ISSN: 2642-9020

Case Report

Journal of Marine Science Research and Oceanography

An Innovative Approach to Blood Collection from Fish

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Submitted: 03 Oct 2020; **Accepted:** 06 Oct 2020; **Published:** 30 Oct 2020

Abstract

Tilapia is one of the most cultured fish in the world; it directly contributes to food security for many countries especially in Africa. Tilapia production is adversely affected by disease, infection, and pollutants. However, there are a few diagnostic tools available to evaluate fish health. Blood parameters are the key tool to investigate fish health. Yet the fish size has been a challenge to researchers and veterinary. The present technique has been developed to draw more blood rapidly from small tilapia fish (below 20gm), and big fish as well. The obtained volume of blood was proportional to the fish size. This technique sacrifices fish; it's not suitable for repeated blood collection.

Keywords: Hematology, Tilapia, Blood Sampling, Aquaculture

Introduction

In aquaculture world, Tilapia (*Oreochromis sp*.) is the oldest cultured fish, as the drawings found in Egyptian tombs back to 2000 BC illustrated. Among the numerous aquacultured fish, tilapias are preferred due to their fast growth, lower trophic level and it can be cultured in both salt and freshwater in tropical and subtropical environments. Tilapia is the second most important group of captured fish, with a global capture of 837,447 tonnes in 2017 [1]. Tilapia is mostly herbivores, feeding generally on phytoplankton and other aquatic vegetation also accepts lipids and proteins from plant or animal pelleted.

Ecologically, tilapia helps the circulation of nutrient metabolites on which mainly production depends, also support carnivorous animal in the ecosystem (fishes, reptiles, birds or mammals including man) [2]. Commercially, Tilapia has become popular seafood, mainly because of its high nutritional value, mild taste, and low expense relative to other finfishes. Tilapia is a rich source of protein, phosphorus, potassium, selenium, niacin, vitamin B-12, and is low in fat and saturated fat, omega-3 fatty acids, calories, carbohydrates, and sodium. Since the demand for tilapia has increased, fish have farmed extensively in the past few years. Thus, tilapia becomes more susceptible to pathogens, disease, and pollutants.

The collection of blood from fish is commonly used for many scientific purposes including biochemistry parameters, haematology, bacteriology, parasitology, reproductive performance and health [3]. Typically these indices could provide data as good as that given by human blood parameters. Using blood biomarkers in fisheries research is growing rapidly as it's very important in toxicological research environmental monitoring and predicting of fish health conditions [4]. Therefore, many methods are used for blood collection from fish, such as puncture of the caudal vein, cardiac vessels or dorsal aorta, execution and the severance of caudal vein [5]. Choosing the proper blood sampling technique is critical, it depends on a number of factors such as; the health status and size of fish and the required quantity of blood must be considered, overall the sampling method should be less stressful [6].

In small size tilapia the most popular blood sampling technique, targeting the caudal vein to draw blood, which is very slow and stressful due to the small size of caudal veins in the species [5]. Moreover, the other mentioned methods are challenging and less convenient to collect blood in small fish. Therefore, the objective of the present study is to evaluate a reliable and rapid method to collect blood from small fish where it is not possible to obtain sufficient blood sample volumes by caudal peduncle severance.

Experimental

Nile tilapia, *Oreochromis niloticus* were obtained from Al-Abbasa hatchery located in Sharkia Governorate. To ensure that fish are disease-free, recovered from transportation and fully acclimated to the research facility all fish were kept for 4 weeks in glass tanks. During this water pH ranged from 6.2 to 6.7 and water temperature ranged from 25 to 28˚C with a constant air-flow system (80-85% dissolved oxygen saturation) and natural photoperiod. fish with an average body weight (16±4.6 gram), with rearing density not exceed 2.5 gL^{-1} [7]. APHA, 1998). Each aquarium was equipped with a biological filter containing high porosity filter sponge which was washed thoroughly every two-days and cleaned regularly.

