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A Study on Nutritional Quality and Identification of Biogenic Amine Forming Bacteria in Marine Edible Species *Portunus sanguinolentus* and *Penaeus notialis* from Tuticorin, Southeast Coast of India

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Abstract: ***The aim of the study was the nutritional quality and to identify the biogenic amine forming bacteria in marine edible species Portunus sanguinolentus and Penaeus notialis from Tuticorin, Southeast coast of India. Physico chemical and biochemical analysis were carried out in both the collected samples. Results revealed that the species Portunus sanguinolentus has the high moisture and lipid and Ash value than the species Penaeus notialis. The sample of the species Penaeus notialis has the high pH, protein, and carbohydrate value is high. Biogenic amine forming bacterias isolated from the collected samples of Portunus sanguinolentus and Penaeus notialis were E.coli, Klebsiella pneumonia, Staphylococcus aureus, Proteus mirabilis, Pseudomonas aeruginosa, Salmonella species, Enterobacter aerogens and Shigella dysentria. Both the samples showed the presence of biogenic amine forming bacteria. Maximum microbial load and lowest biochemical composition were observed in samples collected from wholesale market, road side shop and street vendor. The study clearly shows that the spoilage occurs due to the duration, from the time of capturing, sometimes it takes more than two days to reach the landing centre/market from the day one of the captative process. These are the major reasons which cause the contamination in the species.***

Keywords: *Portunus sanguinolentus*, *Penaeus notialis*, Biochemical analysis, Physicochemical analysis, Biogenic amines forming bacteria

1. Introduction

Biogenic amine is organic, basic, nitrogenous compounds of lower molecular weight, mainly formed by the decarboxylation of amino acids and with biological activity. The most important biogenic amines occurring in food are histamines, tyramine and agmatine. As soon as the organism dies it gets spoiled easily, the spoilage occurs due to the action of enzymes, bacteria and chemicals present in the organisms. The spoilage contributes towards the content like protein, fat, moisture and temperature. When the mortality occurs the bacteria started to grow in the muscle tissue and it leads to the formation of biogenic amine forming bacteria which produces biogenic amines. Spoilage in fresh water species which origin toxins which determine food poisoning, histamine Spoliation is usual among aquatic species. Pathogenic bacteria harmness fresh species occurs due to poor handling and polluted water which can be identified by the changes of external structure and the softness of the muscle, changes in the colour of gills and eyes, muscular dystrophy, skin ulcer.

2. Materials and Methods

Experimental species and Sample Preparation

Portunus sanguinolentus and *Penaeus notialis* was selected for the present study to analyze biochemical parameters and to determine the biogenic amine forming bacteria in muscle tissues of the species. The fresh raw *Portunus sanguinolentus* and *Penaeus notialis* were collected from the landing centre at Tuticorin, Tamil Nadu, India. The fish were gutted, beheaded and filleted, without skin removal. The fish muscles were removed and it was weighed and then used for further analysis.

Proximate Composition

One gram of sample was homogenized in sterile blenders with that 1mg of water was added to make it as a broth. The pH of the broth was measured using a digital pH meter, this reading was recorded for three times the average was calculated (Ronald and Ronald, 1991). Moisture content was determined by AOAC, (2005) method.

The total protein content of the sample *Portunus sanguinolentus* and *Penaeus notialis* was estimated by following the method of Bradford (1976). The total carbohydrate content of the sample *Portunus sanguinolentus* and *Penaeus notialis* was estimated by following the method of Hedge and Hofreiter (1962). Total lipid was determined by the method described by Folch *et al.* (1957).

Isolation of Microorganisms

One gram of the samples *Portunus sanguinolentus* and *Penaeus notialis* was serially diluted, 1ml of an appropriate dilution was inoculated on nutrient agar plates and the plates were incubated for 24hrs at 30°C. After 24 hours, sterile wire loop was used to pick the isolate from the plate and was streaked on a freshly prepared sterile nutrient agar plates, then it was incubated for 24 hours at 30° C in order to get pure cultures. The pure cultures were then stored in a refrigerator at 4°C. The isolates were identified using their macroscopic, cultural and biochemical characteristics. The isolated microbes were *E.*

coli, K. pneumonia, S. aureus, P.aeruginosa, Salmonella sp, P. mirabilis, S. dysentria, Streptococcus species and *E. aerogens.*

