Microbial quality assessment of Pomfret (Pampus argenteus) from the Satpati ice factory, Palghar, Maharashtra, India.

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Abstract: -

The amount of Pomfret (*Pampus argenteus)* catch at Satpati fishing center is brought from mechanized and non-mechanized means of fishing. During present investigation, qualitative estimation of bacterial flora present in Pomfret fish were identified.

13 samples of Pomfret (*Pampus argenteus)* from Satpati ice factory were collected and processed. A total of 44 isolates were isolated which were represented by 15 variety of microbes. The TVC ranged from 02 X 10^{-7} to 230 X10^{-7} cfu/gm. The Prevalence of microbes with predominant species were *E. coli*, *Staphylococcus* species, *Salmonella* species, *Bacillus* species, *Enterococcus* species, *Vibrio* species, *micrococcus* species, *Enterobacter* species, *Proteus* species and *Pseudomonas* species. In this paper quality assessment and pathogenicity of microbes from pomfret was discussed.

Key words: -Satpati, Pomfret (*Pampus argenteus*), Fish Microbiology, TVC.

Introduction: -

Seafood is a nutritious food that constitutes one of the desirable components of a healthy diet. Nevertheless, there are health risks associated with the consumption of seafood. One of the major risks involves the consumption of raw or undercooked seafood that may be naturally contaminated by foodborne pathogens present in the marine environment. Such risk is further increased if the food is mishandled during processing where pathogens could multiply exponentially under favorable conditions. (Food and Environmental Hygiene Department, 2005).

A variety of fishes consumed regularly are prone to pathogenic spoilage especially by *Vibrio spp., Shigella spp., Salmonella spp., streptococci, staphylococci, coliforms, Listeria spp.* and *Clostridium spp.* (Rahman *et. al.*, 2012). They may get entry into the fish from their habitat or during the fish transportation and storage (Frazier and Westhoff, 1995; Eze *et. al.*, 2010). A number of reports suggested that the consumption of the microbiologically spoiled seafoods might be responsible for food-borne diseases like diarrhea, salmonellosis, shigellosis, cholera and even some neurological diseases by an array of viruses, bacteria, fungi and parasites (Snowdon *et. al.*, 1989; Starutch, 1991; Karunasagar *et. al.*, 1994; Cray and Moon, 1995 and Wallace *et. al.*, 1999).

In recent times quality assessment of food at different operational levels is becoming essential to achieve one health objective set by World Health Organization. Rapid urbanization is leading to increasing demand for food products. Quality awareness of consumers from availability of technologies like cold chain, faster transportation and quality standards are making fish industry more dynamic and efficient. In semi urban areas fish is being sold by traditional methods which are being sourced from local resources. Catla is the popular fish due to its taste and economic (Hasan *et. al.*, 2012).

Fish quality is a complex concept involving whole range of factors like handling, processing and storage. Shelf life of freshly harvested fish depends upon bacterial flora, storage temperature, handling and physiological condition of fish. The quality of fish can be estimated by sensory test, microbial methods, measuring volatile compounds and lipid oxidation, determination of changes in muscle protein, ATP breakdown products and physical changes in fish (Abbas *et. al.*, 2008).

Fish contain fat free amino acids and water which is susceptible to spoilage by micro-organisms and biochemical reaction during post-mortem process. Fish are perishable and can be kept fresh in ice for 8-14 days. The maintenance of cold condition from harvest to retail shop is of paramount importance in relation to quality management (Rehman *et. al.*, 2012). Fish sold at open market and exposed to ambient temperature increases the likelihood of spoilage. Marketing and handling involving fresh fish is important from public health point of view (Kapute *et. al.*, 2012). Hazard refers to unacceptable contamination, survivable and or growth of hazardous microorganisms. In case of fish it should also be extended to any pathological condition. HACCP ensures food safety by exercising control to prevent any objectionable contamination or multiplication of microorganisms in production chain (Sherikar *et. al.*, 2013). Present study envisaged the microbial quality of pomfret (*Pampus argenteus*) from Satpat ice factory.

Materials and methods: -

Satpati is one of the biggest fishing village on the coast of Arabian sea of India. It is about 90 km north of Mumbai, located in the Palghar Taluka of Palghar district in Maharashtra. The main industry in Satpati is fishing with large exports abroad.

Pomfret (*Pampus argenteus*) samples were collected on monthly basis and seasonal availability for microbial studies from October 2016 to May 2019. The samples were collected in sterile polythene bags and transported to the laboratory of Zoology, S.D.S.M. College, Palghar in thermo-cool containers for further processing.

