PHYTOCHEMICAL SCREENING AND LIQUID CREAM FORMULATION BASED ON CARROT TUBER (DAUCUS CAROTA L.) POWDER AS ANTI-AGING

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Abstract. **Background:** Skin aging is a natural process in human life and is closely related to degenerative processes. Natural antioxidants can be obtained from various fruits and vegetables, one of which is carrot tubers. Carrot tubers have been used traditionally to prevent skin aging by mashing and applying directly to the skin. This study aims to apply carrot tubers in the form of liquid cream so that its use is more practical and is tested as an anti-aging.
Methods: Carrot tubers are processed into dry powder by mashing and drying them cold using a freeze dryer. Phytochemical screening was carried out on fresh and dried carrot tubers. Furthermore, the dry powder of carrot tuber was made in a cream preparation of oil in water type with a concentration of 5%, 10% and 15%, then tested for homogeneity, emulsion type, pH, irritation to volunteers, stability at room temperature and anti-aging effect using skin. analyzer and moisturizer checker for 4 weeks. The data obtained were tested using ANOVA and BNT test statistics.
Results: The results of the phytochemical screening test showed that fresh carrot tubers and those that had been freeze-dried using a freeze dryer contained the same class of chemical compounds, namely alkaloids, flavonoids, and steroids. The result of making cream is obtained cream in the form of oil-in-water emulsion type pH 4.9-7 does not cause irritation to the skin and the best formula contains 5% carrot tuber powder which is stable on storage for 12 weeks. The results of the anti-aging test show that the higher the dry powder of carrot tubers in the cream, the more water content in the skin, the smoother the skin, the smaller the skin pores, less blemishes, wrinkles and reduced depth of wrinkles. The most effective result as anti-aging was cream with 10% carrot root powder concentration and the ANOVA and BNT test results were not different from cream containing 15% carrot root powder.

Key words: Carrot tubers, liquid cream, anti-aging effectiveness, skin analyzer, moisturizer checker.

Background

Healthy and beautiful facial skin will look firm, supple, and moist, this condition will not last forever, along with the development of age, when the body condition declines, aging skin not only becomes dry but also dull, feels rough, and wrinkled. Aging is a natural process in human life. Collagen is a support for the skin to look tight, but its production in the body decreases due to age, exposure to sunlight or other diseases, as a result the skin will lose elasticity, so it starts to look loose and wrinkled (Sulastomo, 2013).

The phenomenon of premature aging is being widely discussed, usually characterized by dry, scaly, rough skin conditions, accompanied by the appearance of wrinkles and black spots or spots. The first causative factor is internal factors, such as health, endurance, stress and hormonal changes, these natural processes cannot be avoided by humans but their effects can be reduced by proper skin care, routine, and reducing stress. The second cause is external factors which include free radicals, sunlight and pollutants (Sulastomo, 2013).

Free radicals are compounds that have unpaired electrons so they are very reactive and can damage cells and body tissues. Naturally, free radicals are formed in the mitochondria of every cell in charge of processing glucose and oxygen into energy through enzymatic reactions. In addition, free radicals also appear through UV exposure, electromagnetic rays and

the combustion process. The reaction of free radicals can be prevented by the use of antioxidants, both synthetic and natural. Examples of synthetic antioxidants are Butyl Hydroxy Anisol (BHA) and Butyl Hydroxy Toluene (BHT), while natural antioxidants can be obtained from fruits and vegetables, one of which is carrot tubers (Purwanto, 2013).

However, the results of Soebagio et al.'s research on the Antioxidant Gel Formulation test from Carrot Bulb Extract using AQUPEC HV 505 in 2007, found that gel preparations containing carrot tuber extract had greater antioxidant activity than gel preparations containing vitamin E at the same concentration. Carotenoids, provitamin A, are one of the natural antioxidant compounds found in carrot (Daucus carota L.) tubers. The carotenoid content in carrots can be seen from the intensity of the colour, namely the orange the carrot, the more carotenoid content. Carotenoids contained not only beta carotene but also alpha carotene, gamma carotene, beta carotene, and lycopene which can provide protection to the body against the negative effects of free radicals (Soebagio, et al, 2007).

