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Occurrence of *E. coli* in marine prawns (*Penaeus monodon)* from Satpati, Vadarai and Palghar fish markets of Palghar district in Maharashtra, India

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ABSTRACT

The marine prawn's *Penaeus monodon* was used as sample to analyzed outbreak of *E.coli*. Total 840 isolates of *E.coli* from 26 samples of *P. monodon* were isolated from Satpati, Vadarai and Palghar fish markets from Palghar district. The prevalence of *E. coli* in varies sea food may be due to fecal contamination, may also be due to water quality, fishing methods and storage facilities. In the present paper it was attempt to evaluate the incidence of *E. coli* in locally available prawn species (*P. monodon)*, with a view to provide potential approaches for improving the quality assurance and create awareness among the consumers.

Key words: *Prevalence of E. coli, P. monodon, Fecal contamination.*

Introduction

Shrimp is one of the world's most popular shell fish and is mainly consumed in the Asian Countries. Shrimps are highly priced seafood delicacy, are cash crop grown mainly for the affluent export and urban markets. Seafood are a significant fraction of a healthy diet where they have high quality protein and other indispensable nutrients can be low in saturated fatty acids and may contain omega-3 fatty acids (Kakara *et al.*, 2016). Screening of pathogenic microorganisms from commercially important marine fishes (Geetha *et al.*, 2014). As the demand for fish is continuously increasing, making the required protein available to the existing population is a challenge (Ra *et al.,* 2016). The microbial load and the presence of the bacterial pathogens in seafood are a good indication of the food quality and the potential health risk they pose to consumers (Rosmini *et al.*, 2004).

This is no exception for *Penaeus monodon* (black tiger shrimp), which has been a commercially important marine crustacean for the past few decades in many Asian countries and Australia (Rosenberry, 2001 and Waqairatu *et al.,* 2012). With increasingly high shrimp consumption, the decline of wild harvests has forced domestication to become the major source of shrimp production (Lebel, *et al.,* 2010). However, the farming industry has been deteriorating due to several factors, in particular the outbreak of disease.

It was only recently that studies of bacterial diversities in the intestines of *P. monodon* post-larval and juvenile stages were reported (Chaiyapechara *et al.,* 2011,and Rungrassamee *et al.*, 2013), yet there has been no report on the intestinal bacteria of wild-caught *P. monodon*, which feed on slow moving benthic animals such as small crabs, shrimp, mol-

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lusks, and polychaetes (Marte, 1980).

Dines (1980), has reported that occurrence of *E. coli* in various sea food samples. According to Chen and Hsing-Chen (1998), the major sea food bacteria are coliforms belonging to *Enterobacteriaceae*.

Escherichia coli is a commensal microorganism whose niche is the mucous layer of the mammalian colon. This bacterium is the most abundant facultative anaerobe of the human intestinal microflora (Kaper *at el.,* 2004). Furthermore, *E. coli* is widely distributed in the intestinal tracts of warm- blooded animals (Ishii and Sandosky, 2008). *E. coli* is often nonpathogenic, although different strains may cause diseases in gastrointestinal, urinary, or central nervous systems (Nataro and Kaper, 998).

This investigation aimed to evaluate the incidence of *E. coli* in locally available prawn species (*P. monodon)*, with a view to provide potential approaches for improving the quality assurance and create awareness among the consumers.

Materials and Methods

Study site

Palghar District is a district in the state of Maharashtra in Konkan Division. It starts from Dahanu at the north and ends at Naigaon. It comprises the talukas of Palghar, Vada, Vikramgad, Jawhar, Mokhada, Dahanu, Talasari and Vasai-Virar. Satpati, Vadarai and Palghar are three samples collection sites. Which comes under the Palghar district in Maharashtra. Prawns (*Penaeus monodon*) were collected from Satpati, Vadarai and Palghar fish market.

