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Research Article

COMPARATIVE STUDIES OF THE PROXIMATE COMPOSITION OF THREE BODY PARTS OF WILD, CULTURED AND FROZEN PRAWN *MACROBRACHIUM ROSENBERGII* (DE MAN, 1879)

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ABSTRACT

This investigation principally entails with the proximate analysis, such as protein, fat, moisture, ash and carbohydrate content of the whole prawn, exoskeleton and edible portion of freshwater prawn *Macrobrachium rosenbergii* from wild, culture farm and frozen form (market). Considerable variations were observed in the proximate composition of different form prawns. The analyzed all parameters were present in three body parts of this species, however, the crude fibre was not detected in the exoskeleton of *M. rosenbergii*. The proportion of total protein was found to be higher in cultured prawns compared to wild and frozen prawns. Meanwhile, total carbohydrate and lipids contents were found to be higher in wild prawn than in the others. Further, ash content was higher in frozen prawns when compared with other two, and moisture content was higher in wild and cultured prawn. Therefore, present study, the adult cultured prawn showed better nutrients composition compared to the wild and frozen prawn. Hence, present study suggests that cultured (freshly harvested) *M. rosenbergii* can be used as a healthy choice of food for human consumptions.

Keywords: *Macrobrachium rosenbergii*, proximate composition, exoskeleton, wild prawn, culture prawn, frozen prawn.

INTRODUCTION

Palaemonid prawns are an important economic resource in the world's crustacean fishery industry as a major component of tropical and subtropical fisheries (Holthuis 1980; Mantelatto and Barbosa 2005; Hossain *et al.,* 2012). The giant freshwater prawn (commonly called 'Scampi'), *Macrobrachium rosenbergii* known as 'scampi' in commercial parlance, is a highly valued delicious food and commands very good demand in both domestic and export market. An India is considered one of the most suitable countries in the world for giant freshwater prawn *Macrobrachium rosenbergii* (De Man, 1879) farming, because of its favorable resources and agroclimatic conditions. They may reach a length of over 330 millimetres and a mass of 450 grams and are widely fished and farmed for human consumption. The annual world production of prawn, around 6 million tons, makes this market very attractive and has encouraged the development of farming of many species in several countries (Zitari-chatti *et al.,* 2008). However information on the nutritional status of the cultured and frozen prawns was scanty except a few reports (Cavalli *et al.,* 2001; Thomson *et al.,* 2004; Bhavan *et al.,* 2008; Ferdose and Hossain, 2011). Since studies on proximate composition on cultured and frozen prawns were very scanty. So the current study aimed to establish information on the proximate composition of the prawn in cultured and frozen stage. They are eaten either whole (Shell and flesh) after drying or as flesh alone (when fresh) and the exoskeleton is used for animal feeds. Previous research efforts on prawns in many tropical Countries have focused on their biology, ecology, breeding

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cultural management and chemical composition especially in the Western part of the countries (Ehigiator and Nwangwu, 2011). The present study is intended to provide information on the chemical composition in three parts of prawn from wild, culture farm and market (frozen form).

MATERIALS AND METHODS

Sample collection

Wild prawn: The prawns (*M. rosenbergii*) were collected from the river Kaveri, Tiruchirappalli, Tamil Nadu (11˚29´N and 79˚59´E).

Culture prawn: Happy Bay Aqua Nova Hatchery, Mugaiyur, Marakkanam, Kancheepuram district, Tamil Nadu (12.2°N and 79.95°E). Scampi can be cultivated for export through monoculture in existing as well as new ponds or with compatible freshwater fishes in existing ponds. It is exported to EEC countries and USA.

Frozen prawn: Ukkadam Fish Market (10° 57.51' N and 76° 45.29' E) Coimbatore district in Tamil Nadu. Both wild and culture prawn were transported to the laboratory in oxygen filled polythene bags. Live and frozen prawns were taken to the laboratory for proximate composition study. Prawn were selected randomly though both male and female presents.

