



Research Article

Species Diversity and Abundance of Freshwater Crab of the Genus *Allacanthos* in Buner District of Khyber Pakhtunkhwa Pakistan

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Authors' Contributions

WAS designed the experiments and wrote the article. GR presented the idea of the study. KK analysed the data. IA provided reagents/materials/analysis tools. SB studied the area. SI collected the crabs. DS and SGA did the field survey.

Keywords

Diversity, Crab, *Allacanthos*, Animal therapy

Abstract | The crab found in fresh water is a source for proteins having immense importance and its use as a food is not hidden from anyone. Its use by the traditional healers and animal therapists as a healthy calcium supplement and in healing of other injuries is also proven. In the present study, the diversity and abundance of crabs from Buner district of Khyber Pakhtunkhwa Pakistan were looked over, over a period of three years extending from June 2013 till June 2016, collected at different sampling points. Extensive surveys were conducted for three years at different timings during the active periods of crab life. To have a comprehensive study of the crab fauna of Buner District, nine different localities were selected for conduction of survey. The results showed that there were two crab species yawi and Smalley. These species belong to *Allacanthos*. They have gonopod with a distal portion of mesio laterally flattened. They have a cephalic sub distal portion which is concave. There is a narrow marginal process with an almost straight distal end and a sharp tip lateral part with an apex. Periodic and corporal aspects inclined the abundance of *Allacanthos*. The dominant species was *Allacanthos yawi* (62.9%). The abundance was variable according to habitat type. *Allacanthos yawi* had abundance in Pir Baba and Budal localities. The season was also a factor for variation in their diversity. They were mostly found the June, July month. There is a regular decline in the diversity of these species so research on crabs are necessary and an improved understanding of localities are necessary to prevent biodiversity degradation and loss in this area.

Novelty Statement | There is no work found on *Allacanthos* crab of Buner. No such study was carried out by any Zoologist in Buner District. The understanding of localities is necessary to prevent biodiversity degradation and loss in this area. So hope this study will help to prevent endangeredness of species.

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Introduction

The study of invertebrates as an origin of medicine has always been considered interesting and fruitful field in research. Various medicinal firms have succeeded

in derivation of daily life therapeutic medicines, through various studies (Lev, 2003). A study on one hundred and fifty drugs used in the USA shown that Twenty seven out of them were found to be derived from natural products/origins (World Resources Institute, 2000). Despite the fact that the role of faunal biodiversity cannot be ignored, but a careful strategy is to be acquired. Therefore, the basic approach for this purpose will be overharvesting of the

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crab. This is because they have bioactive chemicals in them (Albuquerque *et al.*, 2012). Certain organism's cone shells and mussels may be harvested in a number for they are used in neuro-medicines. A freshwater snail is used in the treatment of bones and joint disorders as the local therapy in china and India (Antony *et al.*, 2011).

Crabs, besides an essential part of the environmental system, are used as food in various countries. As the fact is, the marine type is mostly used as a food but in some countries, the crab from fresh water is also found edible. Its importance as a food is also known to people of countries like China, Indonesia, France, Japan, Spain, Philippines and the United States (Gülle, 2005).

Diversity of marine and fresh water crab discussed by different authors as crabs are economically important for different countries and another reason is regular decline in their diversity and species composition (Wehrtmann *et al.*, 2016). Different factors responsible for their decline like overharvesting, environmental crises, destruction and degradation. This is where concerns arise about the fact that less studies are there about the diversity and environment of crabs, that might help in their protection and conservation.

According to Brandis *et al.*, 2000, crabs are studied on a number of basis like biological, ecological and population features in all over the world (Brandis *et al.*, 2000), however very less studies on the species in Buner are conducted. This study was purposed at demonstration of Species Diversity and Abundance of freshwater crab of the genus *Allacanthos* in Buner district of Khyber Puktun Khawa, Pakistan.

Methods and Materials

Area of study

Collection of sample

Extensive surveys were conducted for three years at different timings during the active periods of crab life. To have a comprehensive study of the crab fauna of Buner District, following localities of the area Table 1 were selected for conduction of survey.

Crabs were collected in the selected areas during three years period from June 2013 till June 2016 during the active period of crab map 1. Fortnight visits were planned and conducted. 2000 traps (Fyke-net), set at each point of collection were used to catch the *Allacanthos* specimens. Before storage of the collected specimens in the museum of Zoology department Abdul Wali Khan University Mardan, they were killed in a bottle containing anesthesia.

Data analysis

One-way ANOVA was used for comparison of the numbers of crabs amongst localities and seasons.

The Pearson correlations were used to test the inter-relationships between the numbers of crabs and their bodily features.

Table 1: Areas of District Buner selected for collection.

