

Effect of Addition of Black Cumin Seed Oil (*Nigella sativa*) as a Source of Omega-6 on Cork Albumin Powder (*Channa Striata*) for Wound Closure

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Abstract- Albumin powder which is processed through vacuum drying life it does not smell, the storing period is longer, and could be used anytime and anywhere. The formation of albumin in the form of powder is also easily absorbed in the body especially helps in wound care. The addition of black cumin seed oil to albumin powder as a source of omega 6 because black cumin seed oil contains active ingredients thymoquinone, saponins and flavonoids which have anti-microbial, antioxidant and cell regenerating effects. Provision of albumin powder in animals using the sonde method. The results of Phase 1 research showed differences in the concentration of black cumin seed oil affect the quality of albumin powder, namely omega 6, protein content, fat content, ash content, and yield. The best albumin powder was obtained at 12% black cumin seed oil concentration with the following results omega 6 was 1.92%, protein content was 11.25%, fat content was 5.24%, ash content was 0.97%, and yield was 60.37% . The highest fatty acid profile test results showed that *Linoleic Acid* was 1.92% and the lowest *Cis-8,11,14-Eicosatrienoic Acid*, C20: 3n6 was 0.002% . Then proceed to Phase 2 of the study, namely the testing of fatty acid profiles, zinc levels and mice try animals obtained observations on day 3, day 5, and day 7 showed the best concentration of albumin powder treatment 12% experienced a process of wound closure. wound character 65% on the 7th day.

Index Terms- albumin powder, black cumin seed oil, wound closure.

I. INTRODUCTION

Cork fish (*Channa striata*) has a high nutritional content and a variety of functions for health one of which can improve the process of wound recovery (Asikin and Kusumaningrum, 2018). Besides albumin, the wound cover on several components, namely the role of collagen, omega 3 fatty acids and omega 6 (Nicodemus et al., 2014). Black cumin seed oil (*Nigella sativa*) as a source of omega 6 contains the active ingredient thymoquinone which has anti-microbial and antioxidant effects that can accelerate wound closure. Giving black cumin seed oil to wounds can increase wound tissue regeneration (Hibono, 2017). The active substances contained in black cumin beside *thymoquinone* are saponins and flavonoids. In addition to regenerating cells, saponins have the ability to protect wounds, whereas flavonoids can be used as an antiseptic (Puspitasari et al., 2016). Collagen is a key component in the phase of wound management. The collagen characteristics that attach cells to form new connected tissues (Siregar and Suprayitno, 2019). The collagen used is collagen from grouper skin because grouper has the best collagen content (Suprayitno, 2019). Source of omega 3 fatty acids from flaxseed oil (*Linum usitatissimum*).

Cork fish albumin is usually consumed in liquid and fishy form so not everyone likes it. To overcome this problem, a way to dry it is to produce albumin powder extract or albumin powder (Hidayat and Suprayitno, 2019). Albumin powder which is processed through drying can produce a non-fishy taste, a pungent odor, a long shelf life and can be used anytime and anywhere. The formation of albumin which consists of powder is also easily absorbed in the body which is more important in wound care (Firlianty, 2016).

II. MATERIALS AND METHODS

2.1 Material

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The research material used consisted of raw materials for the production of albumin extract, namely cork fish, materials for making collagen, namely grouper skin, NaOH, astic acid and aquades. The material for making albumin powder is albumin extract derived from the extraction of cork fish, collagen, black cumin seed oil as a source of omega 6, flaxseed oil as a source of omega 3 and the coating material namely sorbitol and dextrin.

This research method is an experimental method. This research was conducted in two stages, namely stage 1 research and stage 2 research. Research 1 aims to obtain the optimal concentration of black cumin seed oil which is added to the production of albumin powder so that the best powder quality is obtained for the second stage research. While the second phase research aims to see the process of wound closure in animals using albumin powder with the best quality compared to negative control and negative control.

2.1.1 Process Extraction Albumin

The making of albumin extract begins with the preparation of raw materials ie cork fish is turned off by being hit on the head, then the fish is weeded, dipped and then diced and washed with running water. Furthermore, cork fish weighed 250 grams, then put into steam at a temperature of 70°C for 30 minutes. After that the cork fish meat is filtered and the filtrate is taken. Cork fish extract is ready to use.