The whole body of pomfret (*Pampus argenteus)* 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^{-7} dilution were used in 0.1 ml quantities for the TVC on plate count agar (PCA). The agar plates were inoculated by pour plate method and incubated at 37^0 C for 24 hrs. The 10^{-4} dilutions of each sample were taken for plating following differential media simultaneously during processing of the samples, Baird Parker agar, Slanetz and Bartley agar, MacConkey agar, Violet Red Bile agar, Salmonella Shigella agar, TCBS agar and Bacillus cereus 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. 1 gm of fish sample was taken in 9 ml of Selenite cystine broth which was incubated at 37^0 C for 18 hrs. It was then streaked on Salmonella Shigella agar and incubated at 37 C for 24 hrs. for *Salmonella* sp. The colonies from the differential media plates were transferred in sterile peptone water and the same were identified based on morphology, Gram's staining and biochemical tests. The preparation was carried out according to Cowan and Steel (1970, 1993) and Diliello (1982) and Hi-media (2013, 2015). The representative isolates were verified by Gene Ombio Technologies PVT. LTD, Pune.

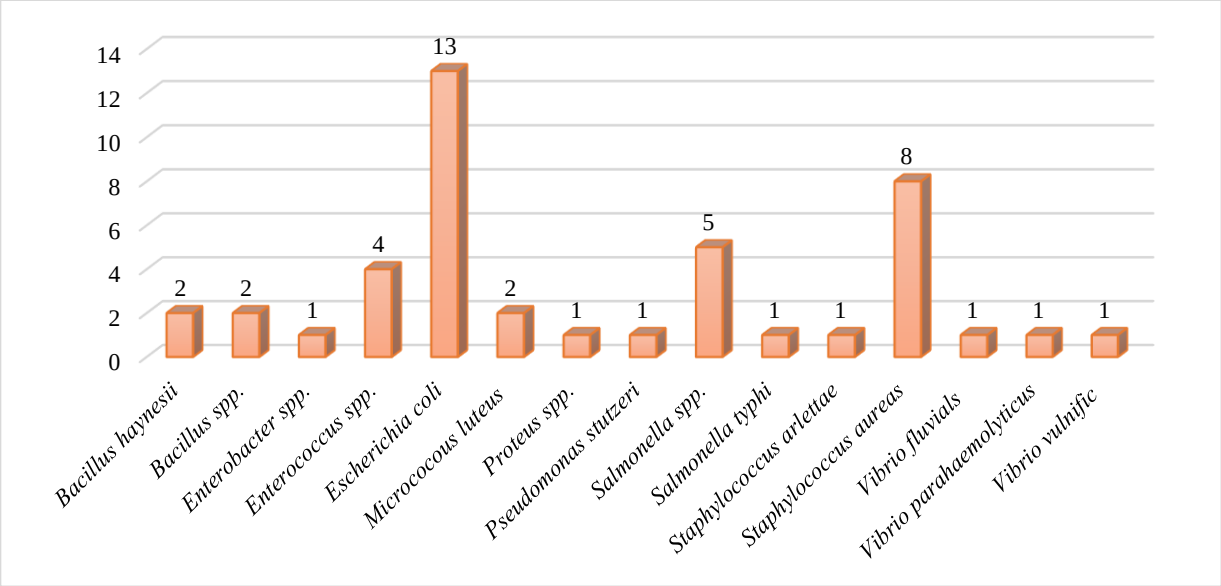
Results: -

13 samples of Pomfret (*Pampus argenteus)* from Satpati ice factory were collected and processed. A total of 44 isolates were isolated which were represented by 15 variety of microbes. The TVC ranged from 02 X 10^{-7} to 230 X10^{-7} cfu/gm. In This 15 varieties of microbes the occurrence of *Escherichia coli* was highest in number (13) followed by *Staphylococcus spp.* (09). *Salmonella spp*. (06), *Bacillus spp*., *Enterococcus spp.* (04 each), *Vibrio spp. (03)*, *Micrococcus luteus* (02), and *Pseudomonas stutzeri, Enterobacter spp.*, and *Proteus spp.* (01 each). In the present study *Vibrio* spp. was represent by *Vibrio fluvalis, Vibrio parahaemolyticus, Vibrio vulnific,* and *Staphylococcus* spp. by *Staphylococcus aureus* and *Staphylococcus arlettae* and *Salmonella* spp. *by Salmonella typhi* Table 01 and Figure 01.

Table 01. Qualitative microbial isolation of *Pampus argenteus* from Satpati ice factory.

