



## **Article review; USE OF TILAPIA SKIN FOR BURN TREATMENT**

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### **ABSTRACT**

This article aims to review the skin ability of tilapia fish as a treatment in the healing of burns. Tilapia skin has a non-infectious microbiota, a high amount of type I collagen, and morphological structures similar to human skin, making it potential for burn management. One of the implementations of tilapia skin for the treatment of burns is by applying tilapia skin that has been sterilized on the skin affected by burns and in the form of fluid that can be applied on the surface of the skin affected by burns.

Keywords: *implemtasi, sterilization, waste, treatment.*

### **INTRODUCTION**

According to the World Health Organization, burns are responsible for 180,000 deaths each year, the majority in low- and middle-income countries. In addition, non-fatal burns lead to prolonged hospitalization, disability, and disability, coupled with stigma and rejection.

A burn (combustio) is damage or loss of tissue due to contact with a heat source such as fire, hot water, chemicals, electricity, and radiation. Burns are a type of trauma with high morbidity and mortality (Moenadjat 2003). Wound healing is a natural phenomenon where the body can cope with tissue damage

itself but the healing rate is relatively slow and the probability of being infected with microbes is high. This leads to the need for nutrients high enough to speed up the wound healing process. Treatment in the healing of burns, among others, prevents infection and gives the remnants of epithelial cells to proliferate and close the surface of the wound (Sabale et al, 2012). Administration of topical antimicrobial therapy in the form of ointments or liquid compresses / soaks is commonly done in the procedure of handling burns.

One source of medicinal ingredients from nature that can treat burns is the skin of tilapia fish (*Oreochromis niloticus*). Scientists at the Federal University of Ceara – Northern Brazil have found that tilapia skin has moisture, collagen and disease resistance at levels comparable to human skin, and can aid healing. It found tilapia skin has a non-infectious microbiota, a high amount of type I collagen, and morphological structures similar to human skin, so it is suggested as a potential xenograft for burn management.

Tilapia (*Oreochromis niloticus*) is one of the aquaculture products that experienced an increase in production volume every year with an average increase of 24.76% from 2007-2011 (KKP, 2011). With the yield value, tilapia production in 2011 of 481,440 tons is expected to produce 41,885 tons of tilapia skin. Tilapia skin waste from the byproducts of the fish processing industry has been used as a skin or gelatin making material because it contains collagen.

Tilapia Tilapia Tilapia (NTFS) skin has been proposed as a biological material option for burn management. Colony Forming Units found in NTFS samples prior to the chemical sterilization process indicated the presence of a normal, non-communicable microbiota. NTFS also presents a large composition of type I collagen, morphologically similar to human skin and high resistance and tensile extension at the time of breakup.

Based on the background above, there is the potential to destroy tilapia skin as a treatment for burn sufferers, then there is an opportunity to use the skin which is a side result of fisheries to be processed and processed for medical purposes. This article aims to review the skin ability of tilapia fish as a treatment in the healing of burns.

## **Burns**

*The World Health Organization* (WHO) says that burns are an estimated global public health problem that there are 265,000 deaths each year worldwide from burns (WHO, 2014).

A burn (combustio) is damage or loss of tissue due to contact with a heat source such as fire, hot water, chemicals, electricity, and radiation. Burns are a type of trauma with high morbidity and mortality (Moenadjat 2003). Wound healing is a natural phenomenon where the body can cope with tissue damage itself but the healing rate is relatively slow and the probability of being infected with microbes is high. This leads to a high enough demand for nutrients to speed up the wound healing process. Treatment in the healing of burns, among others, prevents infection and gives the remnants of epithelial cells to proliferate and close the surface of the wound (Sabale et al, 2012). Administration of topical antimicrobial therapy in the form of ointments or liquid compresses / soaks is commonly done in the procedure of handling burns.

In speeding up the wound healing process, a moist atmosphere is needed because it can increase re-epithelization and stimulate the proliferation and migration of epithelial cells, increase growth factor activity that maintains sufficient surface oxygen and maintains nutrient transport (Hidayat 2013). Therefore moiststate has been widely applied to hydrogels and wound dressings so that the wound healing process can run optimally and quickly. One ingredient that has been widely used to maintain a moist atmosphere in wounds is collagen.

Collagen plays a vital role in the healing process of wounds in connective tissue. Macrophages in wounds release FGF and TGF- $\beta$  thus stimulating fibroblast proliferation and producing collagen (Gaspar, et al., 2012). Some collagen research processed fish has been done a lot. Fish skin is reported to contain collagen with yield values that vary between 11–63% depending on the type of fish, extracting materials, and collagen extraction techniques (Nagai & Suzuki, 2000).

Collagen is the main structural component of white connective tissue, which includes nearly 30% of the body's total protein. Up to now there are about 25 types of collagen that have been identified, namely type I to XXV (Olsen et al., 2003). Collagen types identified in fish are only type I and V. Type I collagen is found in the skin, bones, and scales of fish (Nagai & Suzuki, 2000), while type V collagen is found in connective tissue in the skin, tendons and muscles of fish that also contain type I collagen (Sato et al., 1989). Collagen can be applied to the food, cosmetics, biomedical and pharmaceutical industries. In cosmetics, collagen is used to reduce wrinkles on the face or can be injected into the skin to replace skin tissue that has been lost. In biomedicine, collagen is used as sponges for burns, surgical threads, hemostatic agents, replacement or substitution of blood

vessels and artificial heart valves. In the pharmaceutical industry collagen is used as a drug carrier: mini-pellets and tablets for protein delivery, gel formulations in combination with liposomes for controlled delivery systems, controlling materials for transdermal delivery, and nanoparticles for gene delivery (Lee et al., 2001).

