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Development of Chutney Powder from Spider Conch, *Lambis lambis* (Linne, 1758)

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Abstract

The spider conch, *Lambis lambis* is one of the important fishery resources in the Vellapatti Village, Tuticorin, Southeast Coast of India. These conches land as by catches from crab nets (a modified bottom set gill net). The meat of gastropods is considered as a delicacy, rich in protein and the fat content is very low. Only a small section of the fisher folk consume its flesh, as it is less popular among the coastal fisher folk. For the utilization of this meat, chutney powder (a side dish for Idli or Dhosai in South India) was prepared from the meat. Biochemical, microbiological and sensory analyses were made to assess the shelf life for a period of four months. The meat had a protein content of 5.2%, 0.5% of carbohydrate and lipid content of 1%. The shelf life assessment of the chutney powder for a period of four months was carried out and it was found out that the product was good until the end of the assessment period. Even the TMA and TVB levels were found to be within the limits (10.8 mg per 100g and 18.36 mg per 100g, respectively). The present work reveals that the chutney powder is microbiologically and organoleptically good until the end of the storage period and safe for human consumption.

Introduction

Marine molluscs such as cephalopods, bivalves and gastropods form the important fishery resources next to crustaceans. Gastropod meat is considered as a delicacy and consumed in good quantities around the

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world. The meat constitutes a good source of protein, glycogen and minerals when compared to other animal foods. The shells of the gastropods are used for the preparation of ornamental products and manufacture of lime (Patterson and Ayyakkannu 1992). In India, molluscs are not popular food due to the lack of awareness of its nutritive value combined with conventional vegetarian food habits of Indian people (Patterson 2000). The edible and commercially important species *Lambis lambis* is abundantly distributed in the southeast coast of India (Satyamurthi 1952). This conch inhabits shallow areas sandy and muddy in nature at depths ranging from 4 –16 m (Siraimeetan et al. 1988). It forms an important fishery at the Vellapatti Village, Tuticorin, southeast coast of India. The *L. lambis* is landed as bycatch from trawl nets and it was estimated that the total landing was about 100kg per day. Only a small section of the fisher folk consumes the flesh of these gastropods. The fisher folk in this area are not aware of the nutritive value of this gastropod and thus the meat is wasted in the shore itself. The development of value added products by incorporating gastropod meat powder with other suitable ingredients could be accepted easily by the people of coastal and non coastal areas. Ready to serve type and ready to cook products have increasing demands. Many ready to serve products have been prepared from fishes, prawns and bivalves (Krishnaswamy et al. 1962). In the traditional chutney powder, black gram (*Phaseolus mungo*) is the major ingredient used instead of meat powder. For better utilization of the gastropod meat (*L. lambis*) chutney powder was prepared as a ready to serve product as a side dish for Idli or Dhosai in South India. The shelf life of the chutney powder was assessed for a period of four months.

Materials and Methods

Live *L. lambis* were collected from the Vellapatti fishing village using crab nets and brought to the laboratory in icebox. The shells were broken and flesh was taken out. The edible part such as foot and adductor muscles were separated and cleaned thoroughly. The cleaned meat was sliced into small pieces and was deodorized following the method of Sen and Rao (1966). The deodorized meat was dried at 40-50^{o} C in an artificial drier for 2 days. The dried meat was powdered in a pulverizer and the meat powder was used for the preparation of chutney powder using the standard recipe given below.

Ingredients	Quantity
Deodorized meat powder	300g
Black gram (Skinned) (*Phaseolus mungo*)	150g
Red gram (*Cajanus cajan*)	60g
Asafoetida	5g
Curry leaves	10g
Red Chilli	15 pieces
Salt	10g

The black gram, red gram, red chilly and curry leaves were fried until the grams become golden brown in color and powdered. Then, the deodorized meat powder was mixed thoroughly with the above mixture. Finally, asafoetida and salt were added. The chutney powder was packed in airtight plastic containers and stored at ambient temperature. Monthly analysis of biochemical, microbiological and organoleptic evaluations were done. For normal chutney powder, instead of meat powder 350g of black gram and 160g of red gram were added to the above said ingredients. Here no substitution was made.

