



EFFECTIVENESS OF OINTMENT THERAPY PRODUCTS BASED ON SNAKEHEAD FISH EXTRACT (CHANNA STRIATA) COMBINED WITH BLACK HONEY (EPIS DORSATA) ON POST-OPERATIVE WOUND PATIENTS

Mulidan*, Muhammad Andry

Program Studi Ilmu Keperawatan, Institut Kesehatan Helvetia, Jl. Kapten Sumarsono, No. 107, Helvetia, Kota Medan, 20124, Indonesia

*mulidan22@gmail.com

ABSTRACT

Snakehead fish (*Channa striata*) is a type of freshwater fish that is widely known by the public. The efficacy and benefits of this fish, especially in increasing albumin which is important for the body, have been scientifically proven. Snakehead fish has a very high protein content and is a source of albumin for patients with hypoalbuminemia and wounds. Black honey is also known to have great benefits in the process of tissue formation in wounds. The purpose of this study was to evaluate the effectiveness of therapeutic ointments based on snakehead fish extract combined with black honey in post-operative patients. Methods: This study used a quasi-experimental method with a post-test only with control group design, a sampling technique with purposive sampling with inclusion criteria involving 30 participants who were divided into control and intervention groups. The intervention group was given snakehead fish extract ointment and black honey for 2 weeks. Observations of the wounds were carried out before and after the application of the ointment in both groups. Pre and post intervention scores were measured using the REEDA (Redness, Edema, Ecchymosis, Discharge, Approximation) instrument, with a score range of 0-2 for good wounds and 9-15 for bad wounds. Statistical analysis used the Paired T-test with a significance level of $p < 0.005$. Results: The results showed that patients who received the intervention experienced an increase in wound healing scores. In the intervention group, 7 respondents (56.7%) showed good wound healing and 8 respondents (53.3%) showed moderate healing. Concentration F1 was proven to be more effective than F2 and F3. Based on statistical tests, there was a significant difference between the intervention and control groups, with the Paired Sample Test showing a p value < 0.000 in the intervention group, while the control group was not significant ($p > 0.334$) with an average intervention value (12.86) and control (11.53). Conclusion: Ointment based on snakehead fish extract combined with black honey has been proven to be effective in accelerating wound healing in postoperative patients.

Keywords: black honey; post-operative wounds; snakehead fish; wound care; wound ointment

How to cite (in APA style)

Mulidan, M., & Andry, M. (2024). Effectiveness of Ointment Therapy Products Based on Snakehead Fish Extract (*Channa Striata*) Combined with Black Honey (Epis Dorsata) on Post-Operative Wound Patients. *Indonesian Journal of Global Health Research*, 6(S6), 163-174. <https://doi.org/10.37287/ijghr.v6iS6.4654>.

INTRODUCTION

Surgical wound infection is a type of infection that is often experienced by post-surgery patients within 30 days after surgery. This infection can cause disability or even death, and increases the risk of longer healing times. According to a survey by the World Health Organization (WHO), the incidence of surgical wound infections globally ranges from 5% - 15%, with a mortality rate related to this infection between 3% - 75% in hospitals worldwide (Meo, 2021). In an Australian hospital, researchers found that the incidence of post-operative infections was 40 cases (5.9%) out of 583 cases of infection. According to the Ministry of Health, the incidence of infection in Indonesia reached 7.5% after surgery (Mulyanah & Rini, 2023).

Post-operative wounds are wounds from incisions during surgery. Herbal wound care is a wound care technique by creating moist conditions in the wound, so that it can help the epithelialization and wound healing process by using semi-acculsive dressings and wound ointment combination dressings (Khonsa & Setiawati, 2023). Snakehead fish is a fish that has higher albumin than other fish which is used for wound healing. In the medical world, snakehead fish is one of the alternative basic ingredients to be used to heal post-surgical wounds by taking the fish oil extract. One of the studies conducted by Firmasyah (2022) stated that the re-formation of wound healing epithelial tissue is also accelerated by the influence of topical application of snakehead fish extract ointment which is efficient in accelerating post-surgical wound healing (Firmansyah et al., 2019).

The majority of patients with post-operative wounds treat their wounds by taking medication and using chemicals on the wounds with an average healing time of 5-10 days, based on this, a new innovation is to make a natural/herbal wound ointment product based on snakehead fish extract combined with black honey to accelerate wound healing rather than using chemical ointments. Previous research conducted by Mohammad Andrie (2017) revealed the results of the effectiveness of administration in ointment from snakehead fish extract having a significant value with the results ($p < 0.05$) of the treatment group with the negative control group using a combination of 10% snakehead fish ointment on post-operative wounds (Andrie & Sihombing, 2017).

