PRODUCTIVITY OF SNAKEHEAD FISH (Channa striata) AS A SOURCE OF WOUND HEALING

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ABSTRACT

Snakehead fish (*Channa striata*) is a freshwater fish that can be found throughout Indonesian waters. Snakehead fish in today's society has been associated with medicine. Snakehead fish is processed into various types of dishes and then served to sick families, especially for those who are postoperative because its content has been clinically proven in several diseases. Snakehead fish has a high protein content, especially albumin and essential amino acids, fat, especially essential fatty acids, minerals, especially zinc (Zn), and several vitamins that are very good for health. Bioactive compounds that play a role in accelerating the wound healing process are albumin, glycine, and zinc (Zn). Wound healing is highly dependent on the biochemical processes that occur in the skin involving intrinsic and extrinsic factors. This healing process will be accelerated with the help of dried extracts of Snakehead fish designed in topical forms such as creams or gels.

Keywords: Snakehead fish; Wound; Albumin; Health

1. INTRODUCTION

Indonesia has fisheries potential that is very attractive to the world and is spread throughout the waters of Indonesia. Fish, apart from being a quality and nutritious food, can also be used as an ingredient to heal wounds.

Snakehead fish (*Channa striata*) is a type of freshwater fish and is well known by the public. Snakehead fish is predatory (preys on other fish that are smaller than its body size) and is native to Indonesian waters and spreads almost evenly throughout Indonesia.

Snakehead fish is one of the freshwater fish that is included in the type of fishing fish that is commonly found in lakes, swamps, rivers and waterways to rice fields¹. Scientifically, Snakehead fish has been proven to increase endurance, albumin levels and accelerate the healing process of postoperative wounds, burns²⁻³. Snakehead fish in today's society has been associated

with medicine. Snakehead fish is processed into various types of dishes and then served to sick families, especially those who are postoperative.

People's understanding of snakehead fish as a medicine has been known since our ancestors. Snakehead fish is served to sick families with the belief that it can help heal even though at that time they did not know the content contained in Snakehead fish⁴. Snakehead fish is used in medicine as a wound healer by taking oil from the snakehead fish. The wound healing process can occur due to the content of bioactive compounds contained in snakehead fish⁵. Research by Sinambela⁶ on snakehead fish extract ointment and Gusdi² in the form of snakehead fish extract gel preparation states that both topical preparations can heal cuts.

Therefore in this paper, the author discusses the utilisation of snakehead fish as a source of wound healing.

2. RESEARCH METHOD

Time and Place

The preparation of this Journal was carried out in July 2023.

Methods

This study uses descriptive analysis based on a literature review by using secondary data as a source of information.

3. RESULT AND DISCUSSION Snakehead Fish Content

Snakehead fish is known to contain albumin and other types of proteins that are very important for health. The use of snakehead fish for treatment has been carried out in several regions. In South Sulawesi, snakehead fish is consumed by women who have just given birth. By consuming snakehead fish, it is hoped that women who give birth will recover quickly and produce plenty of breast milk (breast milk) for the needs of their babies.

In Tanah Toraja and Enrekang, snakehead fish has long been given to children because it is believed to increase children's immunity⁸. Snakehead fish has high protein content, making it an excellent source of protein in your daily diet. Protein in the body has a function other than as a source of energy; it also functions as a building and regulating substance.

The protein content of snakehead fish consists of important amino acids, both essential amino acids and non-essential amino acids. Essential amino acids are amino acids that cannot be synthesised in the body so they are required from dietary intake; isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine.

Important non-essential amino acid groups in snakehead fish include glutamate (14.253%), aspartic acid (9.571%), and arginine (8.675%). These three nonessential amino acids are very important in aiding wound healing². Based on the table of snakehead fish content¹⁰, the amount of snakehead fish nutrition per 100 g of material can be seen in Table 1.

Table	1.	The	nutri	tional	l cont	ent	of
		snak	ehead	fish	based	on	per
		100 g of ingredients					

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No.	Nutritional Elements	Quantity/ Unit			
1	Energy	116 cal			
2	Water	69,6 g			
3	Protein	25,2 g			
4	Fat	1,7 g			
5	Carbohydrates	0 g			
6	Fat	3,6 g			
7	Calcium	62 mg			
8	Phosphorus	176 mg			
9	Iron	0.9 mg			
10	Vitamin A	45 mcg			
11	Vitamin B	0.04 mcg			
12	Vitamin C	0 mg			

Alauddin et al.¹¹ conducted an identification test of snakehead fish extract which aims to ensure that the extract obtained contains albumin. The identification of albumin was carried out by heating method, namely by heating the extract of snakehead fish for 30 minutes at a temperature of $90^{\circ}C^{12-13}$.

Based on the results of the identification test, snakehead fish extract produces clots after heating so it can be known that snakehead fish extract positively contains albumin. The greater the concentration of snakehead fish extract given, the greater the wound-healing activity of the test animals.

The wound-healing process is influenced by the substances contained in the given preparation, especially active substances that can accelerate healing by stimulating the growth of new cells in the skin to be faster. During the healing process, adequate intake of nutrients such carbohydrates, proteins, fats, as and micronutrients is required $\frac{14}{2}$. Nutrients are needed by the body in the process of forming new tissues.