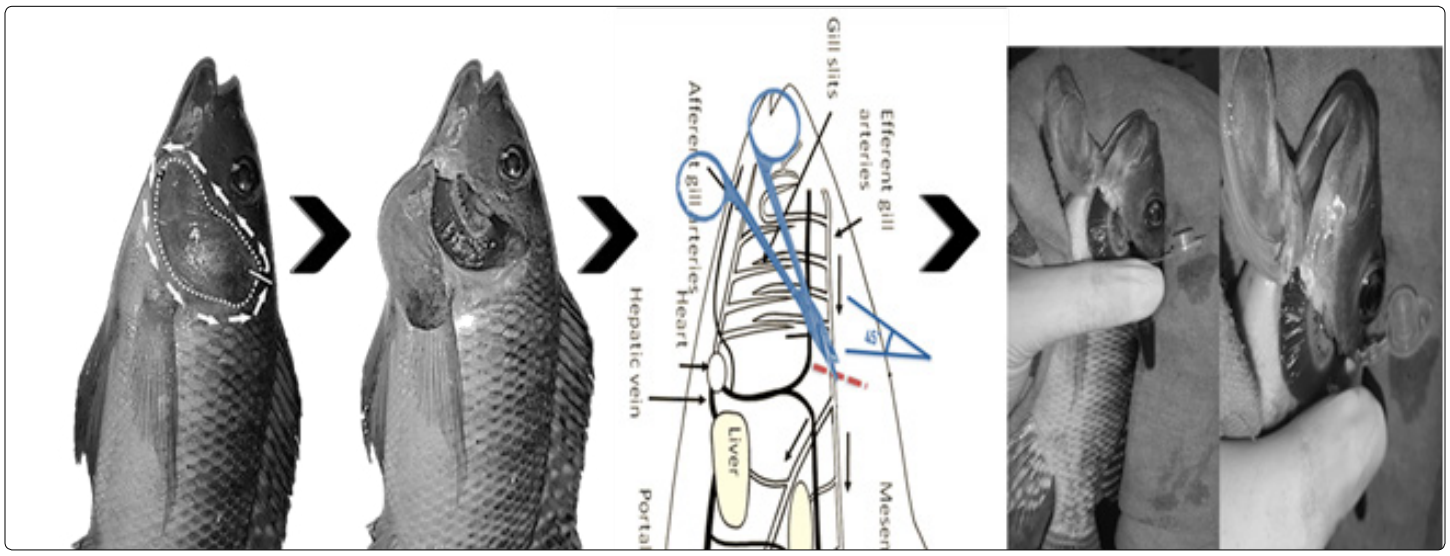

Figure 1: Procedures of the blood collection technique

Procedures of blood collection

- Remove the fully sedated fish with the aid of a net from the anesthetic solution.
- Place fish on a clean towel on its side, dry externally from water using a clean towel.
- Gently lift the gill cover (operculum) and make sure you dried all underneath water using clean delicate tissue, avoiding tissue squeezing.
- Carefully hold the fish to a comfortable handling upright position with one hand.
- Lift the free posterior end of the operculum carefully, insert one blade of scissors beneath and cut along the operculum, avoid any cut in gills.
- Again dry well the exposed gills using clean delicate tissue, avoid squeezing of fish or gills.
- Firmly hold the blood collection tube (could be free or containing EDTA/heparin as desired), upright to collect the draining blood, exactly where the dissection of operculum starts.
- Gently lift the gills filaments; immerse a slightly opened scissors at 45˚ angle from fish, towards the dorsal aorta slightly above the collection tube.
- Incline the fish towards the collection tube to ensure you gather all the draining blood.
- Always avoid squeezing fish head or gill filaments to avert hemolysis.
- Massaging the fish trunk and tail upwards may help to collect more blood. (Figure 1)

The present technique is perfect for small fish, which are too small to bleed with syringe and needle or a vacutainer system. The Caudal Severance method is commonly used for this size, but this usually collects inadequate volume of blood. Yet the present technique can't be used for repeated sampling of the blood.

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