In terms of the chemical content of the carrot tuber (Daucus carota L) and its activity as an antioxidant, it is very potentially efficacious as an antiaging, it needs to be formulated in a cosmetic preparation that is easy to use and store, for example made in the form of liquid cream. However, natural ingredients do not necessarily work well to be formulated into liquid cream preparations, because of the possibility that their active ingredients can damage the base of the cream used, for example the occurrence of decomposition through enzymatic reactions or oxidation, so that the resulting cream preparations are unstable, for example the occurrence of phase changes, rupture of the emulsion., changes in pH, even changes in smell and colour (Martin, A et al., 2009). So to ensure that carrot tubers can be formulated into liquid cream preparations, it is necessary to conduct a study on the manufacture of liquid cream preparations containing carrot tubers, then physical and stability tests of these preparations are carried out.

The use of fresh carrot tubers into the liquid cream base, of course, requires a large volume so that a good preparation is not obtained, it is necessary to dry it, and it is possible that the drying process will damage the chemical compounds contained in it (Soebagio, Boesro et al, 2007).). So, the drying is done by freeze drying using a freeze dryer and to ensure that there is no damage to chemical compounds as a result of this drying process, it is necessary to carry out phytochemical screening of fresh and dried carrot tubers.

To ensure that carrot tubers in liquid cream preparations have anti-aging activity and at what concentration have the best antiaging activity, it is necessary to make preparations with various concentrations of carrot tuber dry powder, and evaluate the preparation directly on the skin of panellists (volunteers), with several parameters include: moisture content, evenness, large pores, number of spots, wrinkles and depth of wrinkles using a skin analyzer and to ensure the safety of using the preparation it is necessary to do a skin irritation test. volunteer (Wasitaatmadja, 1997).

Based on this, the authors conducted research on the formulation of liquid cream preparations using carrot tuber powder (Daucus carota L.) which was dried by freeze drying as an anti-aging method, with the aim of applying carrot tubers in the form of liquid cream so that its use was more practical and was tested as an anti-aging method. anti-aging, the ability to provide skin moisture, and irritation test on volunteers, so that it can be proven the effectiveness of the preparations obtained as antiaging and their use is safe on the skin. On the other hand, in addition to food, the use of carrot tubers can be developed into a product that has economic value.

Methods

This type of research is experimental in the laboratory. Research includes:

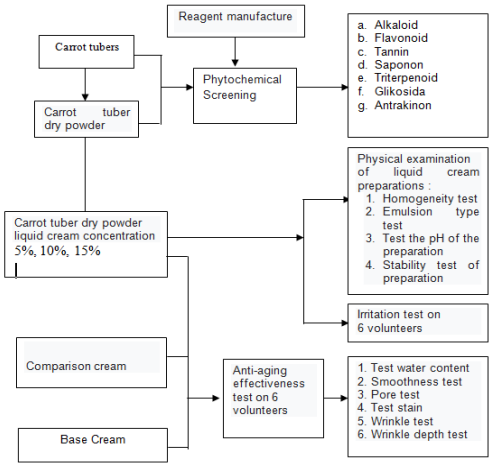

Figure 1. Research Method

Stages of Research Work:

- Preparation of tools and materials
- Application to Volunteers

- Carrot tuber processing
- Cream Base Formula Making
- Liquid Cream Preparation
- Homogeneity Check
- Determination of Preparation pH
- Determination of Preparation Emulsion Type
- Preparation of Stability Monitoring
- Irritation Test on Volunteers
- Determination of Anti-aging

Results of Making Carrot Tuber Powder:

The results of processing a sample of 4 kg of carrot tubers obtained 300 g of carrot tuber dry powder. Phytochemical screening results showed that fresh carrot powder and dried carrot powder contained the same chemical compounds, namely alkaloids, glycosides, steroidal flavonoids, and saponins.

