the carrier material in pharmaceutical preparations is required not to affect the effect of the active ingredient, but it cannot be denied that the carrier can have an influence on diffusion. The active ingredients of the carrier towards the action side, as well as the high stability of the material in the carrier, which separately or simultaneously may cause slow or non-giving preparations effect. Likewise, in physical stability the gel preparation depends largely on the type and concentration of the carrier (gelling agent) used. The ability of this gel-forming material in trapping liquids depends largely on the concentration used. Therefore the determination of the gel formula of this plant extract is carried out by testing the physical stability of gel preparations with various concentrations of HPMC and CMC 3% bases. In pharmaceutical preparations one of them is gel, the stability of a substance is a factor that must be considered, considering that this preparation is

usually produced in quantities. It is large and takes a long time in its use. By conducting a physical stability test can be known the influence of the environment on the parameters of physical stability preparation such as organoleptic observation, scatter power, homogeneity, pH, and sinarsis. The preparation consists of four gel formulas with different carbopol base concentrations but both use the Golden Sea cucumber extract type (*Sticopus Hermanii*). The aim of the study was to look at the concentration of the gel base that was best at forming a preparation of Golden Sea cucumber extract gel (*Sticopus Hermanii*). The process begins with the manufacture of Golden Sea cucumber extract (*Sticopus Hermanii*) through the extraction process using 96% ethanol solvent. Then the condensed extract obtained is made in three different formulas, namely formulas I, II, and III. Organoleptic observations on all gel seedlings with all existing concentration comparisons show observations before and after storage. The results of organoleptic examination can be seen in tables 1 to 6. Overall the gel formed from all formulas has the same color. The smell and taste of

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formula I and II shows the impression is more acceptable because of its tasteless taste and smell is less pungent than formula III. Sineresis does not occur in all gel preparation formulas so it can be said that the preparation appears stable. Sineresis is the release of fluid from the gel structure, this can occur because the concentration of gelling agent used is not able to maintain fluid in the gel structure. The occurrence of sineresis is one of the signs of unstable pharmaceutical preparations physically. Sineresis is a condition in the gel that secretes fluid (Winarno, 1992). This can happen because the gelling agent used is not able to hold the liquid in the preparation. In table 7, observations of the homogeneity of the preparation show good results in formulas I and II, while in Formula III showed no homogeneous signs. , in the form of the onset of two color layers of the extract dissolved in the gel. mouth pH ranges from 5.5-7.9 (Rooban T, et al, 2006), if the preparation is used should have The corresponding pH that is not much different from the oral cavity. The results of the pH observations of gel preparations in table 8 show that formulas I and III have qualified pH compared to formula III.

### CONCLUSION

Based on the results of research that has been done on gel preparations containing Golden Sea cucumber extract (*Sticopus Hermanii*), it can be concluded that: Gel using carbopol gel base at various concentrations has good physical stability, but better preparation stability compared to other preparations in formulas I and II with Concentrations of 5%, 7.5% and 10% respectively. The effect of carbopol concentration as a gel base in the periodontitis gel preparation of Golden Sea cucumber ethanol extract (*Sticopus Hermanii*) exerts a significant influence on organoleptic, pH, homogeneity, and gel preparation dispersal power. The results of the mouth gel base optimization test with various different base concentrations, the bases used by HPMC with the amount of 5%, 7.5%, and 10%. A 5% HPMC concentration is produced that meets organoleptic, pH, stability and viscosity tests.

### CONFLICT OF INTEREST:

The authors have no conflicts of interest regarding this investigation.

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