Snakehead fish of the *Channa striata* type are very rich in sources of albumin and protein needed by the body, albumin is a component produced from human blood which is needed for wound healing. Snakehead fish extract is obtained by extraction. Research conducted by Hairima (2015) revealed that ointment containing snakehead fish extract was proven to have a wound healing effect on cuts with a concentration of 20% (Hairima, 2014). Research by Sahid, et al (2018) revealed the results of the effectiveness of snakehead fish extract ointment on diabetes mellitus wounds with direct testing there were significant results of wound healing in the 4th and 6th weeks with an average WES value in wound healing (Sahid et al., 2018).

Testing of wound ointment based on snakehead fish extract combined with black honey has been carried out on animals and patients with provisions on the inclusion criteria that have been set, such as research by Sangkal et al (2020) who conducted an experimental test of snakehead fish extract ointment on experimental animals with burns which proved significant in the intervention group to accelerate wound healing with a t-value of 2.185 and a t-table value of 2.085 (Sangkal et al., 2020). In addition, research on the water phase of snakehead fish extract contains very high albumin which is effective in increasing fluidity and accelerating granulation in postoperative wounds at a concentration of 20% (Wijaya, 2014). Honey is a sweet liquid processed by bees which comes from flower essence or flour and is used by bees as a raw material called nectar, until now honey is known as a powerful traditional medicine that is effective in minimizing infection in wounds (Cahyadi et al., 2019).

Black honey is one of the honeys that has very good benefits for tissue formation in wounds. Ahmad Redho's research (2023) found that honey has significant effectiveness in wound healing with a t-test result of 0.349 p-value 0.000 in post-surgical wound healing at the proliferation stage, compared to the control group without honey (Redho et al., 2023). Based on observations, there are still cases of wound infection and long healing times, this is related to the patient's inability to maintain wound cleanliness, the therapy used and compliance with routine wound care after surgery. Therefore, in this study, the researcher used a combination of snakehead fish extract with black honey which was made in the form of a topical

preparation, namely an ointment. Previous research has shown that the extract ointment. The aim of this study was to determine the effectiveness of ointment products based on snakehead fish extract combined with black honey in improving wound healing in post-operative patients.

METHOD

Research Design

This study used a quantitative method with a quasi-experimental design, namely post-test only with control group. Treatment was given to the intervention group. The study population consisted of post-operative patients at Mitra Medika Tanjung Mulia Hospital. The sampling technique used was purposive sampling, with a sample size of 30 people divided into 15 people in the intervention group and 15 people in the control group. Inclusion criteria included adult post-operative patients without complications, no history of diabetes mellitus, and no use of other ointments. In this study, the intervention was carried out by treating wounds using snakehead fish extract ointment combined with black honey, while the control group used gentamicin for 2 weeks. Observation of wound development was carried out using a checklist sheet.

Research Tools and Materials

Analytical balance (boeco), stirring rod, glassware (oberoi) tube rack, Freeze Dryer, knife, beaker glass, dropper pipette, napkin, ointment tube, ointment pot, 5 cc syringe, filter paper, aluminum foil, water bath, sterile gauze, mortar and pestle, wound ruler, scissors, label paper, gloves, mask, and pH meter (Hanna), snakehead fish with age criteria of 4-5 months and weight per tail of 400-600 grams, distilled water, black honey, 95% Ethanol, carbomer 940, Glycerin, TEA, Methyl paraben, Propylene glycol, Aquades, 70% Alcohol. The materials used in this study were divided into two groups of snakehead fish and black honey with sampling carried out by purposive sampling, namely without comparing with similar fish and honey from other areas, the sample of this study Snakehead fish (*Channa striata*) was taken at the Brayan Medan market and black honey from livestock.

Preparation of Snakehead Fish Extract

Table 1.
Ointment Formulation

Material	F1	F2	F3
	(%)	(%)	(%)
Water phase of snakehead fish extract	20	15	10
Black Honey	10	15	20
BHA	0,02	0,02	0,02
Vitamin C	0,1	0,1	0,1
Metilparaben	0,18	0,18	0,18
Propilparaben	0,02	0,02	0,02
Propilengikol	1,6	1,6	1,6
Carbovol	2	2	2
TEA	2	2	2
<i>Adeps lanae</i>	Ad100	Ad 100	Ad 100

Snakehead fish (*Channa striata*) is prepared by removing the head, scales, gills, and stomach contents, then washed thoroughly to remove blood and mucus. The fish meat is separated from the bones, cut into small pieces, then mashed by adding distilled water in a ratio of 1:1. A total of 500 grams of snakehead fish meat is extracted with 500 mL of distilled water using the boiling method at a temperature of 56°C for 10 minutes. After the extraction process, filtering is carried out twice using cotton and filter paper. The snakehead fish extract is then dried using a freeze dryer. Research by Muhammad Haqqi (2022) shows that the boiling

method at a temperature of 56°C for 5 minutes produces the highest snakehead fish extract of 2.419% w/w, and the boiling method at a temperature of 56°C for 10 minutes produces the highest albumin content of $47.009 \pm 1.046\%$ w/w. (Hidayatullah et al., 2023).

