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IMPACT OF AMOXICILLIN AND CEFADROXIL ON THE GROWTH AND PROTEIN LEVEL OF FRESH WATER FISH *OREOCHROMIS MOSSAMBICUS*

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ABSTRACT
Success in aquaculture depends to a greater extent on sound nutritional practices based on the knowledge of nutrients required by the species cultured. Indian aquaculture has demonstrated a six and half fold growth over the last 2 decades where fresh water aquaculture contributing over 95% of total aquaculture production. Tilapia has admirable feature in aquaculture and is an important fish all over the world as fishery resources. It can grow to large size rapidly and has good flavour. Apart from the common pollutants, pharmaceuticals have turned out to gradually pollute water resources. Pharmaceuticals are a large and diverse group of medicinal compounds used for diagnosis, cure, mitigation, treatment or prevention of disease in humans and animals. Pharmaceuticals are often classified based on the therapeutic purpose and the worldwide consumption of these "classes" is substantial. The potential of pharmaceutical plays a major role in the level of toxicity. These pharmaceuticals are not the only contaminants, but they combine with other contaminants as complex mixtures at all the possible environmentally relevant conditions. The researchis to study the growth of fish-Oreochromismossambicus,to study the effect of drugs (Amoxicillin and Cefadroxil) influence on the growth of fish and to study the effect of drug in the protein levels of fish.
KEY WORDS: *Tilapia fish - Oreochromismossambicus, Growth, Pharmaceuticals-Amoxicillin and Cefadroxil effects and Protein levels*

INTRODUCTION

Fish culture is an important industry of various kinds of marine and fresh water fish have been cultured and the worldwide production of cultured fish increases every year. Fish is a vital source of high quality protein, providing approximately 16% of the animal protein consumed by the world's population (FAO, 1997).Tilapia has admirable feature in aquaculture (Ekanem and Okoronkwo, 2003) and is an important fish all over the world as fishery resources. It is the most widely cultured fish in the tropics and sub-tropics and second to Carp among the fresh water fish in the world (Offem*et al*., 2010).It is commonly available and easy to manipulate both in capture and culture fisheries due to its qualities such as good taste, hardy nature, fast growth, resistance to disease, reproduce in captivity, switching of diet and tolerance to poor water quality.

In surface waters, concentrations of pharmaceuticals usually range from low mg l21 to low mg l21and are correlated to human population density in the drainage area, volume of the receiving water body and technologies used in STPs (Fatta-Kassinos*et al*.,2011) but certain point sources, such as pharmaceutical production and manufacturing facilities, can result in concentrations as high as mg l21 in receiving surface waters (Fick *et al.*,2010).The potential of pharmaceutical plays a major role in the level of toxicity. These pharmaceuticals are not the only contaminants, but they combine with other contaminants as complex mixtures at all the possible environmentally relevant conditions.Although

most pharmaceuticals are present in the aquatic environment at only very low concentrations, many of them raise considerable toxicological and Eco toxicological concern, particularly when present as components of complex mixtures.

OBJECTIVES

- To study the growth of fish Tilapia - *Oreochromismossambicus*
- To study the effect of drugs (Amoxicillin and Cefadroxil) influence on the growth of fish.
- To study the effect of drug in the protein levels of fish.

MATERIALS AND METHODS

An investigation was carried out in Department of Zoology laboratory, Nirmala College for women, Coimbatore, to evaluate the effect of formulated feed on the growth and biochemical parameters of Tilapia fish (*Oreochromismossambicus)*. The materials and methods used for the present study are described under the following headings:

Experimental Fish

Tilapia islaterally compressed, deep bodies. A complex set of muscles allows the upper and lower pharyngeal bones to be used as a second set of jaws for processing food, allowing a division of labour between the "true jaws" (mandibles) and the "pharyngeal jaws". Their mouths are protrusible, usually bordered with wide and often swollen lips. Tilapia are also known to be a mouth-breeding species, which means they carry the fertilized eggs and young fish in their mouths for several days after the yolk sac is absorbed.Like other large fish, they are a good source of protein and popular among artisanal and commercial fisheries.

Collection and Maintenance of Fish

The freshwater fish, *Oreochromismossambicus* ranging in weight from 4 kg to 8 kg and measuring (7cm in length) were procured from Aliyar. The procured bulk samples of Tilapia were transported to the laboratory in well aerated polythene bag and acclimatized to the laboratory conditions under natural photo period for one week in large plastic containers at (26 ± 5 ^{0}C). The tank was previously washed with potassium permanganate to prevent any fungal infection. The fishes were maintained in dechlorinated tap water of the quality used in the test and water was renewed every day to provide freshwater rich in oxygen.Continuous artificial aeration was maintained throughout the acclimation and exposure periods. During the period of acclimation, they were fed everyday with oil cake mixed with rice flour.

Pharmaceuticals Administered - Amoxicillin

Amoxicillin was discovered in 1958 and came into medical use in 1972. It is on the World Health Organization's List of Essential Medicines, the most effective and safe medicines needed in a health system. Amoxicillin is available as a generic medication.Amoxicillin is an antibiotic often used for the treatment of a number of bacterial infections. It may be used for middle ear infection, strep throat, pneumonia, skin infections, and urinary tract infections among others. It is taken by mouth, or less commonly by injection. Common adverse effects include nausea and rash. Its use in pregnancy and breastfeeding does not appear to be harmful. Amoxicillin is in the beta-lactam family of antibiotics.