Analysis of proximate composition

Whole Prawn, edible and exoskeleton were subjected to analyse the biochemical composition such as, moisture, crude protein, amino acids, carbohydrate, lipid and ash. Crude protein and nitrogen were estimated by Kjeldhal apparatus according to AOAC (1995). Total carbohydrate was estimated by the method of Roe (1995), using TCA extracted sample. Total lipid was extracted with chloroform-methanol mixture following the method of Barnes and Blackstock (1973) and estimated by the method of Folch *et al.* (1957). Amino acids were extracted using sodium tungstate and H_2SO_4. The content of total amino acid was assayed by the method of Moore and Stein (1948). All analysis was carried out in triplicates.

Statistical analysis

The statistical interpretation of the tabulated data was performed by using SPSS (21.0 version) for the mean standard deviation at 5% level of significance.

RESULTS AND DISCUSSION

In a nutritional point of view, the proximate biochemical composition of any edible organism is very crucial. The nutritive values of crustaceans depend upon their body biochemical constituents (Vijayavel and Balasubramanian, 2006). Body biochemical composition is a good indicator for physiological condition and easy to assess in cultivable organisms Muralisankar *et al.* (2014). Comparison between the wild, cultured and frozen *M. rosenbergii* shows that high level of protein, were reported in the cultured prawn. High level of lipid and moisture content were reported in the wild prawn. Likewise higher level of carbohydrate and ash content was noticed in frozen prawn and higher moisture was in the wild prawn.

High level of protein was obtained in all the body parts of both (wild, cultured and frozen) species with the highest level occurring in the edible portion. The crude protein level of the whole prawn (51.27±3.43, 54.39±4.54 and 49.04±3.31) and edible portion (52.74±3.54, 54.79±5.69 and 52.56±3.45) of *M. rosenbergii* wild, culture and frozen prawn was higher than that recorded for the exoskeleton protein (31.54±2.93, 37.65±3.26 and 32.54±3.19) (Figure 1). This finding agrees with that of Ravichandran *et al.* (2009) with protein level of 41% (flesh) and 32.5% (shell) from *P. indicus.* The result of the protein content is higher than that obtained by Fasakin *et al.* (2000) for *M. vollenhovenii*, (16.99 ± 0.20), *M. rosenbergii* (17.30 ± 0.30); *Penaeus notialis* (20.57 ± 0.05) and *Bachrus niger* (18.52 ± 0.01). The protein in the cultured prawn was higher than that of wild and frozen prawn. Thus, this high protein content may be valuable for food formulation as protein replacement for other expensive animal protein source in feed production.

High level of carbohydrate was obtained in all the body parts of both (wild, cultured and frozen) species with the highest level occurring in the edible portion. The carbohydrate level of the whole prawn (29.32±0.09, 23.21±0.92 and 25.11±0.72) and edible portion (31.45±0.67, 27.67±0.76 and 26.09±0.31) of *M. rosenbergii* wild, culture and frozen prawn was higher than that recorded for the exoskeleton protein (21.04±0.98, 23.02±0.35 and 19.62±0.29) Figure 2. This result is contrary to that from *P. indicus* whose NFE content was higher in the flesh (2.4%) than the level in the shell (Ravichandran *et al.,* 2009).

Lipids are the best source of energy producers of the body through metabolism. High level of carbohydrate was obtained in all the (wild, cultured and frozen) species with the highest level occurring in the edible portion of the wild prawn (Figure 3). In the present study, the level of total lipid was found to higher (17.79±0.67) in cultured prawns when compared to the other prawns.