Preparation of Preparation

The process begins by weighing the ingredients to be used. Snakehead fish extract and black honey are mixed in a mortar, then Carbopol is added, then stirred and ground until the mixture becomes clear. After that, TEA is dripped and stirred until evenly distributed, forming phase 1. In another mortar, the ointment base (adepts lanae) is added and ground until it turns yellowish white. Propyl paraben and methyl paraben that have been mixed with propylene glycol are added to the mortar and stirred until evenly distributed, forming phase 2. Both phases (phase 1 and phase 2) are then mixed and ground together until homogeneous in the same mortar. After the mixture is homogeneous, the ointment is put into an ointment container, and an evaluation test is carried out to measure its physical properties.

Research Instrument

The independent variable in this study is wound care using snakehead fish extract ointment combined with black honey, while the dependent variable is the condition of the post-operative wound. The instrument used for wound observation during treatment in the intervention group was a wound observation sheet using the REEDA scale (redness, edema, ecchymosis, discharge, and approximation). This scale has the following provisions: a value of 0-2 indicates good wound healing, 3-5 indicates moderate wound healing, 6-8 indicates poor or unhealthy wound healing, and 9-15 indicates poor wound healing. The validity and reliability of this instrument have been tested by previous researchers. Rezeki, (2010) with the results of $r_{\text{count}} > 0.934$ and the reliability of the alpha value of more than 0.75 is valid. In the first week, patients in the intervention group will receive treatment on the third day after surgery by applying ointment to the wound, and this treatment will last for approximately 2 weeks. Meanwhile, the control group will not receive this treatment, only using gentamicin as a comparison, and will be observed for the same period.

Statistical Analysis

Univariate analysis was applied to all variables to obtain a description of the characteristics. Bivariate analysis was used to investigate the effectiveness of the snakehead fish extract ointment product combined with black honey on postoperative wound healing before and after the intervention. The type of bivariate used was the paired sample t-test on normally distributed data and the average pre-post score in the intervention and control groups.

Ethical Considerations

This study meets the principles of research ethics. This study has been tested for feasibility in one of the ethics committees and has been approved with the approval number: 1034 / KEP-IKDH / VII / 2024.

RESULT

Evaluation of Physical Properties of Ointment Preparations

Hedonic Test

Hedonic test is a test conducted to determine the level of consumer preference or acceptance of ointment products, this test is part of the organoleptic sensory analysis that uses the five human senses to test product quality. The results can be seen in table 1.

Table 1.
Hedonic Testing on Researchers

No	Formulation	Results
1	F1	$1,61 \leq \mu \leq 2,19$
2	F2	$2,45 \leq \mu \leq 2,95$
3	F3	$3,74 \leq \mu \leq 4,06$

Information:

F1= $1,61 \leq \mu \leq 2,19$

F2= $2,45 \leq \mu \leq 2,95$

F3= $3,74 \leq \mu \leq 4,06$

Based on the hedonic test, it can be concluded that the level of preference or orgnoleptic sensory results are acceptable and in accordance with the established standards.

Homogeneity Test

The test is carried out by applying the preparation to a glass slide and covering it with another glass slide. Furthermore, observations are made to see whether there are coarse grains or not, and to assess whether the preparation is homogeneous or not. The homogeneity requirement is met if no coarse grains are visible

Tabel 2.
Ointment Homogeneity Testing

Formulation	Homogeneity	
	Yes	No
F1	√	
F2	√	
F3	√	

Based on homogeneity testing on ointment preparations, the results show that all formulas fall into the homogeneous category.

Cyling Test

It is done to test the ability of the preparation to spread evenly when applied to the skin. The method is to place the preparation on a round glass with a diameter of 15 cm, then cover it with another glass on top of the preparation. After that, leave it for one minute and measure the diameter of the preparation distribution. A total of 0.5 grams of the preparation is placed in the center of the round glass scale, then covered with another round glass. Measurement of the diameter of the preparation distribution longitudinally and transversely, and is carried out for each additional load of 50 grams to a total weight of 100 grams. The qualified spread power is 8-9 mm.