2.1.2 Process Collagen

Collagen manufacturing is done by preparing grouper skin that has been removed from scales and remaining flesh attached. Grouper skin is cut 1 x 1 cm and then soaked with 0.1 M NaOH for 24 hours with a ratio of skin and solution of 1:10, then grouper skin is neutralized with aquades. Furthermore, soaked with acetic acid in the ratio of 1:10 for 24 hours and then filtered and taken the filtrate. Then the precipitation is done with NaCl 0.9 M for 24 hours. After 24 hours, centrifugation was carried out at 3500 rpm for 20 minutes then dialysis with 0.5 M acetic acid in a ratio of 1:10. Then inserted into the cellophane membrane. After that the cellophane membrane was immersed in 0.1 M acetic acid solution for 6 hours. Furthermore, soaked with distilled water to neutral pH. After that, collagen is ready to use.

2.1.3 Process Albumin Powder

The making of albumin powder is 180 ml cork fish extract albumin added with 6% sorbitol and 80% dextrin. Then added black cumin seed oil concentrations of 8%, 10%, and 12%. Subsequently added 0.6% collagen, 1.5% flaxseed oil then homogenized with a 2000 rpm homogenizer for 15 minutes. The resulting mixture is poured into a baking dish and dried with vacuum drying. After the sample is dried, blend until smooth and sieved with a 60 mesh sieve. Albumin powder was analyzed in omega 6, protein content, fat content, water content, ash content, yield and organoleptic

III. RESULT AND DISCUSSION

3.1 Omega 6

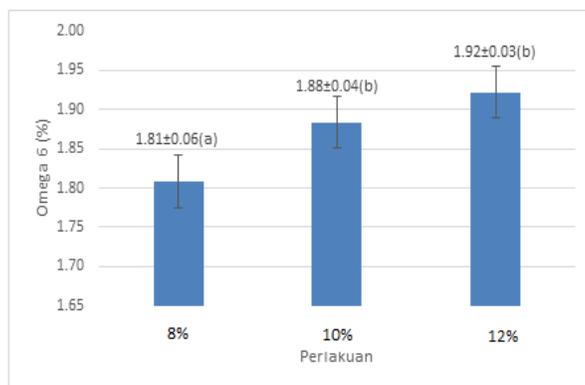


Figure 1. The Result of Omega 6

Omega 6 albumin powder with different concentrations of black cumin seed oil produces different omega 6 values. At 8% black cumin seed oil concentration of 1.82%, 10% concentration of 1.88%, and 12% concentration of 1.92%. The highest omega 6 value is shown at a concentration of 12% which is equal to 1.92%, while the lowest omega 6 at an concentration of 8% is 1.82%. The omega 6 black cumin seed oil value has decreased due to the heating process when drying albumin powder. According to Sipayung et al. (2015), one cause of damage to fat is oxidation. The oxidation process is not determined by the size of the amount of fat in the material so that even small amounts of fat-containing material are easily subjected to oxidation.

3.2 Protein Content

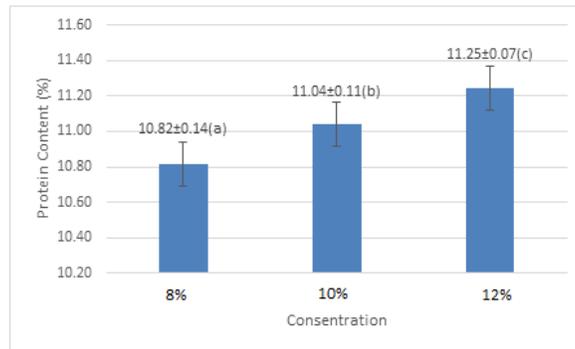


Figure 2. The Result of Protein Content

The value of 8% black cumin seed oil concentration produced a protein content of 10.82%, a concentration of 10% at 11.04%, and a concentration of 12% at 11.25%. The highest protein content results in the concentration of black cumin seed oil 12% by 11.25% and the value of the lowest protein content in the concentration of black cumin seed oil 8% is 10.82%. Protein content produced in the manufacture of powder increases with increasing concentration of black cumin seed oil that is given in the manufacture of powder. This is because black cumin seed oil contains high protein which is equal to 22.7%.