In the present study, the contents of moisture were found to be slightly higher in wild prawns Figure 4, and ash in frozen prawns than other prawns Figure 5. Amino acid and nitrogen were found to be slightly higher in culture prawn compare to wild and frozen prawn Figure 6, 7 respectively. Ash content was observed in exoskeleton portion of frozen prawn (39.39±4.01) than that wild (37.49±4.55) and culture (35.63±4.22) prawn. The higher value of moisture content was observed in wild prawn (78.08±0.53) than that culture (76.09±0.46) and frozen (71.03±0.45) prawn. It has been reported that the muscle of male prawns contained higher levels of ash and water, and the females have relatively greater amounts of fat, protein and carbohydrates (Amer *et al.,* 1991). This high level of ash has been observed in the exoskeleton of shrimps found in Lagos Lagoon (Adeyeye, 2000). Chitin is

a linear polymer of acetyl D-glucosamine that has properties similar to cellulose in many respects (MacDonald *et al.*, 1998).

The ether extract for wild *M. rosenbergii* was 11.04±0.09, 11.29±1.02 and 3.19±1.13 whole prawn, edible portion and exoskeleton respectively and culture prawn with 12.01±0, 14.64±2.98 and 4.75±2.07 for the whole prawn edible portion and the exoskeleton respectively. These findings were quite high compared with findings of other scientists carried out on prawns and shrimp. The values were higher that the extract of other crustacean oil compared with *M. vollenhovenii* 7.62 ± 0.21%, P. *notialis* 3.90 ± 0.06% *C. Africana* 5.57 ± 2.05 but lower than *M. rosenbergii* 17.97 ± 0.09% (Fasakin *et al.*, 2000, Bello-Olusoji and Oke, 2005).

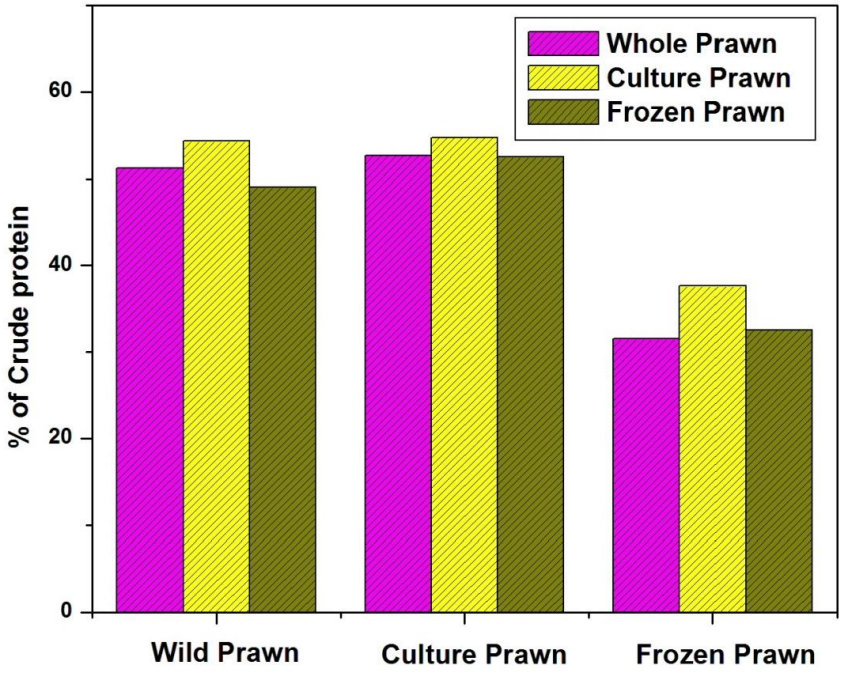

Figure 1. The Crude protein content of three body parts of wild, culture and frozen *M. rosenbergii*.