Tabel 3.
Cyling Test

Siklus 1			
Formula tion	No Burden	Burden 50 g	Burden 100g
F1	8,9 mm	13,6 mm	19,3 mm
F2	8,5 mm	10,9 mm	16,5 mm
F3	9,6 mm	12,1 mm	15,4 mm

Based on the test results, it was found that of the three formulas tested, one met the requirements.

Adhesion Test

Aims to assess how well the ointment sticks to the skin, because the longer the ointment sticks, the longer the therapeutic effect lasts. In this test, 0.25 grams of ointment is weighed

and placed on a glass slide. Then, another glass preparation was placed on top of the ointment, and for 5 minutes a weight weighing 100 grams was applied, then released, and the time required for the two glass preparations to come off was recorded.

Tabel 4.
Adhesion Test

Adhesion Test			
Formulation	No Burden	Burden 50 g	Burden 100g
F1	11,6 mm	16,4 mm	17,6 mm
F2	13,4 mm	14,1 mm	16,9 mm
F3	12,8 mm	15,2 mm	18,7 mm

pH Test

Aims to examine the effect of the addition of Carbopol on the physical stability of the preparation, especially in conditions of high temperature and humidity. The pH of the ointment is measured using a pH meter. Previously, the beaker was filled with 5 mL of distilled water, then 0.5 grams of ointment was added. The pH meter was calibrated first using a standard buffer solution with a pH of 4, 7, and 9. The pH meter electrode was immersed in a beaker containing a standard buffer solution for ten minutes. The criteria for a good ointment pH are within the human skin pH range, which is 4.5-6.5.

Tabel 5.
pH Test

pH			
Formula	Pengulangan 1	Pengulangan 2	Pengulangan 3
F1	5,60	5,70	5,76
F2	5,80	5,85	6,00
F3	5,20	5,30	5,44

Based on the pH test conducted, the results obtained met good pH criteria.

Respondent Characteristics

After observing the characteristics of the research subjects based on Age, Education, Occupation, and Type of Surgical Wound, the following results were obtained.

Tabel 6.
Respondent Characteristics Based on Age

Age	Intervention		Control	
	f	%	f	%
17-25 Year	2	13,3	2	13,3
26-35 Year	7	46,7	7	46,7
36-45 Year	6	40,0	4	26,7
>46 Year	-	-	2	13,3

Based on table 1. A total of 15 respondents aged 26-35 years as the intervention group who were given wound ointment based on snakehead fish extract combined with black honey, the results were 7 respondents with a percentage (46.7%). While for 15 respondents from the control group were not given intervention Most were aged 29-35 years as many as 7 respondents with a percentage (46.7%).

Tabel 2.
Respondent Characteristics Based on Education Level

Education	Intervention		Control	
	f	%	f	%
Junior high school	7	46,7	2	13,3
Senior High School	8	53,3	10	66,7
Bachelor	-	-	3	20,0

Based on table 2, a total of 15 respondents as the intervention group who were given snakehead fish extract ointment combined with black honey, the results showed that 8 people had high school education with a percentage of (53.3%). While for the 15 control groups who were not given intervention, the results showed that 10 people had high school education with a percentage of (66.7%).

Tabel 3.

Respondent Characteristics Based on Employment Level

Employment	Intervention		control	
	f	%	f	%
Housewife	4	26,7	2	13,3
Farmer	7	46,7	1	6,7
self-employed	4	26,7	11	73,3
PNS	-	-	1	6,7

Based on table 3, a total of 15 respondents as an intervention group who were given a combination of black honey snakehead fish extract ointment, the results obtained were 7 people who became farmers with a percentage of (46.7%). While for the 15 control groups who were not given intervention, the results obtained were 11 people working as entrepreneurs with a percentage of (73.3%).

Tabel 4.

Respondent Characteristics Based on Gender

Gender	Intervention		Control	
	f	%	f	%
Male	9	60,0	7	46,7
Female	6	40,0	8	53,3

Based on table 4, a total of 15 respondents as an intervention group who were given a combination of black honey snakehead fish extract ointment, the results obtained were male gender as many as 9 people with a percentage (60.0%). While for the 15 control groups that were not given intervention, the results obtained were female gender 8 people with a percentage (53.3%).

Tabel 5.

Respondent Characteristics Based on Operation Type

Operation Type	Intervention		Control	
	f	%	f	%
Post Excision	7	46,7	5	33,3
Sectio Caesarea	2	13,3	3	20,0
Appendicitis	4	26,7	1	6,7
Post Minor Operation	2	13,3	6	40,0

Based on table 5, a total of 15 respondents as an intervention group who were given a combination of black honey snakehead fish extract ointment, the results of the type of post-excision surgical wound were 7 people with a percentage (46.7%). While for the 15 control groups who were not given intervention, the results of the type of minor surgical wound were 6 people with a percentage (40.0%).