Sources of Sample

For this study marine prawns Samples were collected for microbial study from the fish markets of Satpati, Vadarai and Palghar. Samples were collected from December 2016 to May 2018. To avoid further contamination, during transportation from the source to laboratory, Samples were carried in special sterile bags packed in insulated box with ice to maintain the temperature around 5 to 6 ^{0}C.

Total viable count

The whole body of Prawns (*Penaeus monodon)* was used as sample and around 10 grams was transferred to a sterile beaker to which 90 ml of sterile normal saline solution (NSS) was added. The samples were serially diluted by 10-fold serial dilution method in the normal saline solution up to 10^7. The 10^{-4} dilutions of each sample were taken for plating following differential media simultaneously during processing of the samples, Baird Parker agar, MacConkey agar, Violet Red Bile agar, 0.1 ml of the 10^{-4} dilutions were inoculated by the spread plate method on the above media plates and were incubated at 37 ^{0}C / 44^0 C for 24 / 48 hrs. The colonies from the differential media plates were transferred in sterile peptone water and the same were identified by Gram's staining.

Biochemically *E. coli* was positive to Indole and methyl red tests and negative to Voges – Proskauer test and citrate utilization tests. The preparation was carried out according to Cowan and Steel (1970) and Diliello (1982). This tests and gram stanning technique are used to conform the presence of *E. coli*.

Results and Discussion

In this analysis it was observed that the total 840 isolates of *E.coli* from 26 samples of *P. monodon* were isolated from Satpati, Vadarai and Palghar fish markets. Biological screening of Satpati, Vadarai and Palghar fish market of total 10, 10, and 06 prawns samples (*P. monodon)* (Table 1). *E. coli* were isolated 37, 726 and 77 respectively (Fig. 1, 2 and 3). From which *P. monodon* at Vadarai fish market was more dominated with isolation of *E.coli* (87%), (Fig. 4).

Table 1. *E. coli* isolation from *P. monodon* at all three sites (Satpati, Vadarai and Palghar fish markets)

No. of sample	Total number of *E. coli*		
	Satpati fish market	Vadarai fish market	Palghar fish market
1.	02	01	01
2.	01	01	12
3.	02	01	03
4.	02	01	47
5.	01	13	04
6.	09	01	10
7.	09	11	00
8.	06	601	00
9.	03	45	00
10.	02	51	00
Total	37	726	77

E. coli is a classic example of enteric bacteria causing gastroenteritis. *E. coli* including other coliforms and bacteria as *Staphylococcus spp*. and sometimes