Cefadroxil

Cefadroxil is a first-generation cephalosporin antibacterial drug that is the para-hydroxy derivative of cefalexin and is used similarly in the treatment of mild to moderate susceptible infections such as the bacterium *Streptococcus pyogenes*, causing the disease popularly called strep throat or *Streptococcal tonsillitis*, urinary tract infection, reproductive tract infection, and skin

infections.Cefadroxil is almost completely absorbed from the gastrointestinal tract. About 20% of cefadroxil is reported to be bound to plasma proteins. Cefadroxil is removed by haemodialysis.

Estimation of Protein

The amount of protein in the samples with the respective pharmaceuticals was estimated by Bradford method (1971).

Principle

Comassie brilliant blue G250, the dye used for this assay can interact with proteins producing a blue colour complex whose absorbance maximum is at 595nm.

Procedure

100mg of sample was taken and ground well in a mortar and pestle with 1ml of 0.1N NaCl and 1ml of 5% TCA (Trichloro acetic acid) solution. The extract was centrifuged at 3000rpm for 15 minutes and sediments were washed with 1ml of 0.1N sodium hydroxide. From the obtained extract, 0.1ml of solution was taken and made up to 1ml using distilled water. To this mixture, 5ml of Bradford reagent was added and mixed well by inversion or gentle vortex mixing avoid foaming. Then the absorbance at 595nm was measured. The same procedure was repeated for all the remaining fish with different level of exposure (in terms of mg).

RESULT AND DISCUSSION

After 35 days of study, the biochemical parameter to be analysed (protein) was estimated. The analysis of the data revealed considerable difference between the control and the treatment fish. The analysis of the obtained data is discussed below:

Impact of Amoxicillin in the muscle of *Oreochromismossambicus*

The amount of protein in muscle in long term duration of Amoxicillin drug for 7, 14, 21 and 35 days were found to contain 2.79, 2.62, 2.48, 2.18 mg/g whereas the control fish contained 2.84mg/g of protein. The estimated data mentioned was done at the 35th day of exposure.

Impact of Cefadroxil in the muscle of *Oreochromismossambicus*

The amount of protein in muscle in long term duration of Cefadroxildrug for 7, 14, 21 and 35 days were found to contain 2.80, 2.69, 2.43, 2.31mg/g whereas the control fish contained 2.84mg/g of protein. The estimated data mentioned was done at the 35th day of exposure.

Table: 1-Theeffect of Amoxicillinin the muscle of Fish *Oreochromismossambicus*

Control	20mg	40mg	60mg	80mg
2.84	**2.79**	**2.62**	**2.48**	**2.18**

Table: 2-Theeffect of Cefadroxilin the muscle of Fish*Oreochromismossambicus*

Control	**20mg**	**40mg**	**60mg**	**80mg**
2.84	2.80	2.69	2.43	2.31

Table: 3- Mean and Standard Deviationof Total Protein content of *Oreochromis mossambicus*

Administered Pharmaceuticals	**Standard Deviation**	**Mean**
Amoxicillin	0.238	2.582
Cefadroxil	0.205	2.596

The present 35 day study was dealt with the pharmaceuticals and their negative impact on the fish protein. Lascelles*et al.*, 2007; Khan and McLean 2012, documentedthe side-effects andtoxicity of non-selective NSAIDs in mammals and the negative influence ofaquatic contaminants of this type are expected. The dumping of unpleasant materials especially pharmaceuticals is observed in the aquatic environment and the impact of these can be seen drastically later if not in the present decade. Kannan*et al*., (2010) reported thedecreased protein content on gill, brain and muscle of*Mystusvittatus*when exposed to mercuric chloride.

SUMMARY AND CONCLUSION

An investigation was carried out in the laboratory to evaluate the effect or impact of amoxicillin and cefadroxil on the growth and protein content of fish Tilapia(*Oreochromismossambicus*). The steps during the course of study are summarized below:

- The fish taken for study, Tilapia *(Oreochromismossambicus*) were procured from Aliyar Dam, Pollachi, were segregated and kept for an acclimatization period of 7 days in the laboratory and were fed regularly with the prepared feed.
- The selected pharmaceuticals, Amoxicillin was in the form of 500mg tablets and Cefadroxil in the form of powder.The 10 segregated tubs comprised 2 control tubs for amoxicillin and Cefadroxil respectively and the remaining tubs were labelled (20mg, 40mg, 60mg, and 80mg) to differentiate the level of exposure.After the period of acclimatization, the pharmaceuticals were mixed in the habitat water at the respective levels of exposure mentioned.The addition of Amoxicillin and Cefadroxil was done on a daily basis.The duration of study being 35 days, the amount of protein was estimated by Bradford estimation method (1971) at the end of the 35^{th} day.The growth of the fish at the initial stage of research and the end of the 35^{th} daywas observed.The estimated protein content was found to be considerably lower at the various levels of exposure in comparison with the control values for both the pharmaceuticals.
- This research work being an initial step of observation to analyse the negative impact any pharmaceutical drug utilized by human can affect the aquatic ecosystem.This duration of study has depicted the influence of drugs by consistent dumping into water resources and the gradual decrease in the quality of protein content we consume.The occurrence of such changes in protein content can affect and degrade the well being of humans who largely depend on other resources for food.

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