The homogeneity test was carried out on liquid cream preparations formulated using carrot tuber powder in various concentrations, namely 5%; 10%; 15% and the blank preparation shows that there are no granules on the glass object that is smeared with liquid cream preparation, then the preparation meets the requirements (Directorate General of POM, 1979).

Determination of the type of emulsion preparation can be done using methyl blue, if the methyl blue dissolves when stirred then the type of emulsion is an O/W emulsion type (Directorate General of POM, 1985). liquid cream of carrot tuber powder with various blank concentrations and liquid cream of 5% and 10% carrot tuber powder showed a blue solution while 15% carrot tuber powder preparation did not see a blue solution, this is probably because the colour of the liquid cream preparation of 15% carrot tuber powder was too concentrated so the methylene blue colour is not visible.

The emulsion type test for this preparation was continued by dilution with water, it was seen that the results of the homogeneous dilution meant that the entire preparation was a liquid cream type of oil in water (Lachman, 1994). The pH of the preparation is determined with a pH meter, The greater the concentration of carrot tuber dry powder in the liquid cream preparation, the lower the pH of the preparation. This is probably due to the presence of acidic compounds and vitamin C in the dry powder of carrot tubers (Cahyono, 2003). All liquid cream preparations from the experimental results obtained between pH 6.0-7.0 still meet the pH requirements for hand and body liquid cream and do not cause skin irritation (Wasitaatmadja, 1997).

Stability of the preparation after the preparation has been made shows the results that have been observed storage preparations at room temperature, and observed every week for 12 weeks. Formulas with concentrations of carrot tubers 5% and 10 are stable until week 12, while preparations with concentrations of carrot tubers 15% are only stable for up to 8 weeks. This is because carrot tubers contain carotenoid compounds and provitamin A which are antioxidant compounds that are easily oxidized with air (Purwanto, et al., 2013).

The results of the irritation test on the volunteer's skin were carried out by applying it to thin/sensitive skin, i.e. behind the ear, left for 24 hours showed that there were no visible side effects in the form of redness, itching, roughening caused by the smeared cream preparation, it was concluded that the preparation did not cause irritation.

Testing the effectiveness of anti-aging using a skin analyzer (Aramo), the test parameters include measuring moisture content (moisture), skin smoothness (evenness), pore size, number of spots, wrinkles and wrinkle's depth.). Measurement of anti-aging activity began by measuring the initial condition of the skin on the back of the volunteers' hands. Then applied every morning and evening liquid cream of carrot tuber powder on the skin on the back of the hand. Once a week the changes were measured, up to four times the measurement.

Measurement of water content was carried out using a moisture checker device contained in the skin analyzer device (Aramo). Measurements were carried out on the skin of the back of the hands of 6 volunteers, before being given the tested liquid cream preparation, and after giving the preparation every day, with inspections once a week for 4 weeks. Week, showed that an increase in the moisture content of the skin on the back of the volunteer's hands for 4 weeks, blank preparations, commercial creams and test creams of various concentrations of carrot tuber dry powder could increase the water content but the percent difference in the increase in water content was different, the greatest increase in water content in liquid cream of 10% carrot tuber powder, almost the same as 15% preparation and with commercial cream, skin moisture is said to be normal if the measurement results with a moisturizer checker show the number 30-50 (Aramo. 2012)

The results of the analysis of variance (ANOVA) seen from the 3rd week to the 4th week that F0 was entirely greater than F-table 5% = 2.76%; and 1% = 4.18, then all experimental results produce a very significant difference in percent increase in water content. Then it is necessary to do the smallest significant difference test (BNT) to find out which groups give different or the same increase in water content to each other.