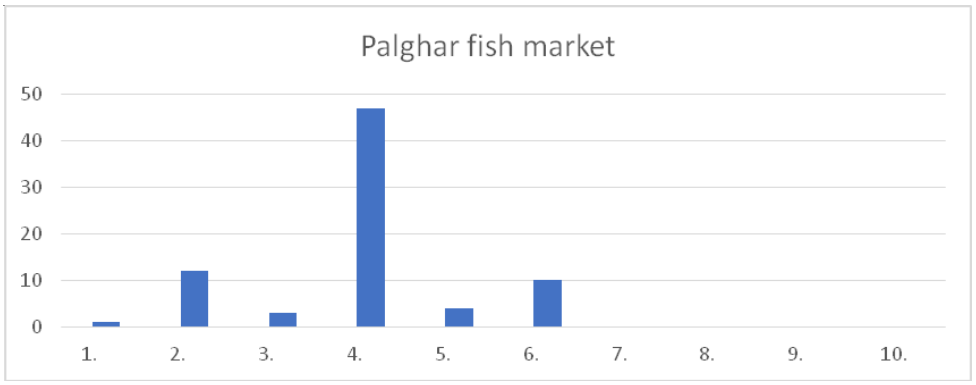

Fig. 1. Isolation of *E. coli* from *P. monodon* from Satpati fish market

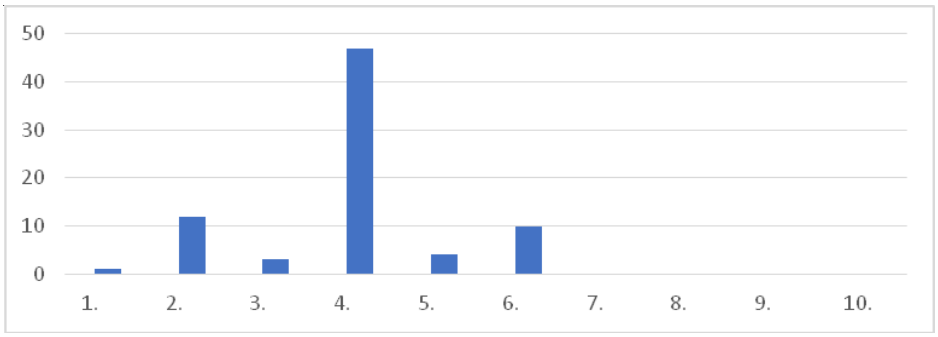

Fig. 2. Isolation of *E. coli* from *P.monodon* from Vadarai fish market

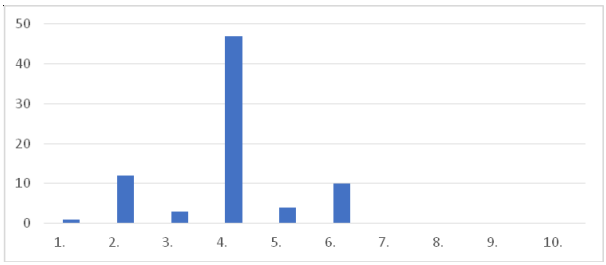

Fig. 3. Isolation of *E. coli* from *P.monodon* from Palghar fish market

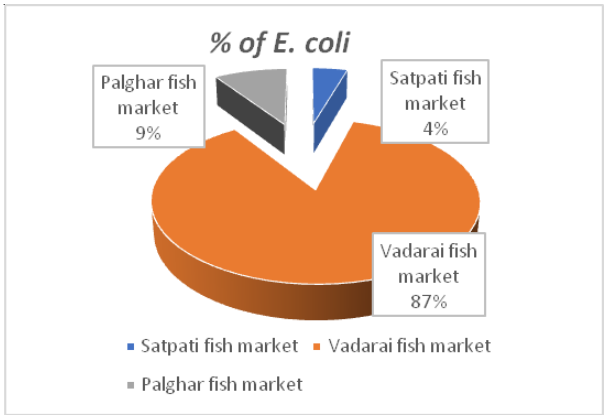

Fig. 4. Percentage wise graphical representation of *E.coli* from three sites

enterococci are commonly used as indices of hazardous conditions during processing of sh. Such organisms should not be present on fresh-caught sh (Chattopadhyay, 2000). The contamination of food of sh origin with pathogenic *E. coli* probably occurs during handling of sh and during the production process (Ayulo *et al.*, 1994).

According to Dines (1980) the prevalence of *E. coli* in various sea foods may be due to fecal contamination and improper handling. The contamination may also be due to water quality, fishing method and storage (Chen, 1985). Gastrointestinal or respiratory symptoms or other infection with human or animal fecal contamination of beach water by *E. coli* has been observed in seven sea bathing centers of New Zealand (Falcao 2003).

Conclusion

In the present study from 26 prawns (*Penaeus monodon*) samples 840 isolates of *E coli* were isolated.

The results founds in this study explain microbiological contamination of prawns is related to 1). Reckless handling and lack of food hygiene knowledge in the chain of people engaged in these businesses and 2). Potential environmental contaminates in the vicinity. The prevalence of *E. coli* in varies sea food may be due to fecal contamination, may also be due to water quality, fishing methods and storage facilities. So proper hygiene practices of fish handlers from catchments till sale with sellers (personal hygiene) should be mandatory.

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