### **Tilapia Fish**

National tilapia production as one of the leading commodities of Indonesian aquaculture during the period 2015-2018 increased by 12.85%. Tilapia skin waste from the byproducts of the fish processing industry has been used as a skin or gelatin making material because it contains collagen. Tilapia (*Oreochromis niloticus*) is one of the aquaculture products that experienced an increase in production volume every year with an average increase of 24.76% from 2007-2011 (KKP 2011). Tilapia fish is now widely processed into fish filet which is the raw material of the processing industry of fishery products. The processing of tilapia filets produces a byproduct in the form of fish skin with a yield of 8.7% of the total weight of the fish (Peranginangin et al., 2006). With the yield value, tilapia production in 2011 of 481,440 tons is expected to produce 41,885 tons of tilapia skin.

In general, tilapia skin is exported to several countries or marketed locally as skin crackers. Some of the use of tilapia leather include as tanned leather for craft materials such as shoes, sandals, and wallets (Murniyati et al., 2012), gelatin making as a food and pharmaceutical material (Peranginangin, 2007). Moreover, tilapia skin can also be processed and processed again for medical attention.

### **Content in Tilapia Skin**

According to Wahyuni Eka Maryati (2018) tilapia skin has moisture, collagen and disease resistance at levels comparable to human skin, so it can help wound healing. On the skin of tilapia fish contains protein levels of 47.43%, water 23.4%, fat 1.68%, and ash 3.01% with the type of collagen contained in the skin of tilapia is a type of collagen with an SDS-PAGE pattern that has chains and that cannot be observed clearly because it still appears clustered, so it is included in collagen type I.

According to Dr. José Frota (2019) Nile Tilapia Fish Skin (NTFH) has been proposed as a biological material option for burn management. Colony Forming Units found in NTFS samples prior to the chemical sterilization process indicated the presence of a normal, non-communicable microbiota. NTFS also presents a

large composition of type I collagen, morphologically similar to human skin and high resistance and tensile extensions when broken.

It found tilapia skin has a non-infectious microbiota, a high amount of type I collagen, and morphological structures similar to human skin, so it is suggested as a potential xenograft for burn management.

### **Treatment of Burns with Tilapia Skin**

Burns are skin lesions due to trauma that comes from heat, which may or may not be severe, that may be outside the skin, tendons, and bones. The treatment, inspired by research by Brazilian doctors from the Federal University of Ceara state, located in northern Brazil, has been tested and all samples have been analyzed. To finally find the final results of the analysis, note that fish skin has collagen that is very close to human skin and is suitable for treatment and treatment functions this appears to provide better recovery for patients whose economy is low, a more agile healing process that reduces the risk of wound contamination as well as for better social well-being.

There are several ways to treat burns with tilapia skin. Among them are:

#### **Tilapia Skin Dressing Directly**

This method has been applied by Lordello et al. (2019) in a way: first clean the skin of the fish with various sterilization materials, by passing the irradiation to kill the virus before the skin is packed and cooled. Once cleaned and packed, the skin can last up to two years. And treatment to get rid of fishy odor.

The treatment consists of covering the burned part of the patient's skin with fish skin, and covering it with bandages, without the need for any cream. After about 10 days, the bandage can be removed. The skin of tilapia, which is already dry and loosened, can be peeled by hand.



Implementation of tilapia skin on burns  
Picture : Lordello *et al.* (2019)

## Manufacture of Lubricant Drugs from Tilapia Skin



Cikikubar "Tilapia Skin Fluid for Burns"

<https://www.uny.ac.id/berita/cairan-kulit-ikan-nila-obati-luka-bakar>

One of the burns healing fishery products is CIKIKUBAR. CIKIKUBAR stands for tilapia skin fluid for burns. This product was developed by Wahyuni Eka Maryati (2018) in the Student Creativity Program.

Wahyuni Eka Maryati et al., tried to make a different burn remedy by utilizing the skin of tilapia fish (*Oreochromis niloticus*) which is much wasted. Tilapia fish in the Special Region of Yogyakarta is quite abundant and the skin only becomes discarded garbage.

This burn drug is the only tilapia skin-based wound medicine that is specially designed in the form of a liquid named Cikikubar (Tilapia Fish Skin Fluid For Burns).

- **How to Make CIKIKUBAR**

Annisa Husnul Latifah explained how to make Cikikubar, where the main ingredient needed is tilapia skin. The first step, tilapia skin that has been filleted from the meat and all equipment sterilized by boiling it first. The skin of tilapia fish is washed, then soaked in betel lime water to remove the fishy smell and cleaned. It is then mixed with  $\text{ddH}_2\text{O} + \text{NaOH}$  to get the collagen fluid of tilapia skin. After the collagen fluid is obtained and then separated with other fluids. This collagen is then filtered with filter paper and mixed with essen using methylisothiazolinone. This liquid is then mixed again with gel drugs, and packaged in a package of 10 grams then Cikikubar is ready to use.

### Conclusion

Tilapia skin has a non-infectious microbiota, a high amount of type I collagen, and morphological structures similar to human skin, making it potential for burn management. One of the implementations of tilapia skin for the treatment

of burns is by applying tilapia skin that has been sterilized on the skin affected by burns and in the form of fluid that can be applied on the surface of the skin affected by burns.

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