In the 3rd week, there was a very significant difference between commercial cream and liquid cream of 10% and 15% carrot tuber powder and blanks, while the 10% liquid cream did not differ from 15%. In the 4th week there was an increase in water content, the effect of commercial cream was not significantly different from the liquid cream of 10% and 15% carrot tuber powder.

From the overall results of the test of increasing water content on the skin of the back of the volunteers' hands, it can be seen that the best test cream is at a concentration of 10% because at week 4 there is an increase in water content which is not significantly different from 15% liquid cream and commercial cream. This can be because in addition to containing beta-carotene, carrots also contain vitamin C and unsaturated fatty acids which may have the potential to prevent evaporation of water from the skin surface (Mora et al., 2013).

Measurement of skin smoothness (evenness), using a skin analyzer device using a 60 x magnification lens (normal lense) with a blue sensor, showed that the skin roughness was reduced starting to appear in the 2nd week. In the 4th week, 10% and 15% carrot powder liquid cream preparations gave the effect of smoothness on the back of the hand, namely the percent difference in smoothness was almost the same as the percent difference in smoothness in commercial creams. The skin is said to be smooth when measured using a skin analyzer, showing the numbers 0-31 (Aramo, 2012).

The results of the analysis of variance (ANOVA) seen from week 1 to week 4 obtained that F0 is entirely greater than F-table 5% = 2.76%; and 1% = 4.18, then all the experimental results produce a very significant difference in percent fineness. Then furthermore, it is necessary to do the smallest significant difference test (BNT) to find out which test cream has a smoothing effect that is different or the same as one another.

BNT test calculation results in the 3rd week, it was seen that the blanks gave an effect that was not different from the liquid cream of 5% carrot tuber powder, very significantly different from commercial cream, 10% and 15% carrot tuber powder liquid cream. liquid powder i carrot tuber 15%. At week 4, it was seen that the commercial cream was not significantly different from the liquid cream of 10% and 15% carrot tuber powder, and the liquid cream of the 10% carrot tuber powder was no different from the liquid cream of 15% carrot powder.

From the overall results of the test for increasing the smoothness of the skin on the back of the volunteers' hands, it can be seen that the best test cream is a concentration of 10% because every week there is an increase in smoothness which is not significantly different from 15% cream and commercial cream. This can happen because the carrot tubers contained in liquid cream preparations contain protein and provitamin A which are useful for making skin smoother and reducing excess oil (Vulanda, et al., 2014).

Pore Inspection, showed that pore size was measured using the same skin analyzer as fineness measurement, namely using a blue sensor 60 x magnification lens (normal lens), when performing skin smoothness analysis, the pore size analysis was automatically read, showed that the test cream had the effect of shrinking skin pores. Carrot tuber cream powder 5% can reduce pore size at week 2 with a small percentage difference, while carrot tuber cream 10% and 15% can reduce pore size at week 1 and at week 4 can reduce pore size almost the same with commercial cream. The pore size at the beginning of the measurement was several large (20-39) at the time of measurement for 4 weeks there was a decrease in the pore size but still within the large pore limit (20-39). Skin pores are said to be small when the measurement results using a skin analyzer show small pores = 0-19, large pores = 20-39, and very large sizes = 40-100 (Aramo. 2012).

The results of the analysis of variance (ANOVA) seen from week 1 to week 4 obtained that F0 is entirely greater than F-table 5% = 2.76%; and 1% = 4.18 except, then all the experimental results produce a very significant difference in percent reduction in pore size. Then it is necessary to carry out the smallest significant difference test (BNT) to determine

which test cream has the effect of reducing the pore size that is different or the same as one another.

At week 3, it was seen that the blank cream was very significantly different from all the test creams, the liquid cream of 5% carrot tuber powder was very significantly different from 10%, 15% and commercial cream. The commercial cream was significantly different from the liquid cream of 10% and 15% carrot tuber powder. At week 4, the pores were getting smaller, the commercial cream was not significantly different from the liquid cream of 10% and 15% carrot tuber powder. Liquid cream of 10% carrot tuber powder was not significantly different from 15%. While the 5% cream differs very significantly with 10% and 15%.