3.3 Water Content

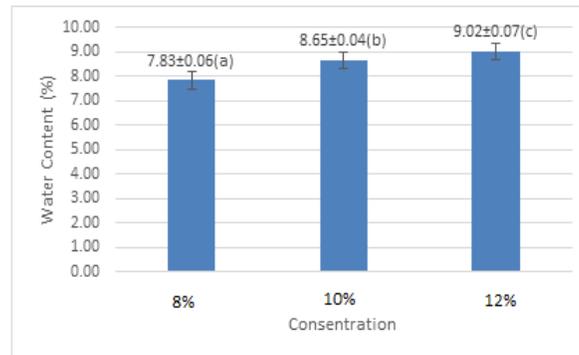


Figure 3. The Result of Water Content

The value of 8% black cumin seed oil concentration produced a moisture content of 7.83%, a concentration of 10% at 8.65%, and a concentration of 12% at 9.02%. The highest value of water content in black cumin seed oil concentration of 12% was 9.02% and the lowest water content value was in the concentration of black cumin seed oil 8% of 7.83%. The water content in the resulting albumin powder showed an increase along with the increased concentration of black cumin seed oil given.

3.4 Fat Content

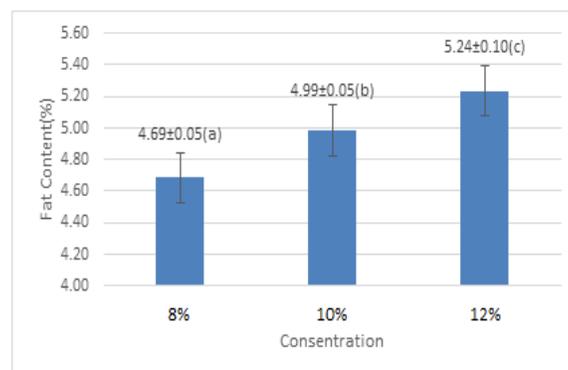


Figure 4. The Result of Fat Content

The fat content of albumin powder at the concentration of black cumin seed oil was 4.69%, the concentration of 10% was 4.99%, and the concentration of 12% was 5.24%. The highest value of fat content in black cumin seed oil concentration is 12% by 5.24%, and the lowest value of fat content in black cumin seed oil concentration is 8% by 4.69%. It can be concluded that the higher the concentration of cumin seed oil, the greater the fat content produced.

3.5 Ash Content

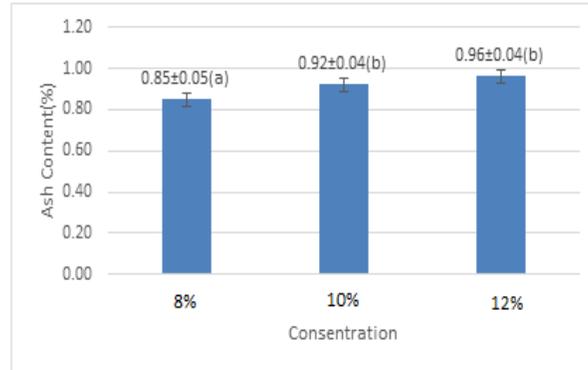


Figure 5. The Result of Ash Content

Ash content contained in the concentration of 8% black cumin seed oil produced ash value of 0.85%, 10% concentration of 0.91%, and 12% concentration of 0.97%. The highest ash content value in the concentration of black cumin seed oil is 12% by 0.97%, and the lowest ash content value in the concentration of black cumin seed oil is 8% by 0.85%. The ash content in the albumin powder comes from omega 3 source oil and omega 6 source oil added.

3.6 Yield

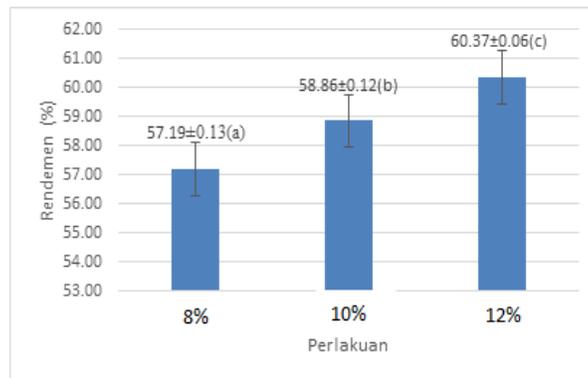


Figure 6. The Result of Yield

The results of the yield at 8% black cumin seed oil yield yields 57.19%, 10% concentration at 58.86%, and 12% concentration at 60.37%. The highest yield at a concentration of 12% was 60.37% and the lowest yield at a concentration of 8% was 57.19%. The higher the concentration of black cumin oil given will increase the volume the higher the yield produced.