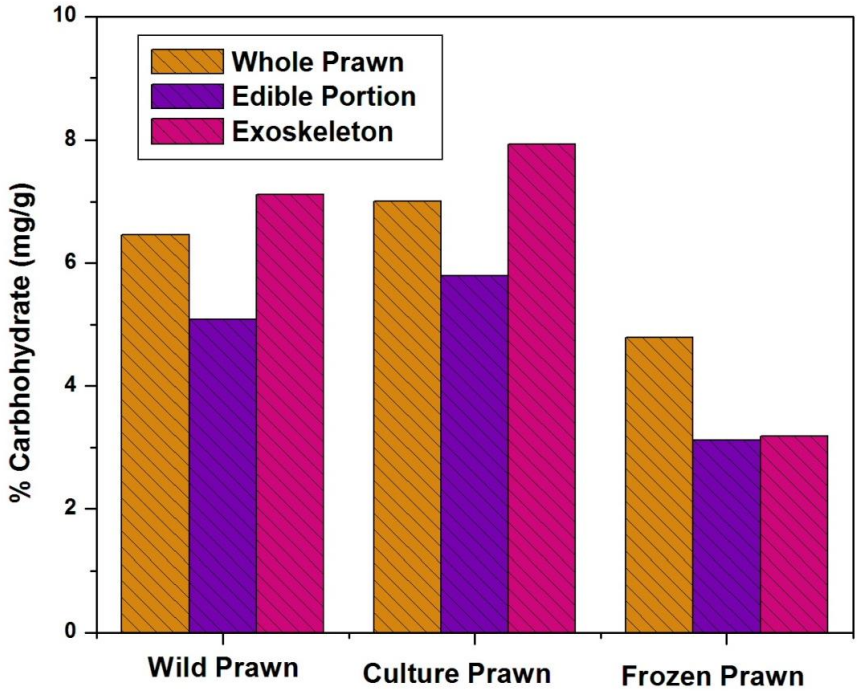

Figure 2. The Carbohydrate content of three body parts of wild, culture and frozen *M. rosenbergii*.

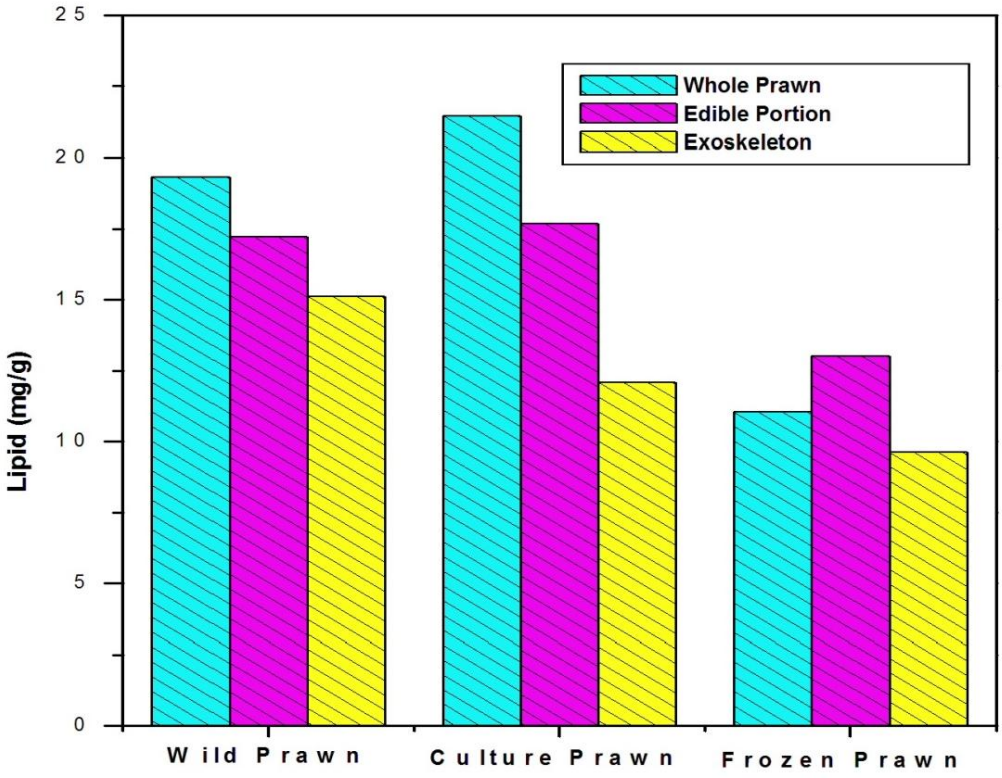

Figure 3. The Lipid content of three body parts of wild, culture and frozen *M. rosenbergii*.