Identification of Post-Operative Wound Healing in Experimental and Control Groups

Tabel 6.

Identification of Post-Operative Wound Healing in Experimental and Control Groups

Wound Healing /REEDA Scale	Pre-Eksperimen		Post Eksperimen	
	f	%	F	%
Good wound healing (0-2)	-	-	7	56,7
Moderate Wound Healing (score 3-5)	2	13,3	8	53,3
Poor Wound Healing (score 6-8)	10	66,7	-	-
Poor wound healing (score 9-15)	3	20,0	-	-

Based on table 6, a total of 16 respondents from the intervention group who were given a combination of snakehead fish extract wound ointment and black honey, the pre-test results

were obtained with a category of less healed wounds with a score of 6-8 of 10 respondents (66.7%), while the post-test results showed moderate wound healing for 8 people (53.3%).

Tabel 7.

Identifying Postoperative Wound Healing in the Control Group

Wound Healing /REEDA Scale	Pre-Control		Post Control	
	f	%	f	%
Good wound healing (0-2)	6	40,0	8	53,3
Moderate Wound Healing (score 3-5)	9	60,0	7	46,7

Based on table 7, a total of 16 respondents from the control group who were not given intervention and only used gentamicin, the pre-test results were obtained with a moderate wound healing category with a score of 3-5 of 9 respondents (40.0%), while the post-test results showed good wound healing for 8 people (53.3%).

Descriptive Results of Comparison of Wound Ointment Concentrations

Based on observations of the application of wound ointment from snakehead fish extract combined with black honey at each concentration, the following results were obtained.

Tabel 8.

Testing of Three Concentration Wound Ointment

Wound Healing /REEDA Scale	Pre-Eksperimen		Post Eksperimen	
	f	%	f	%
Konsentrasi (F1)				
Poor Wound Healing (6-8)	4	80,0	-	-
Bad Wound Healing (9-15)	1	20,0	-	-
Wound Healing Good (0-2)	-	-	4	80,0
Moderate wound healing (3-5)	-	-	1	20,0
Fair Wound Healing (3-5)	2	40,0	3	60,0
Poor Wound Healing (6-8)	3	60,0	-	-
Good Wound Healing (0-2)	-	-	2	40,0
Konsentrasi (F2)				
Wound Healing (6-8) Good	3	40,0%	-	-
Bad Wound Healing (9-15)	2	60,0%	-	-
Healing (0-2)			1	20,0
Fair Wound Healing (3-5) Poor			4	80,0
Konsentrasi (F3)				
Fair Wound Healing (3-5)	23	40,0	3	60,0
Poor Wound Healing (6-8)	-	60,0	-	-
Good Wound Healing (0-2)		-	2	40,0
Fair Wound Healing (3-5)	2	40,0	3	60,0
Poor Wound Healing (6-8)	3	60,0	-	-
Good Wound Healing (0-2)	-	-	2	40,0
Fair Wound Healing (3-5)	2	40,0	3	60,0
Poor Wound Healing (6-8)	3	60,0	-	-
Good Wound Healing (0-2)	-	-	2	40,0

Based on table 8, the results of the descriptive test of the percentage comparison between wound ointment concentrations, it was found that wound ointment with a concentration of F1 snakehead fish extract (20%) combined with black honey (10%) was more effective in healing wounds with a score before the intervention, wound healing was less good (6-8) 4 people (80.0%), after the intervention, wound healing was better (0-2) as many as 4 people (80.0%) than concentrations F2 and F3, then the average percentage obtained was that F1 increased the growth of new tissue in wounds more quickly, so that wounds dried and recovered quickly.

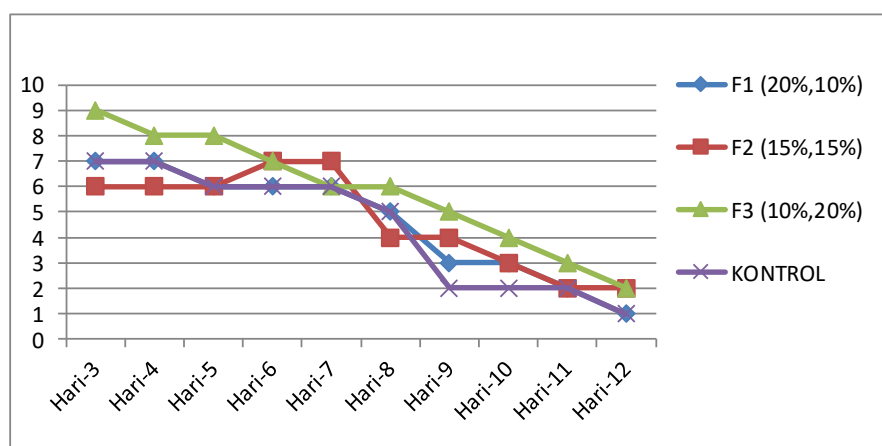


Figure 8. Graph of the percentage of wound healing in post-operative patients

Tabel 9.