3.7 Organoleptic

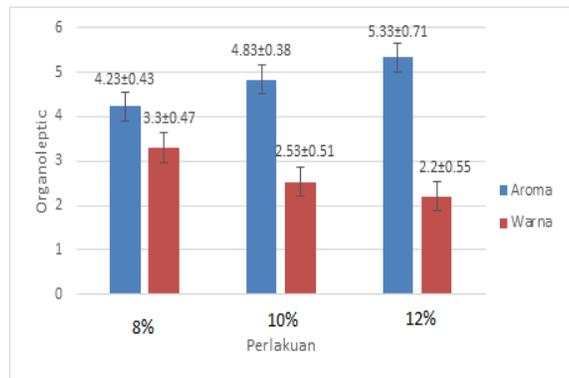


Figure 7. The result of Organoleptic

Organoleptic assessment of albumin powder with different concentrations shows differences. At 8% black cumim seed oil concentration, the value of color parameter shows a value of 3.30, a concentration of 10% at 2.53, and a concentration of 12% at 2.20. Whereas in the treatment of black cumim seed oil concentration with a concentration of 8% the aroma parameter was 4.23, a concentration of 10% was 4.83, and a concentration of 12% was 5.33. In the color parameter, the highest value was obtained from the concentration of black cumim seed oil at 3% by 3.30 and the lowest value from the concentration of black cumim seed oil at a concentration of 12% by 2.20. The highest value in the color parameter indicates that panelists dislike the color produced by albumin powder with the addition of black cumim seed oil because it tends to be too brown. As for the aroma parameter, the highest value was obtained from the concentration of black cumim seed oil at 12% by 5.33 and the lowest value of the concentration of black cumim seed oil at 8% by 4.23. The highest value on the aroma parameter indicates that the panelists liked the color produced from albumin powder with the addition of black cumim seed oil because the resulting aroma was not fishy and pungent.

3.8 Animal Testing

After knowing the optimal concentration of black cumim seed oil for the production of best quality albumin powder, which is 12% concentration which is then tested on animals to find out the effect of albumin powder on wound closure, further tests are analysis of albumin powder fatty acid profile, and zinc content test. Albumin powder with the best concentration of 12% was then compared with negative control and positive control. Mice were injured with a wound length of 2 cm. The process of wound closure was measured for 7 days with observation on the 3rd day of the 5th day and 7th day. Giving albumin powder using the sonde method.

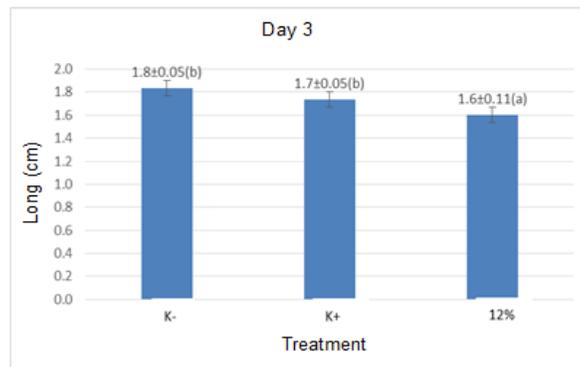


Figure 8. The Result of Day 3

On the 3rd day different treatments showed different results of wound closure. The negative control treatment showed an average wound length of 1.8 cm, a positive control treatment of 1.7 cm, and a 12% albumin concentration powder treatment of 1.6 cm. The fastest wound closure on day 3 was obtained at 12% albumin powder concentration treatment of 1.6 cm, while the longest wound closure was at negative control treatment of 1.8 cm. This can be interpreted that the wound closure process on the treatment on the 3rd day was 30%.

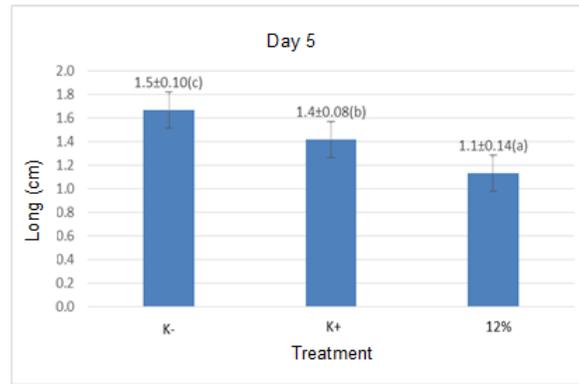


Figure 9. The Result of Day 5

Different treatments show different results of wound closure on the 5th day. The negative control treatment showed an average wound length of 1.5 cm, a positive control treatment of 1.4 cm, and a 12% albumin concentration powder treatment of 1.1 cm. The fastest wound closure on day 5 was obtained by albumin powder treatment with a concentration of 12%, which was 1.1 cm, while the longest wound closure was negative control treatment at 1.5 cm. This can be interpreted that the process of wound closure at the best treatment on the 5th day was 45%.