A wound is a disruption of the normal condition of the skin. A wound is a damage to the skin. When a wound occurs, there will be several negative effects such as the loss of all or part of organ function to bleeding and even cell death. One type of wound based on the cause is a *Vulnus* scissum or cut wound. *V. scissum* is a cut or slash wound characterised by straight or regular edges and is usually encountered in everyday activities.

Surgery is one example of V. scissum and the speed of wound healing in surgery depends on many factors, one of which is nutrition. One of the ingredients in snakehead fish is albumin, which is a globular protein that is often applied clinically for nutritional improvement and postoperative wound healing. Albumin functions to regulate osmotic pressure in the blood and maintain the presence of water in blood plasma to maintain blood volume in the body and as a means of transport and transportation. Albumin is also useful in the formation of body tissues, such as wounds after surgery, burns and during illness.

Wound Healing Process

The wound-healing process is influenced by the substances contained in the given preparation, especially active substances that can accelerate healing by stimulating the growth of new cells in the skin to be faster. Good nutrition will support healing, delay malnutrition, and inhibit and prevent complications¹⁵.

During the healing process, adequate intake of nutrients such as carbohydrates, proteins, fats, and micronutrients is required $\frac{14}{1}$. In general, the stages in the healing process wound are the inflammatory phase, proliferation phase, and maturation phase. In the inflammatory process, albumin plays a role in regulating osmotic pressure in the blood and constitutes almost 50% of plasma proteins¹³.

When injured, the skin will show signs of inflammation where foreign bodies from outside the body can enter through open wounds such as cuts. The entry of foreign bodies can trigger hydrostatic pressure disturbances, where intracellular fluid will enter the cell due to the difference in concentration inside and outside the cell through osmotic pathways, causing the cell to swell.

In this condition, albumin is needed to maintain osmotic pressure inside and outside the cell. The inflammatory phase itself has characteristics such as pain (dolor), heat (calor), redness (rubor), swelling (tumour), and loss of function (fungsio laesa)¹⁶.

The proliferation phase is characterised by the formation of tissue the granulation in wound. Granulation tissue is a combination of cellular elements including fibroblasts as well as inflammatory cells and along with the onset of new capillaries is embedded in a loose extra-cellular network of collagen, fibronectin and hyaluronic acid matrix. In the proliferation phase, new blood vessel formation continues throughout the wound^{<u>17</u>}.

The role of albumin in the maturation phase is as a basic material for collagen formation. Collagen rapidly develops into the main matrix-forming factor. Collagen fibres are initially randomly distributed forming crosses and aggregating into fibril bundles that slowly cause tissue healing and increase the stiffness and tension strength of collagen fibres.

Restoration of tension strength will proceed slowly due to continuous collagen tissue deposition, and remodelling of collagen fibres to form larger collagen bundles. Collagen remodelling during scar tissue formation depends on a continuous process of collagen synthesis and catabolism. The maturation stage begins on the 21st postoperative day and may continue for years.

Wound healing can be impaired by internal (endogenous) or external (exogenous) causes. The most important endogenous causes are coagulation disorders and immune system disorders. All blood clotting disorders will inhibit wound healing because haemostatic is the starting point and basis of the inflammatory phase¹⁹.

Immune system disorders will inhibit and alter the body's reaction to wounds, tissue death and contamination. When the immune system, both cellular and humoral, is compromised, the clearance of contaminants and dead tissue and containment of infection is compromised.

Apart from viral infections and poor general condition, the immune system is affected by malnutrition due to starvation, and malabsorption, as well as by deficiencies of essential amino acids, minerals and vitamins, and by disturbances in food metabolism such as liver disease.

The Role of Snakehead Fish for Health

From the above explanation about wounds, we can know that many factors cause wounds. People have used snakehead fish to speed up the healing process of various types of wounds, especially postoperative wounds. This is because snakehead fish contains bioactive compounds that function to accelerate wound healing, namely amino acids (Zn) zinc minerals, (glycine), and unsaturated fatty acids such as omega-3, omega-6 and omega- 9^{19} .

Protein is needed in the wound healing process as the basis for collagen tissue formation. Research by Sunatrio¹⁹ showed a significant relationship (p = 0.001) between serum albumin administration and wound healing time. Albumin functions as a binding and transporting agent, regulation of osmotic pressure, inhibition of platelet formation and anti-thrombosis, increases cell permeability and is an antioxidant.

Research on snakehead fish has been carried out in many pharmaceutical dosage forms such as 1) Dry extract of snakehead fish designed in injectable liposome form for chemotherapy treatment of breast cancer. 2) Dry extract of snakehead fish designed in nanoemulgel dosage form to accelerate burn wound healing. 3) Dry extract of snakehead fish designed in nanoemulsion dosage form to accelerate open wound healing. 4) Dry extract of snakehead fish designed in a double emulsion syrup dosage form to boost the immune system. 5) Dry extract of snakehead fish designed in cream dosage form to accelerate the wound healing process

4. CONCLUSION

Snakehead fish has the potential to be used as a source of food and health because it is easily available in the market. The nutritional content of snakehead fish in the form of protein, fat, minerals and vitamins is very good for health as well as clinically proven efficacy and a variety of processed products and various types of dishes can be made from snakehead fish.

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