Effectiveness of Wound Ointment of Snakehead Fish Extract Combined with Black Honey on Post-Operative Wounds at Mitra Medika Hospital

	Group	N	Mean Rank	Standard Deviation
Post-operative Wound Healing	Experiment	15	1,53	0,743
	Control	15	0,67	0,258
	Total	30		
Statistical Test Results				
Uji Paired Sample Test	Experiment	P value. 0,000		
	Control	P value. 0,334		

Based on Table 9, the results of the Paired Sample Test show a difference in scores or mean values between the experimental group and the control group. The results show that the group with wound ointment therapy experienced better healing than the control group, with a percentage of 1.5 compared to 0.67. This means that the average intensity of post-operative wound healing is higher when given snakehead fish extract ointment therapy combined with black honey. Therefore, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. Thus, it can be concluded that the snakehead fish extract wound ointment combined with black honey is effective in accelerating wound healing in post-operative patients at Mitra Medika Tanjung Mulia Hospital, Medan.

DISCUSSION

Identifying Wound Healing in Postoperative Patients in the Experimental Group

Analysis of research data shows that almost all intervention groups achieved a REEDA score between 0-2 after being given wound ointment from snakehead fish combined with black honey, where 7 people (56.7%) recovered with a good category, and 8 people (53.3%) recovered with a moderate category (score 3-5). This indicates that most respondents experienced good postoperative wound healing. These results are influenced by the albumin content and antibacterial properties found in snakehead fish and black honey, which contribute to improving wound healing by helping the formation of new tissue and maintaining wound moisture. Research by Elsa Fitri also shows that wound ointment from snakehead fish extract can improve and accelerate healing in cat incision wounds, with observations for 7 days where the wounds are united and dry. (Fitrianti et al., 2023). Administration of albumin from snakehead fish extract has been proven effective in accelerating the healing of post-operative wounds, because the active substances contained in albumin can help the body form new tissue in the wound area.(Harun et al., 2023). In this

study, postoperative patients who met the inclusion criteria were given wound ointment every morning for 2 weeks, with a once-daily application schedule that was applied thinly to the wound. Wound ointment made from snakehead fish extract combined with honey has gone through a standardized laboratory examination process. The materials used were selected based on their albumin content, namely 3-5 month old snakehead fish and black honey that had been tested for purity by a honey provider agency. Treatment began on the 3rd day after the patient underwent surgery, and observations were made until the 10th day. The results showed that honey was more effective in healing wounds than the control group using 0.9% NaCl. Thus, honey can be used as an alternative therapy for post-cesarean wounds (SC). (Mutiah et al., 2022).

Identifying Wound Healing in Postoperative Patients in the Control Group

Analysis of the research data showed that in the control group, half of the patients achieved moderate wound healing (score 3-5) as many as 9 people (60.0%), while good healing was recorded as many as 8 people with a percentage (53.3%). The statistical results showed that there was no significant difference between the pre and post tests in the control group, with a P value = 0.334. In this study, postoperative patients in the control group only received oral antibiotics and gentamicin ointment, without the administration of snakehead fish extract ointment combined with honey. Postoperative wound care can be done through pharmacological and non-pharmacological approaches.(Yuliana, 2022). Wound healing using snakehead fish extract showed a significant difference in time in accelerating wound healing, which was seen starting on the 9th day of intervention with a p value of $0.030 < 0.05$, meaning that the treatment group began to show the effectiveness of the test material on the 9th day. (Hadi et al., 2024).

Identifying the Comparison of Ointment Concentration on Wound Healing Rate

The implementation of complementary wound ointment from snakehead fish extract combined with black honey is a new innovation in improving and accelerating wound healing. Snakehead fish has a high albumin content, while black honey contains antibacterial properties that are useful in suppressing infection in wounds and accelerating the formation of new tissue. Based on the analysis presented in Table 8, it was found that there was a significant difference between the three concentrations of wound ointment before and after treatment in the experimental group. Ointment with concentration F1, which contains 20% snakehead fish water phase extract and 10% black honey, showed more dominant effectiveness in increasing wound healing faster compared to F2 and F3. Research by Rusyanti revealed that honey has a high antibacterial and protein content, which functions to help accelerate post-operative wound healing. The results of the t-test showed a p value of 0.003 ($p < \alpha$), which indicated a difference in the average wound healing score between the intervention group and the control group on day 3, where the wound healing score in the intervention group was lower (healed faster) compared to the control group. (Rusyanti & Yuningsih, 2024).