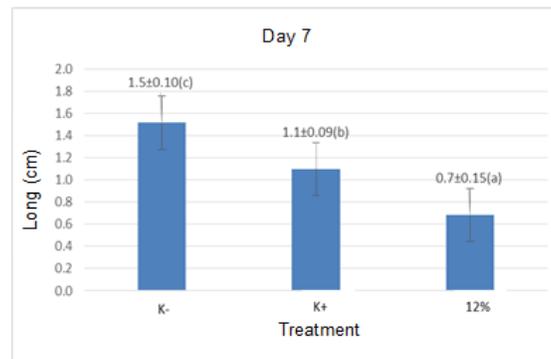


Figure 10. The Result of Day 7

The negative control treatment showed an average wound length of 1.5 cm, a positive control treatment of 1.1 cm, and a 12% albumin concentration powder treatment of 0.7 cm. The fastest wound closure on day 7 was obtained by a 12% concentration of albumin powder treatment of 0.7 cm, while the longest wound closure was at a negative control treatment of 1.5 cm. This can be interpreted that the process of wound closure at the best treatment on day 7 was 65%.

3.9 Fatty Acid Profile

No.	Jenis Asam Lemak	Kadar (%)
1.	<i>Linoleic Acid, C18:2n6c</i>	1.92
2.	<i>Linolenic Acid, C18:3n3</i>	0.94
3.	<i>Oleic Acid, C18:1n9c</i>	0.99
4.	<i>Heptadecanoic Acid, C17:0</i>	0.006
5.	<i>Palmitoleic Acid, C16:1</i>	0.02
6.	<i>Arachidonic Acid, C20:4n6</i>	0.006
7.	<i>Cis-11,14-Eicosadienoic Acid, C20:2</i>	0.07
8.	<i>Cis-4,7,10,13,16,19-Docosahexaenoic Acid, C22:6n3</i>	0.01
9.	<i>γ-Linolenic Acid, C18:3n6</i>	0.94
10.	<i>Stearic Acid, C18:0</i>	0.18
11.	<i>Palmitic Acid, C16:0</i>	0.51
12.	<i>Myristic Acid, C14:0</i>	0.01
13.	<i>Cis-8,11,14-Eicosatrienoic Acid, C20:3n6</i>	0.002
14.	<i>Pentadecanoic Acid, C15:0</i>	0.06
15.	<i>Lauric Acid, C12:0</i>	0.06

Total

5.724

The highest content of fatty acids in albumin powder with black cumin seed oil concentration of 12% was Linoleic Acid of 1.92% and the lowest Cis-8,11,14-Eicosatrienoic Acid, C20: 3n6 was 0.002. The high linoleic fatty acid in albumin powder due to the use of black cumin seed oil which contains a lot of linoleic acid or omega 6. High and low fatty acids in the product can be caused by these fatty acids can not stand the heat during the drying process.

3.10 Zinc Content

The best concentration of Zn in albumin powder was 1.82 mg / 100g. Compounds that accelerate wound healing are zinc minerals (Zn), and unsaturated fatty acids such as omega 3, omega 6 in cork fish albumin powder can accelerate the wound closure process. Omega-6 fatty acids found in black cumin seed oil and mineral and vitamin content are useful as nutrients in healing wound cuts on the backs of mice and stimulating the division of new cells (cell proliferation). So the addition of black cumin seed oil as a source of omega 6 and zinc influences the wound healing process.

IV CONCLUSION

Black cumin seed oil concentration of 12% is the optimal concentration to produce the best albumin powder. include omega 6 values of 1.92%, protein content of 11.25%, fat content of 5.24%, ash content of 0.97%, and yield of 60.37%.

The results showed that giving different treatments to wounds had a significant influence on the process of wound closure. At the observations of the 3rd day, 5th day, and 7th day, the process of wound closure was 65% as good as the experimental animals treated with albumin powder on the 7th day.

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