From the overall results of the test to shrink pores on the skin on the back of the volunteers' hands, it can be seen that the best test cream is at a concentration of 10% because every week there is an increase in shrinking pores. At week 4 it was not significantly different from 15% cream and commercial cream.

Large skin pores are caused by the pressure of the sebum produced, the sebum will attract dust and carbon in the air in the presence of beta carotene can release dead skin cells and stimulate the formation of new cells and capture free radicals that damage the skin so that it can shrink pores. pores (Safitri, 2013)

Smudge examination is carried out with a skin analyzer with a 60-x magnification lens (polarizing lens) with an orange sensor. showed that there was a decrease in the number of spots on the skin on the back of the volunteers' hands. The liquid cream of carrot tuber powder 5% was only able to reduce the number of stains in the 3rd week, while the liquid cream of the carrot tuber tuber 10% and 15% was able to reduce the stains at the 1st week with the difference percent difference in the number of stains being almost the same as the commercial cream. The number of stains at the beginning of the measurement is between 47 to 100. The number of small stains on the skin when measured using a skin analyzer shows the numbers 0-19, (Aramo. 2012). Although the test results have not been able to remove stains on the skin until it is said to be a little stain (0-19), it can be seen that there is a reduction in the number of stains.

The results of the analysis of variance (ANOVA) seen from week 1 to week 4 obtained that F0 is entirely greater than F-table 5% = 2.76%; and 1% = 4.18 except, then all the experimental results produce a very significant difference in percent reduction in pore size. Then it is necessary to carry out the smallest significant difference test (BNT) to determine which test cream has the effect of reducing the pore size that is different or the same as one another.

At week 3, it was seen that the blank cream was very significantly different from all test creams, the liquid cream of 5% carrot powder was very significantly different from the 10% and 15% cream, the commercial cream was very significantly different from the 10% and 15% cream. At week 4, the pores are getting smaller, the commercial cream is not significantly different from the liquid cream of 10% and 15% carrot tuber powder, the 10% cream is not significantly different from 15%. While the 5% cream was very significantly different from the 10% and 15% cream.

From the overall results of the test to shrink pores on the skin on the back of the volunteers' hands, it can be seen that the best test cream is at a concentration of 10% because every week there is an increase in shrinking pores. At week 4 it was no different from 15% cream and commercial cream.

Large skin pores are caused by the pressure of the sebum produced, the sebum will attract dust and carbon in the air in the presence of beta carotene contained in the test cream can release dead skin cells and stimulate the formation of new cells and capture damaging free radicals. skin so that it can shrink pores (Safitri, 2013).

The wrinkle/wrinkle test on the back of the volunteer's hand showed that there was a reduction in the number of wrinkles on the skin on the back of the volunteer's hand. The preparation of liquid cream with a concentration of 5% can reduce the number of wrinkles in the 3rd week with a slight difference, while the liquid cream of 10% and 15% carrot tuber powder has given results in the 1st week with a slight difference and then increases every week. so the percent difference is almost the same as the commercial cream. Skin wrinkles are categorized, not wrinkled = 0-19, wrinkled = 20-52, and many wrinkles = 53-100 (Aramo, 2012). has been shown to reduce the number of wrinkles.

ANOVA test results for data on the measurement of the number of wrinkles on the skin seen from week 1 to week 4 obtained F0 entirely greater than F-table 5% = 2.76%; and 1% = 4.18, then all the experimental results produce a very significant difference in the percent reduction in stains. Then it is necessary to carry out the smallest significant difference test (BNT) to find out which test cream has the effect of reducing wrinkles that are different or the same as each other.