Biochemical analysis

Protein content was estimated using the Biuret method of Raymont et al. 1964, carbohydrate by the phenol sulphuric acid method (Dubois et al. 1956) and total lipid content by chloroform/methanol extraction according to the method of Folch et al. (1956). The spoilage indices such as Trimethylamine-N (TMA-N) and Total Volatile base-N (TVB-N) were estimated using the Conway micro-diffusion method (Beatty and Gibbons 1937). Free Fatty Acid (FFA) content was estimated by following the method of Ke et al (1976). The pH was measured using the digital DELUXE pH METER Model 101E Deep vision. Moisture content was analyzed by drying the materials in a hot air oven at 50-60ºC for 2 days.

Microbiological analysis

Microbial examinations for total plate count (TPC), *E. coli, Vibrio and Salmonella* were done as per the methods of USFDA (1995).

Sensory evaluation

For sensory evaluation, the meat chutney powder from *L. lambis* was mixed with coconut oil and served to the taste panel of 6 to 8 members and the organoleptic attributes, overall acceptability were determined using the hedonic scale of 1 to 9 (Amerine et al. 1965). The organoleptic scores for the product with a rating of 9 for extremely good, 8 for very good, 7 for good, 6 for very fair to good, 5 for very fair, 4 for fair, 3 for poor, 2 for very poor and 1 for extremely poor.

Results

The protein, carbohydrate and lipid contents of the meat were estimated as 5.2, 0.5 and 1% respectively. The biochemical parameters such as pH, moisture and free fatty acid (FFA) values are given in table 1. The initial values of pH, moisture and FFA were very low. The initial pH level in the *L. lambis* chutney powder was 5.2 and it increased steadily to 6.3 towards the end of the storage period after 4 months. There was a gradual increase in moisture content that ranged from 2.05-3.24%. The FFA content in chutney powder exhibited a low level (0.211 as% oleic acid) during the initial period and an increase in FFA value (0.832 as% oleic acid) was noted at the end of the storage period. The spoilage indicators such as Trimethylamine-N (TMA-N), Total Volatile Base-N (TVB-N) content of chutney powder during the storage period are shown in figure 1. The initial values of TMA-N and TVB-N were 2.8 and 11.2 mg per100g, respectively while a maximum value of 10.8 and 18.36 mg per100g respectively were observed at the end of the storage period.

The fresh chutney powder was tested for total plate count (TPC) of pathogenic microorganisms like *Vibrio, Salmonella* and *E. coli* and the results are depicted in table 2. The initial TPC observed was 6.4×10^3 $CFU.g^{-1}$ followed by a gradual increase during the third month (1.34×10^4 $CFU.g^{-1}$). After f4 months of storage period there was a reduction (9.4×10^3 $CFU.g^{-1}$). The pathogens like *Vibrio* and *Salmonella* were not detected whereas *E. coli* count of 4 $MPN.100g^{-1}$ was observed.

Table 1. The pH, moisture and free fatty acid (FFA) content of *Lambis lambis* chutney powder during storage at ambient temperature

Storage Period (months)	pH	Moisture (%)	Free Fatty Acid (as % oleic acid)
Initial	5.26	2.05	0.211
1	5.6	2.26	0.276
2	5.62	2.58	0.564
3	6.16	2.82	0.620
4	6.31	3.24	0.832

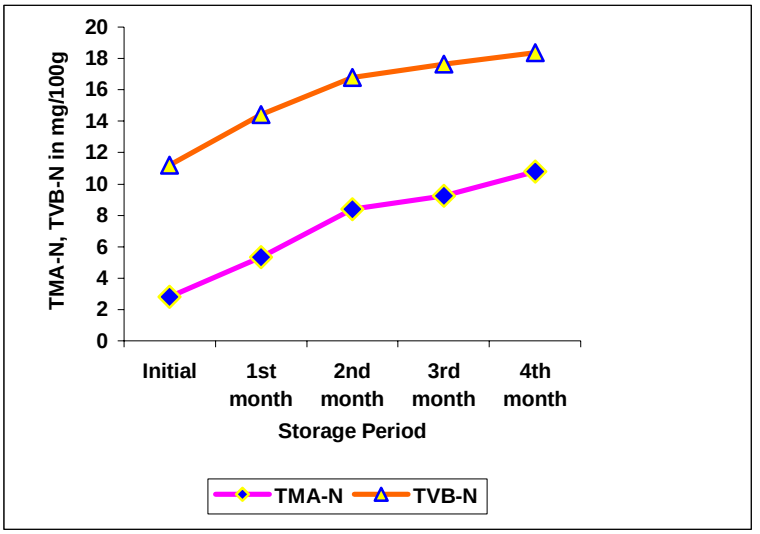

Fig 1. The TMA-N and TVB-N values of *Lambis lambis* chutney powder during storage at ambient temperature