Identifying the Effectiveness of Snakehead Fish Extract Wound Ointment Combined with Black Honey in Post-Operation Patients

Based on the results of statistical tests using the Paired Sample Test technique, it is known that Asymp.Sig. -tailed) / p.value is 0.000 in the intervention group below the value < 0.05 , it can be concluded that snakehead fish extract wound ointment combined with black honey can heal post-operative wounds faster than the control group statistically. Snakehead fish extract ointment is rich in albumin which is beneficial for the body in increasing body immunity, albumin can help accelerate wound healing(Hidayatullah et al., 2023). Irenesia's research

(2023) found that administering acacia forest honey gel with a concentration of 80% can significantly increase the wound healing process in the third week. (Irenesia et al., 2023). Based on the results of observations in this study, it was found that of the three concentrations tested on postoperative patients with wounds that met the specified criteria, ointment with concentration F3 proved to be more effective in accelerating wound healing compared to F1 and F2. This can be seen from the score on the REEDA scale. In line with research conducted by Muhammad Zain Indrawan, there was a significant difference ($p < 0.05$) between groups 1, 2, and 3 (given the water phase) with group 4 (negative control) which began to appear on the 4th day. Group 3 showed the fastest wound healing effect on the 10th day with a percentage of 97.19%, compared to groups 1 (78.72%) and 2 (89.25%). From the results of the study and the theory above, it can be concluded that snakehead fish extract ointment therapy combined with black honey can heal wounds in the postoperative area with significant results in the experimental group compared to the control group. Thus, wound ointment made from snakehead fish extract and a combination of honey has been proven effective in increasing wound healing faster compared to the ointment used in the control group.

CONCLUSION

Postoperative wound healing is influenced by several factors, one of which is the use of non-pharmacological therapy in treating wounds. The results of this study indicate that statistically there is a significant value, namely the results of the paired sample t-test with $P = 0.000$ for the treatment group and $P = 0.334$ for the control group. In addition, this study also found that of the three ointment concentrations tested, ointment with concentration F1 (20% snakehead fish extract and 10% black honey) was more effective in accelerating wound healing. Descriptively, the percentage in the control group showed a moderate healing category with a score of 3-5 as many as 9 people (60.0%), while good healing occurred in 8 people with a percentage of 53.3%. On the other hand, in the experimental group after being given a combination of snakehead fish and black honey wound ointment, 7 people (56.7%) recovered with a good category, and 8 people (53.3%) recovered with a moderate category (score 3-5). From these results, it can be concluded that wound ointment made from snakehead fish extract and a combination of black honey is effective in increasing faster wound healing in post-operative patients at the Hospital.

REFERENCES

- Andrie, M., & Sihombing, D. (2017). Efektivitas Sediaan Salep yang Mengandung Ekstrak Ikan Gabus (*Channa striata*) pada Proses Penyembuhan Luka Akut Stadium II Terbuka pada Tikus Jantan Galur Wistar. *Pharmaceutical Sciences and Research*, 4(2), 4.
- Cahyadi, M. A., Sidharta, B. R., & To'bungan, N. (2019). Karakteristik dan Efektivitas Salep Madu Klanceng dari Lebah *Trigona* sp. Sebagai Antibakteri dan Penyembuh Luka Sayat. *Biota: Jurnal Ilmiah Ilmu-Ilmu Hayati*, 104–109.
- Firmansyah, A., Andrie, M., & Taurina, W. (2019). Uji Sifat Fisik Sediaan Salep Kombinasi Ekstrak Ikan Gabus (*Channa Striata*) Dan Minyak Cengkeh (*Syzygium Aromaticum* L). *Jurnal Mahasiswa Farmasi Fakultas Kedokteran Untan*, 4(1).
- Fitrianti, E., Zulkarnain, Z., & Nurmayanti, N. (2023). Efektivitas albumin ekstrak ikan gabus (*Channa striata*) terhadap penyembuhan luka pascaoperasi pada kucing domestik di UPTD Puskesmas Makassar. *Filogeni: Jurnal Mahasiswa Biologi*, 3(2), 79–84.
- Hadi, A. O., Ofsah, O. N., & Primaningsih, R. A. (2024). Evektifitas Minyak Ikan Gabus (*Channa Striata*) Terhadap Penyembuhan Luka Sectio Caesarea Pada Tikus Wistar (*Rattus Norvegicus*). *The Shine Cahaya Dunia Ners*, 9(01), 119–128.