In the third week, it was seen that the blank cream was very significantly different from all the test creams, the liquid cream of 5% carrot tuber powder was very significantly different from the 10%, 15%, and commercial creams. At week 4, the number of wrinkles was seen decreasing, commercial cream was not significantly different from liquid cream of 10% and 15% carrot powder, 10% cream was not significantly different from 15% cream. While the 5% cream was very significantly different from the 5% and 10% cream.

From the overall test results, the more carrot powder content contained in the cream preparation, the greater the effect of reducing wrinkles on the skin. The best test liquid cream preparation is a 10% concentration because every week it reduces a lot of wrinkles which is no different from the effect of 15% carrot tuber powder liquid cream and commercial cream.

Beta-carotene and vitamin C contained in carrots can play a role in the skin's defense system, protect the skin from ultraviolet radiation and inhibit the photoaging process (skin aging process triggered by ultraviolet radiation), the effectiveness and benefits of giving high concentrations of topical beta-carotene and vitamin C can provide protection against ultraviolet radiation so as to reduce the number of wrinkles (Sulastomo, 2013).

The depth of wrinkles is a continuation of measuring the presence or absence of wrinkles, where if the results of the measurement of wrinkles can be continued by measuring the depth of the wrinkles showed that all test cream groups gave different percentage results each week, 5% carrot tuber powder liquid cream had an effect in reducing the depth of wrinkles in the 3rd week while 10% and 15% carrot tuber powder liquid cream had an effect on the 3rd week. the first and the percent difference continued to increase until the 4th week the results were almost the same as the percent difference of commercial creams. The higher the concentration of carrot powder, the easier it is to reduce the depth of wrinkles.

The results of the analysis of variance (ANOVA) seen from week 1 to week 4 obtained that F0 is entirely greater than F-table 5% = 2.76%; and 1% = 4.18, then all the experimental results produce a very significant difference in the percentage reduction in wrinkle depth. Then it is necessary to do the smallest significant difference test (BNT) to find out which test cream has the effect of reducing the depth of wrinkles that are different or the same as each other.

At week 3, it was seen that the blank cream was very significantly different from commercial cream, liquid cream of carrot tuber powder 5%, 10% and 15%, commercial cream was very significantly different from 10% and 15% cream and 10% cream was significantly different from 15 cream. %. At week 4, the depth of wrinkles was seen decreasing, the blanks were very significantly different in all test creams, the commercial creams were no different from the 10% and 15% creams, the 10% creams were not different from the 15% creams. While the 5% cream was very significantly different from the 5% and 10% cream.

From the overall test results to reduce the depth of wrinkles on the skin on the back of the volunteers' hands, it can be seen that the best test cream is at a concentration of 10% because every week there is an increase in reducing the depth of wrinkles which is not different from the effect of 15% cream and commercial cream.

Provitamin A contained in carrot tubers makes the skin firmer and suppler and reduces excess oil on the skin, thereby reducing the depth of wrinkles (Vulanda, et al., 2014).

Conclusion

Based on the results of the study it can be concluded that:

a. Fresh carrot tubers contain the same class of chemical compounds as carrot tuber powder that has been freeze-dried, namely alkaloids, flavonoids, steroids, glycosides, and saponins.
b. Carrot tuber powder can be formulated into an oil-in-water emulsion type cream, pH 6.0 – 7.0 does not cause skin irritation and is stable in storage for 12 weeks.

c. The liquid cream formulation containing carrot tuber powder is able to provide an effect as a skin moisturizer and anti-aging with increasing water content, smoother skin, smaller skin pores, reduced blemishes, wrinkles and reduced depth of wrinkles. The best effectiveness as anti-aging is liquid cream of 10% carrot tuber powder which every week is able to increase the water content from dry to normal; reduce roughness of the skin to be smooth; shrink pores that are becoming small; reduce blemishes from multiple stains to multiple blemishes; reduce wrinkles; and the depth of wrinkles, where the effectiveness is almost comparable to the effectiveness of commercial creams.

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