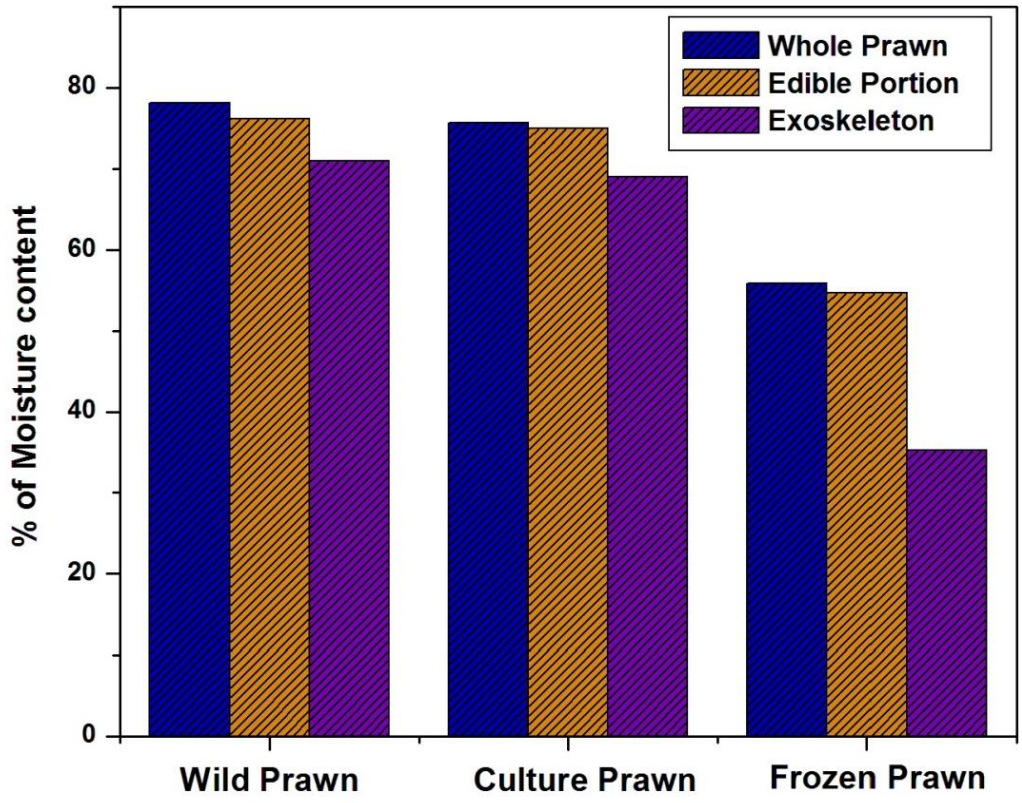

Figure 4. The Moisture content of three body parts of wild, culture and frozen *M. rosenbergii*.