- Hairima, H. (2014). Uji aktivitas salep obat luka fase air ekstrak ikan toman (*Channa micropeltes*) pada tikus putih jantan galur wistar. Tanjungpura University.
- Harun, H., Haroen, H., Fitri, S. U. R., Herliani, Y. K., & Cahyadi, A. (2023). Edukasi Kesehatan Diet Tinggi Kalori Tinggi Protein pada Pasien Pasca Operasi di Ruang Jasmin RSUD Sumedang. *Jurnal Kreativitas Pengabdian Kepada Masyarakat (PKM)*, 6(2), 713–722.
- Hidayatullah, M. H., Munawwarah, M., & Suhendi, A. (2023). Optimasi Metode Ekstraksi Albumin Dari Ikan Gabus (*Channa striata*). *JPSCR: Journal of Pharmaceutical Science and Clinical Research*, 8(3), 385–393.
- Irenesia, B., Satria, T., & Octariany, O. (2023). Efektivitas Gel Madu Akasia Terhadap Penyembuhan Luka Sayat Pada Tikus Putih. *Collaborative Medical Journal (CMJ)*, 6(2), 9–12.
- Khonsa, K., & Setiawati, R. (2023). Uji Efektivitas Pemberian Salep Ekstrak Ikan Patin (*Pangasius Sp.*) Terhadap Penyembuhan Luka Bakar Stadium Ii Kronik Tertutup Pada Tikus Putih Jantan Galur Wistar. *Journal Transformation of Mandalika*, 4(10), 546–551.
- Meo, M. Y. (2021). Hubungan Kepatuhan SOP Perawatan Luka Dengan Kejadian Infeksi Daerah Operasi (IDO) Pada Pasien Pasca Section Caesarea (SC) Di Ruang Anggrek Dan Poliklinik Kebidanan & Kandungan RSUD Dr. TC Hillers Maumere. *Jurnal Keperawatan Dan Kesehatan Masyarakat*, 6(1).
- Mulyanah, S., & Rini, A. S. (2023). Hubungan Mobilisasi Dini, Nutrisi dan Peran Bidan terhadap Penyembuhan Luka Operasi Sectio Caesarea di RSUD Malingping Tahun 2022: Relationship of Early Mobilization, Nutrition and the Role of Midwives in Wound Healing for Sectio Caesarea Operations at Ma. *Open Access Jakarta Journal of Health Sciences*, 2(4), 665–673.
- Mutiah, C., Abdurrahman, A., & Putri, I. (2022). Efektivitas Penggunaan Madu (Mel) Terhadap Penyembuhan Luka Operasi Pada Ibu Sectio Caesarea. *Malahayati Nursing Journal*, 4(3), 627–633.
- Redho, A., Jannaim, J., Rahmaniza, R., & Makruf, H. (2023). Efektivitas Madu Trigona Sp terhadap Proses Penyembuhan Luka Post Sirkumsisi Tahap Proliferasi. *Jurnal Penelitian Perawat Profesional*, 5(1), 417–424.
- Rusyanti, S., & Yuningsih, N. (2024). Konsumsi Madu Hitam Mempercepat Penyembuhan Luka Perineum Pada Ibu Masa Nifas. *Trend And Issue In Healthcare*.
- Sahid, N. A., Hayati, F., Rao, C. V., Ramely, R., Sani, I., Dzulkarnaen, A., Zakaria, Z., Hassan, S., Zahari, A., & Ali, A. A. (2018). Snakehead consumption enhances wound healing? From tradition to modern clinical practice: A prospective randomized controlled trial. *Evidence-Based Complementary and Alternative Medicine*, 2018(1), 3032790.
- Sangkal, A., Ismail, R., & Liputo, A. (2020). Uji Efektivitas Luka Bakar Pada Kelinci (*Oryctolagus cuniculus*) Sediaan Salep Ekstrak Ikan Gabus (*Channa striata*) Dari Danau Tondano. *Jurnal Sains Dan Kesehatan*, 4(2), 29–36.
- Wijaya, U. (2014). Uji aktivitas salep fase minyak ekstrak ikan Toman (*Channa Micropeltes*) terhadap luka sayat pada tikus jantan galur Wistar. *Jurnal Mahasiswa Farmasi Fakultas Kedokteran UNTAN*, 3(1).
- Yuliana, D. (2022). Perawatan Luka Perineum setelah Melahirkan dengan Menggunakan Daun Binahong (*Anredera cordifolia* (Tenore) Steen). Penerbit NEM.