Sr. No.	Isolates	No of isolates	Percentage
1.	*Bacillus haynesii*	02	4.55
2.	*Bacillus spp.*	02	4.55
3.	*Enterobacter spp.*	01	2.27
4.	*Enterococcus spp.*	04	9.09
5.	*Escherichia coli*	13	29.55
6.	*Micrococous luteus*	02	4.55
7.	*Proteus spp.*	01	2.27
8.	*Pseudomonas stutzeri*	01	2.27
9.	*Salmonella spp.*	05	11.36
10.	*Salmonella typhi*	01	2.27
11.	*Staphylococcus arlettae*	01	2.27
12.	*Staphylococcus aureus*	08	18.18
13.	*Vibrio fluvials*	01	2.27
14.	*Vibrio parahaemolyticus*	01	2.27
15.	*Vibrio vulnific*	01	2.27
	Total	**44**	

Figure 01. Microbial isolation of *Pampus argenteus* From Satpati Ice factory.



Discussion: -

From the 13 samples 44 isolates were isolated which were represented by 15 variety of microbes.Presence of *E coli* in the present study was higher than rest of the microbes indicates that those fish samples collected from Satpati ice factory were not protected from faecal contamination. *E. coli* strains can cause a variety of diseases, including diarrhea, dysentery, hemolytic uremic syndrome, and bladder and kidney infections. Kumar *et. al*., 2005.

Staphylococcus aureus can cause bloodstream infection pneumonia or bone and joint infection in human (Park *et. al.*, 2013, Dinakaron *et. al.*, 2012 and Bernier *et. al*., 2019). *Staphylococcus arlette* is a novel spp. which was first isolated from skin and nail of poultry and goat (Schleifer *et. al.*, 1984). The presence of *staphylococcus* species in the fish samples from the ice factory indicates poor sanitary conditions prevailing in the ice factory.

The prevalence of *salmonella* spp. was also observed during this study. *Salmonella* species are recognize as human pathogen can cause abdominal pain, diarrhea, vomiting, headaches and dehydration are typical symptoms and severity ranges from mild pain and little diarrhea to extreme pain and bloody, severe diarrhea. Secondary disease syndrome can be chronic and include endocarditis, meningitis, pneumonia and arthritis (Patterson and Isaacson, 2003). *Salmonella typhi* infect the intestinal tract (bc enter for Disease control 2012) and may cause different ailments in human. *Salmonella* and other bacteria may contaminate seafood during processing (Amagliani *et. al*., 2011).

Among the *Bacillus* species, *Bacillus hanisi* as a novel species. It was originally isolated from the soil in evolution Canyon Israel in a survey of ecological diversification (Christopher A Dunlao *et. al.*, 2017). In this study prevalence of *Vibrio* species was also observed by *Vibrio parahaemolyticus* causes acute gastroenteritis (Baffone *et. al.*, 2000) *Vibrio vulnificus* is an opportunistic pathogen for human and can be transmitted by water (Amaro and Biosca, 1996).

Micrococcus species are found both on the skin and in the environment. They are occasionally recognized as causes of infection, particularly in immunocompromised patients (Magee *et. al*., 1990). *Micrococci* cause spoilage of fish and shellfish stored in ice, Hussain *et. al.*, (1976). *S.aureus* and the other *micrococcaceae* are among the hardiest of the non-sporing bacteria and survive well in the environment under both moist and dry conditions.

Enterobacter infections can include lower respiratory tract infections skin and soft tissue infection urinary tract infection and details osteomyelitis and intra-abdominal infection (Fraser, 2019). The presence of *Proteus* species and *Pseudomonas stutzeri* in fish sample may indicate that the fishes are stored in the ice factory where hygienic condition are compromised. Colonization of the upper gastrointestinal tract, including the esophagus and stomach, by Proteus species in infants and older adults has been reported, often associated with instrumentation of the oropharynx (Thomas *et. al.*,1992, Challacombe *et. al.*, 1974, *Segal et. al.*, 2006 and Ehrenkranz 1970). *Pseudomonas stutzeri* is an opportunistic pathogen for humans. It can cause osteomyelitis, arthritis, endocarditis, meningitis, pneumonia, empyema, skin infections, eye infections, urinary tract infections, and diverticulitis. (*Min Wu et. al., 2014).*

Conclusion: -

In the present study different types of pathogenic bacteria were encountered in the raw fish from ice factory of Satpati. Which is a serious threat to the fish consuming community. Unhygienic fish handling practices of these infected fishes and inadequate cooking may further contribute to the spread of these pathogens. Appropriate surveillance methods are needed to keep the levels of food and water borne infections to minimum and utmost care should be taken while handling fish, particularly the iced fish. Further continuous research is needed to evaluate the risk of pathogenic bacteria.

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