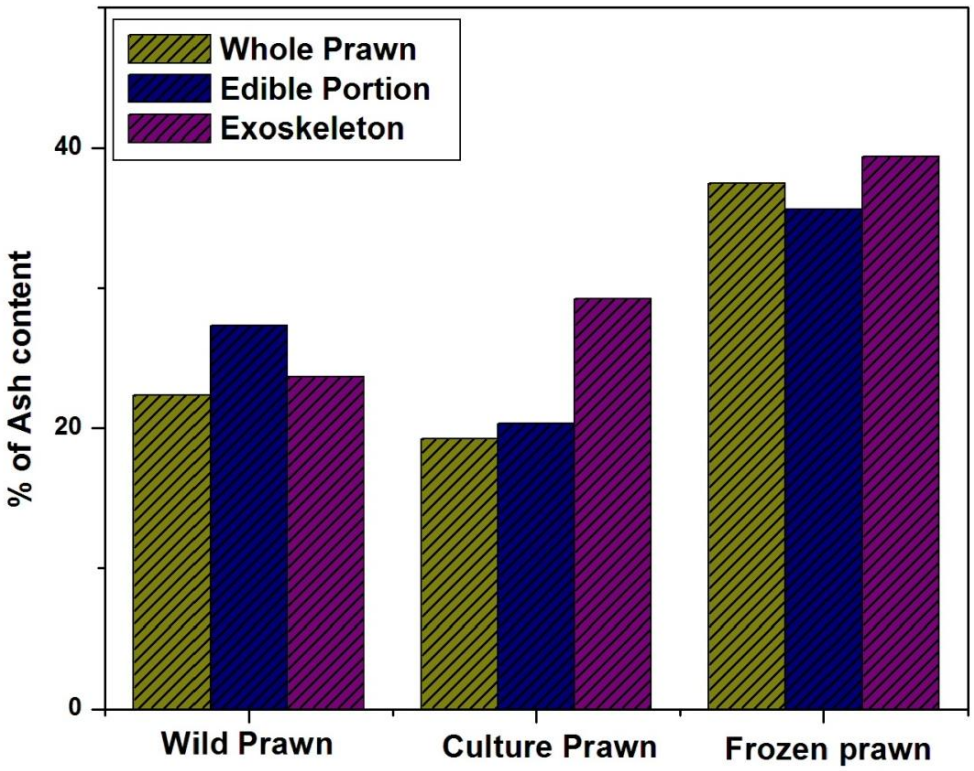

Figure 5. The Ash content of three body parts of wild, culture and frozen *M. rosenbergii*.

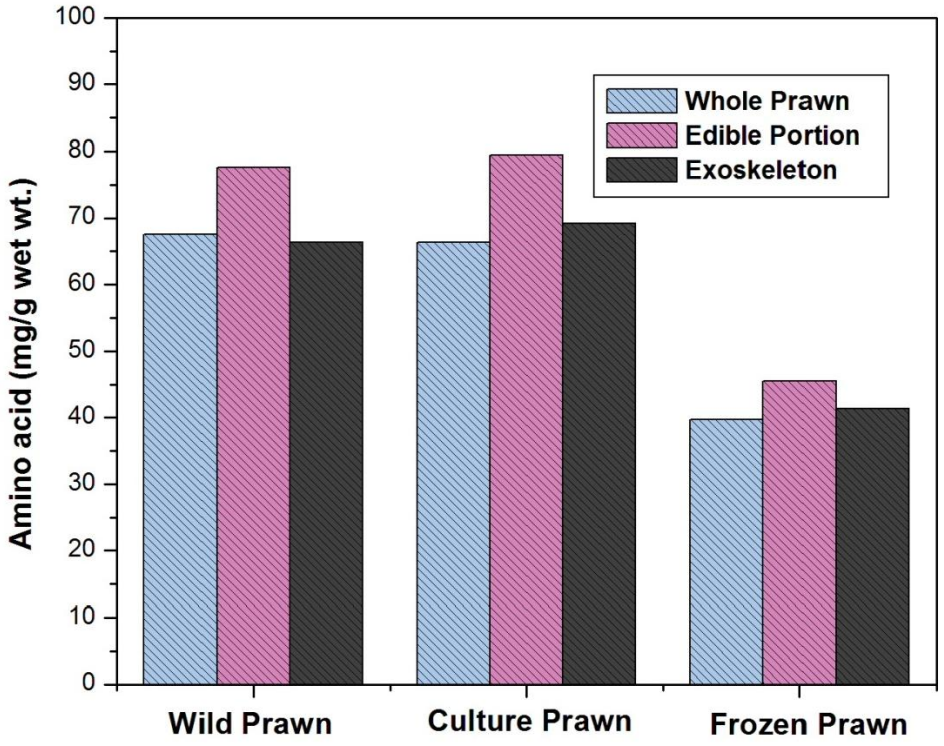

Figure 6. The Amino acid content of three body parts of wild, culture and frozen *M. rosenbergii*.