The results of organoleptic characteristics are revealed in table 3. There was no remarkable organoleptic characteristic change in the chutney powder prepared from *L. lambis* meat. The appearance, flavor, taste and texture were good and were found to be similar to that of normal chutney powder. The sensory scores of chutney powder remained within the acceptable limit throughout the storage period. The overall acceptability of chutney powder ranged from 8.6 – 8.5 during the storage period. Along with *L. lambis* meat powder, black gram and red gram were added to give

additional taste and nutritive value. This protein rich value added food product will reduce the malnutrition problem particularly among children. The cost of the chutney powder prepared from *L. lambis* was 0.8123 USD and the normal vegetarian chutney powder was 0.5559 USD. The cost of *L. lambis* chutney powder is little higher because the meat powder was added to the normal chutney powder.

Table 2.Total plate count (TPC) and *E. coli* count of *Lambis lambis* chutney powder during storage at ambient temperature

Storage Period (months)	TPC ($x10^2 CFU.g^{-1}$)	*E. coli* ($MPN.100g^{-1}$)
Initial	64	4
1	82	ND
2	116	4
3	134	ND
4	94	3

ND – Not Detected

Table 3. Organoleptic attributes of *Lambis lambis* chutney powder during storage at ambient temperature

Storage Period (months)	*Organoleptic attributes*						
	Appearance	Color	Taste	Odor	Texture	Flavor	Overall Acceptability
Initial	8.6	8.6	8.5	8.5	8.6	8.5	8.6
1	8.5	8.2	8.5	8.6	8.2	8.5	8.5
2	8.5	8.0	8.2	8.5	8.2	8.5	8.5
3	8.0	8.2	8.3	8.1	8.0	8.4	8.4
4	8.0	7.8	8.2	7.6	7.8	8.0	8.0

Extremely good = 9, Very good = 8, Good = 7, Very fair to good = 6, Very fair = 5, Fair = 4, Poor = 3, Very poor = 2, Extremely poor = 1

Discussion

The results reveal that the meat has low lipid content and higher protein content. Similarly, Ramesh and Ayyakkannu (1995) have reported a low lipid content of 0.2% in foot muscles of *Chicoreus ramosus*.

The pH of the chutney powder was good till the end of the storage period. The moisture levels of fish and fishery products also play an important role in the spoilage (Stansby 1963). In dehydrated fishery products, the water content of the material was completely removed and it retards the microbial spoilage due to lower moisture content and it extends the shelf life period of the product. The present study reveals that the moisture content gradually increased during the storage period of 4 months**.** The FFA values were found to increase slowly and did not exceed the permissible limits till the end of storage period of 4 months. Similar increases in FFA values were noted in prawn soup powder packed in flexible packaging material (Gopal et al. 1988). The TMA-N and TVB-N values were low in the initial period and it increased at the end of the storage period. But these values were within the acceptable limit of 15 mg per100 g of tissue for TMA-N and 30 mg per100 g of tissue for TVB-N (Connell 1975).

The TPC was within the acceptable limit in the chutney powder and this is safe for human consumption. Venugopalan and James (1969) have reported similar reductions in total microbial count after 8 weeks of storage for prawn soup mix which is in line with the present work. The *E. coli* count was within the acceptable limit of 11 MPN. $100g^{-1}$ (FDA 1989).

The organoleptic attributes such as appearance, color, odor, texture, flavor and overall acceptability showed no spoilage of chutney powder till the end of the storage period. The mean panel scores of the organoleptic characteristics showed a decreasing trend, the color and flavor of the meat chutney powder was similar to that of a normal vegetarian chutney powder. The overall scores were beyond the acceptable limit (4.0) at the end of the storage period. From the organoleptic point of view, the meat chutney powder was good and safe for human consumption. The chutney powder prepared from smoked sardine fillets had no spoilage during its storage period (Muraleedharan 1980). In the present study, *L. lambis* chutney powder had no spoilage during the storage period of 4 months in air tight plastic containers.

Conclusion

The above results illustrate a good storage life (a period of 4 months), as spoilage was not observed even towards the end of the storage period. So an acceptable chutney powder can be prepared with the *L. lambis* meat. This will pave the way for better utilization of this under-utilized gastropod meat.

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