3. Results and Discussion

The present study was aimed to study the quality of the different species *Portunus sanguinolentus* and *Penaeus notialis* collected from Tuticorin South East coast of India. The Physico- chemical and Biochemical parameters and the Microbial population of these two sample species were studied to analyze the nutritional quality for the human consumption. The nutritive values of edible marine organisms are based on its Physico-chemical composition, like protein carbohydrate lipid vitamins, ash and moisture. (Ahkam *et al*., 2018).

pH is the most important factor which spoils the food and the microbial growth of the fish and foods. The pH of the species *Portunus sanguinolentus* has the high value than (6.5 ± 0.1201) the *Penaeus notialis.* In decapods pH influences the metabolism, physiology and maturation process. (Bandral *et al.,* 2013). It is the reliable indicator of degree of freshness or spoilage (Hulya *et al.,* 2008*).*

The moisture content of the sample *Portunus sanguinolentus* found to be high with the value (80.88 ± 0.16) % than *Penaeus notialis.* Moisture content always plays an important role in spoilage of the organisms. The spoilage occurs slowly when the moisture content is low.

In the present study the protein content was rich in *Penaeus notialis*. The value of the protein content is (1.670±0.304) mg. Protein is an essential nutrient for the growth of a human body and fish contains all the necessary amino acids (FAO, 2012).

In the present study, carbohydrate value was recorded about (1.580±0.179) mg in *Portunus sanguinolentus* than *Penaeus notialis.* Carbohydrate improves the quality of the food.

Lipids are soluble in ether hence they are ether extractable. They serve as source of energy during starvation and fasting. *Penaeus notialis (*6.364±0.114) mg has the height value. Fluctuation in carbohydrate and lipid values may be due to the moisture content in the samples.

The result showed that the spoilage occurs due to the microbial population level, because of handling and storage methods while capturing. The preservation of the species for a long time reduces the quality.

In the *Portunus sanguinolentus* and *Penaeus notialis* samples, the isolation of biogenic amine forming bacteria was isolated. They were *E.coli, K. pneumonia, S. aureus, P. mirabilis, P. aeruginosa, Salmonella species, S. dysentria* and *E. aerogens*. The presence of *Pseudomonas* and *Enterobacter* indicates that bacteria present in fishes are normally associated with those found in their natural environment and proportion of initial population can easily be changed after harvesting but this depends on the ability of those bacteria to adapt new condition (Merlin *et al.,* 2015*).* In *Portunus sanguinolentus E.coli, S. aureus, P. mirabilis, Salmonella species, S. dysentria and E. aerogens* were present and *K. pneumonia, P.aeruginosa, Salmonella species, S.dysentria* were absent. In *Penaeus notialis E.coli, K.pneumonia, S. aureus,* and *P. mirabilis,* were present. *E. aerogens, P. aeruginosa, Salmonella species* and *S.dysentria* were absent.

4. Conclusion

From this present study, it is concluded that Persons who handles the species and the vessels, nets which was used for the captative process, the quality and the quantity of the ice which is used for preservation. No Proper sterilization of the vessel can cause spoilage. If the species is captured near the shallow water or on the particular area where the captative process undergone will be a contaminated zone. Due to the duration, from the time of capturing, sometimes it takes more than two days to reach the landing centre/market from the day one of the captative process. These are the major reasons which cause the contamination in the species.

Table 1: Physicochemical and proximate composition of *Portunus sanguinolentus* and *Penaeus notialis*

Parameters	*Portunus sanguinolentus*	*Penaeus notialis*
pH	6.5 ± 0.1201	6.4 ± 0.185
Moisture (%)	80.88 ± 0.16	74.25 ± 0.69
Protein (mg)	1.345±0.1440	1.670±0.304
Carbohydrate(mg)	1.580±0.179	1.215±0.100
Lipid (mg)	5.596±0.054	6.364±0.114
Ash (%)	0.026 ± 0.02	0.077 ± 0.09

Table 2: Isolation of biogenic amine forming bacteria from *Portunus sanguinolentus* and *Penaeus notialis*

Microorganisms	*Portunus sanguinolentus*	*Penaeus indicus*
Escherichia coli	Present	Present
Klebsiella pneumonia	Absent	Present
Staphylococuus aureus	Present	Present
Proteus mirabilis	Present	Present
Pseudomonas aeruginosa	Absent	Absent
Salmonella species	Absent	Absent
Enterobacter aerogens	Present	Absent
Shigella dysentria	Absent	Absent

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