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Microbiological analysis of tissues of *Parreysia corrugata*

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ABSTRACT

Faecal coliform counts that are indicative of water pollution were isolated and enumerated from water samples and tissues of freshwater mussels *Parreysia corrugata* collected from two locations in the state of Maharashtra. Results indicated that Nanded site was heavily polluted whereas Thane site was significantly pollution free.

Key words: *Parreysia corrugata*, faecal coliforms, water pollution, Freshwater mussels.

INTRODUCTION

Bivalves are filter feeding organisms which have the ability to uptake, accumulate and concentrate particulate matter from their surrounding environments. This capability of bivalves to uptake and concentrate the fecal coliforms (FC) from the surrounding waters can be used for the benefit of the society and assessment of public health. Use of molluscs as biological monitors for FC may be advantageous because it may provide a concentrated microbiological sample reflecting the bacterial density in the water column through time. Fluctuations of fecal pollution, which could be missed by point sampling, may be detected if elevated FC numbers are retained in the viscera of the molluscs.

Studies on freshwater mussels in the state of Maharashtra have been limited to various physiological, biochemical and toxicological aspects. Karadkhele (2002) has indicated that freshwater mussels are nutritionally rich and can be consumed as food[1]. However, it should be pointed out that diseases such as hepatitis[2] and gastroenteritis[3] have been linked to eating oysters in many countries. Epidemiological investigations revealed that shellfish consumption has played a key role in spreading these diseases. In addition, a number of studies have reported the isolation of pathogenic bacteria, including *Vibrio parahaemolyticus*, non-0-group 1 *V. cholerae* and *V. cholerae* serotype 01 from oysters[4]. So before consuming these freshwater mussels it is obligatory to make sure that they are safe to eat as they can accumulate a number of bacteria from the surrounding environment which may cause serious health hazards to humans. This can be checked by an analysis to investigate the presence of faecal coliform bacteria from water and tissue samples of mussels collected from different locations.

Bivalve *Parreysia corrugata* is widely distributed in freshwater bodies of Indian sub-continent. The animal is reported to be medicinally important[5] and used by aboriginal people to control blood pressure[6]. It is also used in cement, lime, button, toys and cosmetic industries. In certain parts of the country, the animal is consumed as food by poor people. Recently, successful pearl production has been reported using this species in the state of Orissa[7].

A variety of microbiological studies have been done using bivalves other than *Parreysia corrugata,* a species of bivalve found commonly in the freshwater environment of Maharashtra. Hence, an attempt has been made in the present study to investigate the presence of faecal coliform bacteria from water and tissue samples of mussels collected from two locations and conclude whether the mussels collected from those locations are safe to consume or not.

MATERIAL AND METHODS

Water and bivalves were collected from Vaitarana River in district Thane and Godavari River near Nanded city. Water samples were collected at a depth of 1 m in a dark amber coloured bottle. Live bivalves were collected by hand. After collection, water samples were transported immediately to the laboratory in an insulating foam box fitted with a cold pack having a temperature of around 5°C. Bivalves *P. corrugata* were brought alive to the Aquaculture Biotechnology laboratory of Department of Life Sciences, University of Mumbai. Plating on membrane fecal coliform (mFC) agar was done within 15 hours of collection.

100 ml of water sample was passed through membrane filter and this membrane filter was then aseptically kept on mFC agar for 24 hours at 44.5°C. After incubation period, plates were observed and blue coloured colonies were counted to get FC count. Bivalve tissue was homogenized in an electrical blender for 4 min on, then 2 min off, for a total blending time of 10 to 15 min. A total of 100 gram of homogenized tissue was homogenized in 100 ml sterile 0.85% NaCl solution and then this supernatant was passed through membrane filter and then placed on mFC agar following the same procedure used for the water samples. After inoculation, each plate was incubated for 24 hours at 44.5° C. for enumeration of FCs. Procedure was repeated thrice and mean count was taken.

RESULTS AND DISCUSSION

Freshwater mussels are filter feeder animals that up-take and concentrate the contaminants and faecal coliform bacteria from its surrounding waters and thus act as indicators of health of its environment. Attempts have been carried out outside India to use this important component of aquatic ecosystem to monitor its health and pollution level. However, in India there is dearth of information available on such studies. Hence, an attempt was made to carry out analysis of the tissues of freshwater mussel, *P. corrugata* and its surrounding water to confirm these earlier findings in other freshwater bivalves.

On mFC agar after incubation, numerous colonies were observed. Blue coloured colonies were counted as faecal coliforms. Some cream and pale yellow non-coliform colonies were also observed on the plate. Faecal coliform counts in water samples and bivalve tissues collected from Thane were found to be significantly lower than those collected from Nanded. Results indicate that FC counts in tissues are several folds higher than those seen in water in case of both Nanded and Thane samples indicating accumulation of faecal coliforms in filter feeder bivalves. Thane sample was found to be relatively less polluted and FC counts were quite low. Water sample collected from Thane showed a count of 32 colonies per 100 ml whereas homogenized tissues of *P. corrugata* from Thane showed a count (102 colonies) almost triple (Table 1). Nanded sample on the contrary was found to be highly polluted with faecal coliforms. FC count per 100 g of homogenized tissue from Nanded (284 colonies) was about 2.5 times higher than the one found in water sample (116 colonies) (Table 1).

Results of the present study indicated that FC counts in tissues are several folds higher than those seen in water. Thane sample is relatively less polluted and FC counts were quite low. However, Nanded sample is highly polluted. These findings

Table 1: FC counts in water and tissue samples of *P. corrugata* collected from Nanded and Thane

Sample	Fecal coliform count in	
	Water (count / 100 ml)	Homogenized bivalve tissue (count / 100 g)
Nanded	116 colonies	284 colonies
Thane	32 colonies	102 colonies

are in agreement with Rahim *et al*., (1985) who studied the relative abundance of faecal coliform bacteria in water and sediment and in the freshwater bivalve *Lamellidens marginalis*[8]. Authors also found out that Faecal coliform counts were consistently higher for the bivalve tissue than those for water and sediment samples; in the bivalve *Lamellidens marginalis,* they were ~ 10.0- to 87.0-fold higher than those in water, and 2.0- to 11.0-fold higher than those in sediment.

In November 1965, the National Shellfish Sanitation (NSS) Workshop recommended two standards, satisfactory and conditional, when FC counts were less than or more than 230/100 g, respectively[9]. In the present study, FC counts in bivalve muscle were much higher in sample of *P. corrugata* collected from Nanded than that recommended by NSS[9] indicating that habitat at Nanded is highly polluted and shellfish collected from that area is not fit for consumption as food. If consumed, freshwater bivalve *P. corrugata* collected from Nanded can present a potential public health problem. FC counts in sample of *P. corrugata* collected form Thane was however much lower (102 colonies/100g) than that recommended by NSS indicating that habitat at Thane is significantly less polluted and shellfish collected from that area can be consumed as food.

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