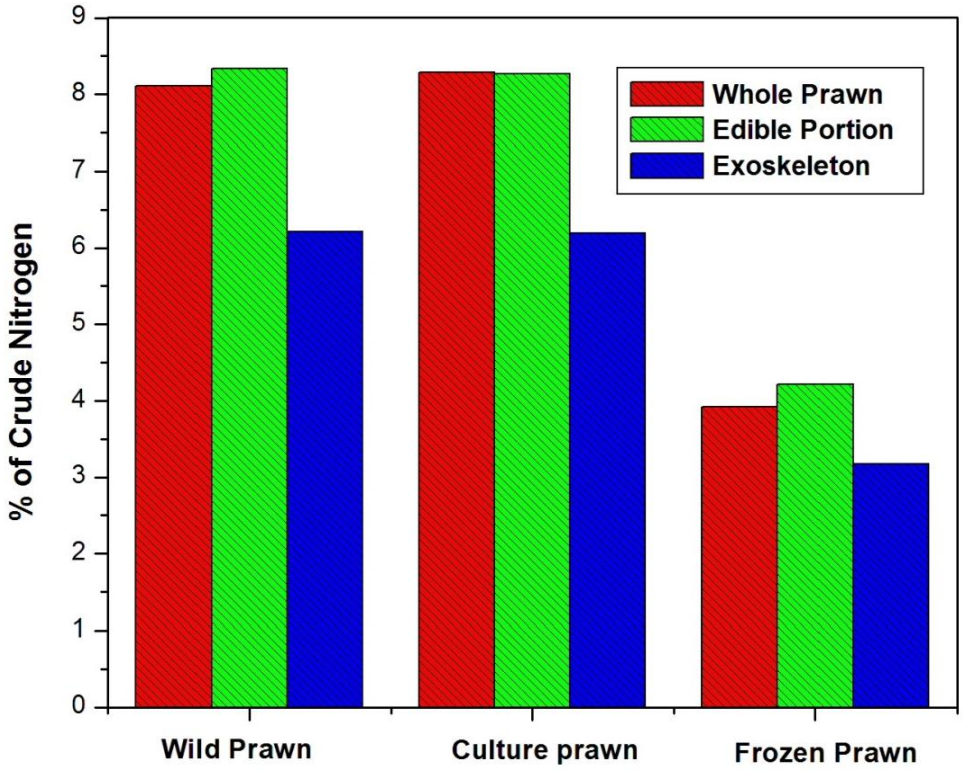

Figure 7. The Nitrogen content of three body parts of wild, culture and frozen *M. rosenbergii*.

CONCLUSION

The result of this investigation shows that the culture *M. rosenbergii* edible portion shows maximum level of protein compare to the wild and frozen prawn. Frozen *M. rosenbergii* shows maximum level carbohydrate than the culture and wild prawn. Meantime, lipid content was high in edible portion of wild prawn than the culture and frozen prawns. Ether extract and moisture content was observed in the whole prawn and the edible portion in wild prawn. The recorded data indicates that nutritionally the adult cultured prawns were better than the adult wild and frozen prawns. Further, the significant decreases of proximate compositions in frozen prawns indicates the long stored prawns might be loss its essential nutrients. Hence, present study suggests that the cultured (freshly harvested) *M. rosenbergii* can be recommended as a healthy choice for human consumption due to presence of good protein source and other nutrients**.**

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