Use Of 'TILAPIA' As Therapeutic Agent In Oral Mucosal Burns: An Unprecedented Proposal

Case Report

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Abstract

Water bodies offer plenty of natural resources, which are procured and utilized in the manufacturing of materials or as novel medicines, employed in medical and dental practice. Among sponges, corals, fishes, etc one such promising source is the 'Tilapia fish'. It is predominantly farmed for the consumption and production of curative biomaterials. As oral physicians or dental practitioners, we encounter many oral lesions and wounds in regular practice, 'burns' being one of them. Tilapia skin and its collagen are being utilized in the resolution of dermatological burns. Since the branch of oral medicine encourages innovative ideas and research work in the treatment of challenging oral lesions, hereby, this article aims to communicate the idea of its feasible application in oral burns and alike lesions, making Tilapia a neoteric healing agent, keeping in mind the great biological properties it possesses.

Keywords: Burns; Collagen; Heparin; Gel; Oral; Tilapia; Skin; Wounds.

Perspective

Marine lifeforms are the biggest examples of impeccable bioresources. Environmental biologists plumb the water depths to procure biomaterials from marine sources like corals, sponges, fish, etc; for fabricating efficient and safe medications to treat various medical ailments ranging from chronic pain to various malignancies. Currently, potent applications of marine biomaterials have secured a place in operative and reconstructive aesthetic procedures. These bioactive materials possess antitumoral, antiviral, antibacterial, and antifungal properties, and serve as scaffolds for tissue regeneration. This progress in the field of marine biology has drawn the special attention of dental practitioners. Few such marine derived dental materials which have acquired a strong foothold over these years include agar, alginate, chitosan, calcium phosphate, hydroxyapatite, biosilica, etc. [1] One such great source of modern medicine is Tilapia. It has found application in resolution of dermatological burns in burnt victims. Through this article, we aim to bring forward an innovative proposal for the

treatment of oral burns and alike lesions, normally encountered in routine dental practice. The idea is to deliver the concept of innovative application of tilapia skin and biomaterials derived from it, in oral burns.

Oral Burns

Burns occurring inside the oral cavity or around the perioral structures are resultant of thermal exposures, contact with chemicals, or electrical abuse; can be medication-induced lichenoid reactions, and independent deep oral wounds due to accidental infliction, oral contracture, etc. Most burns are facile, requiring supportive treatment in form of topical applications, however, there is no definitive protocol for treating oral burns. Appropriate management needs to be done to achieve pain alleviation, prevention of secondary infection, and accelerated repair of injured tissues, to reinstate the altered orofacial function and aesthetics. [2]

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Tilapia's origin, production and use of its collagen in oral burns and wounds

Collagen owing to its properties like “low immunogenicity, good biocompatibility, and biodegradability” is extensively used in wound dressing. Collagen molecules potentially promote wound epithelialization and rapid healing.[3] Traditionally, the majority of the collagen is obtained from the bovines, pigs, or chicken waste and actualize the risk of acquiring health hazards.[4] This contradicts its wide application. To deal with these issues, marine biomaterials having consequential therapeutic benefits have developed great interest among the researchers. Lately, extensive studies have been done on the procurement and utilization of Tilapia fish collagen, rendering it readily acceptable by all cultural and religious groups. Tilapia is a freshwater fish, native to and cultivated in Africa, Asia, Thailand and Brazil. [5, 6] In India, it forms a decent proportion of the Ganges waters. “Mozambique tilapia” was the first to be introduced in India, in 1952 (Sugunan 1995), followed by other varieties and hybrids. Considering it highly useful, the Indian government has encouraged tilapia husbandry in the fisheries sector. [7] The fish's skin is not eaten and thrown away. Tilapia is made up of miniature collagen fibers which speed up the healing process by promoting adherent properties of the cells, accretion, and differentiation.[8] Tilapia skin collagen is currently being utilized in the manufacturing of cosmetics, oral supplements, etc.[7]

Applying tilapia skin directly over the burnt site is questionable. Ample studies need to be executed to ascertain the mucoadhesive and suturable properties of the Tilapia skin at the wound or surgical sites. Previously, Tilapia skin has been utilized in burnt victims as reported in this case.[9] Brazilian researchers have fabricated a depurated tilapia skin dressing for moderate and severe dermal burns, vivifying many clinical studies.[10] They presume the treatment to be inexpensive, causing amelioration, and diminish the requirement of pain relieving medications. Collagen fibers which are predominantly found in the Tilapia skin and help in maintaining moisture, are also found inside the oral cavity. Since saliva inside the mouth aids in rapid healing, this in conjunction with Tilapia skin can even accelerate the healing process.

Novel suggestions for fabrication of medications for oral burns and wounds, prepared using Tilapia collagen

Considering the above properties, tilapia skin can be modified into a surface sheet or film containing active medication that can be used on inner surface of the cheeks at the burnt site. The chief collagen peptide protein i.e. “Tilapia Hepcidin”, procured from its skin can be dried, and grounded into a fine powder. This can be mixed with orabase/dental pastefavoring the formation of a biodegradable oral gel and applied topically over the burnt or affected site. Ge B et al. [3] prepared water-based collagen gel from the Tilapia skin, and Ullah et al. [11] isolated collagen from tilapia scales, and amalgamated it with chitosan and glycerin, for the repair and restoration of impaired tissues. Antimicrobial peptides derived from the fish have already demonstrated anti-neoplastic activity and an article proposes its application in oral cancer. [12] Literature mentions no significant studies that have been done to investigate the anti-inflammatory activity of fish collagen. However, Liu C et al. [13] performed a study to evaluate the anti-inflammatory effects of hydrolyzed tilapia collagen. Considering the healing properties of Tilapia, we put forward the thought of

its application inside the oral cavity. However, various clinical trials need to be encouraged to test its potentiality as a novel curative agent.

Conclusion

Marine organisms hold great potential to integrate themselves with human tissue, promoting regeneration and healing. In this context, considering the biological properties of Tilapia, its use can be revolutionary. Procurement of collagen peptides from the Tilapia skin, with similar properties shared by the collagen derived from the conventional sources, can be a boon in novel medicine production. Its application is being tested in extraoral burns and wounds. Extensive studies are required to test its potentiality in intraoral and perioral burns and medication-induced mucosal alterations.

Competing Interests

1. Source of Financial Support: None
2. Conflict of Interest: Nil

Author's Contributions

1. G C Shivakumar: Conceptualisation, write up, and final approval of the manuscript - 40%
2. Shahid Areeba: Data acquisition, drafting and editing - 40%
3. Shivakumar Sahana: Complete revision of the manuscript - 20%

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