S.No	Name of locality	Longitude	Latitude
1	Kingergali	72°14'44"E	34°30'38"N
2	Daggar	72°29'3"E	34°30'38"N
3	Pirbaba	72°27'13.81E	34°36'8.55"N
4	Shaheede sar	72°39'26"E	34°37'46"N
5	Nawagai	72°33'29"E	34°24'24"N
6	Nagrai	72°40'58"E	34°22'49"N
7	Budal	72°38'59"E	34°29'27"N
8	Barkalay	72°29'15"E	34°28'3"N
9	Totalai	72°29'49"E	34°11'36"N
10	Gokand	72°30'56"E	34°34'55"N
11	Malka	72°40'16"E	34°19'6"N
12	Chinglai	72°30'41"E	34°19'9"N

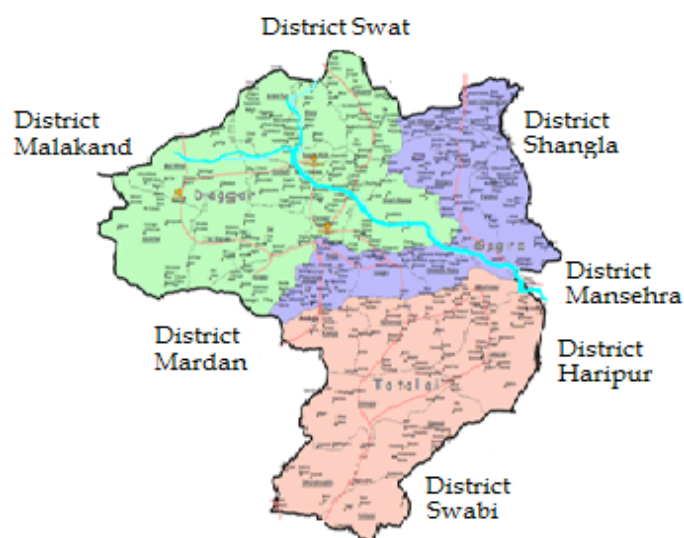


Figure 1: District Buner map (WFP, 2010).

Results

Species diversity

The species diversity of crab in Buner District is classified into 1 family, 01 genera, and 02 species. Out of the total of 140 crabs, two *Allacanthos* species were found, *Allacanthos yawi* (88, 62.9%) and *Allacanthos smalley* (52 individuals, 37.1 %).

Diagnosis, description, color, distribution and ecology of *allacanthos yawi*

They had a curved head part, and a straight distal part. The spine was in the apical portion while gonopod was placed distally and was narrow. The lateral part was smooth. They were small sized about less the 30cm. Elaborated in middle. Dorsal surface was mostly flat. Gastric pits were paired and smooth. The cervical groove was narrow and

shallow. The postfrontal portion was very distinct with shallow between them. In the dorsal portion front margins were straight. The upper orbital portion was not crinite. A lower orbital portion had faint papillae. The Claws were rounded with fleshy tufts, typically no spots. They had pereopods with fine sparse hairs. First pereopods completely closed. They were different. Mostly right was larger than left. Palm was swollen. Finger gripping when closed. They had triangular teeth. All the abdominal portion was free.



Figure 2: *Allacanthos* crab Museum Specimen.

Carapace and pereopods were Olivia colored. Some areas were the lighter green. The specimens (Figure 2) were collected in streams of different heights and slopes and consisting of different ranges of volume of water. A rich vegetation cover provided shade for the study area. Various sizes stone pebbles, clay and sand were the main components of the waterbed. The half-decomposed leaves made the spot favorite for *Allacanthos yawi* aided by other organic substances.

Diagnosis, description color distribution, ecology of allacanthos smalley

Their gonopod was straight. The apex was folded. They have spermatid channels. Sub distal portion had spines. Large cephalic lobe. Apical spines weakly developed. Carapace was square. The size was up to 50mm; they had 3 forward pointing marginal teeth, 2 rostral bumps. The Claws were rounded, often fleshy tufts, typically no spots. Pereopods were with fine sparse hairs. They were present in localities of Gokand 72°30'56"E, 34°34'55"N, Nagrai, 72°40'58"E, 34°22'49"N, Totalai 72°29'49"E, 34°11'36"N and Malka, 72°40'16"E, 34°19'6"N.

They were caught all year long in the freshwater streams of Buner district, consisting of a range of volume of water.

Discussions

This is the first-ever study on Crab diversity in district Buner of Khyber Pakhtunkhwa Pakistan. This study result shows that we had found the diversity of only one genus *Allacanthos*. They had only two species *yawi* and *smalley* diverse in the study area. Such type of study has been reported by Magalhães, et al. (2010). He found different species of *Allacanthos* from Central America in same ecological condition as found in Buner district. They were compared with University of Washington crab guide and found that it has the same size, colour, distribution and body structure.

This study is also a comparison to previous studies in Thailand. But Thailand has 746 species of sea-borne crabs (Ng and Davie, 2002). 54 species of sea-borne crabs were found in coastal areas of Cape Panwa, Phuket Province (Wisetsongpand et al., 2009), Mu Ko Angthong Marine National Park, Surat Thani Province, had 54 species (Wisetsongpand et al., 2008), and Mu Ko Surin National Park, Thailand had 77 species (Wisetsongpand et al., 2007). Moreover, 11 families, 37 genera and 72 species of marine crabs from a small trawl fishery were reported by Khoyngam and Lauhachinda (1985).

As reported by Magalhães, et al. (2010) from southern Costa Rica, Central America that *Allacanthos* species mostly found in freshwater and sloppy and humid area. The same was found there. Most streams and freshwater springs were found with mud, humid and in between trees and agricultural land. Some marine crabs distributed in high temperature, transparent depth and saline water (Manmai et al., 2013).

The seasonal abundances of *Allacanthos smalley* and *Allacanthos yawi* were same to other freshwater crabs like the genus *Mediapotamon* (Wang et al., 2019). They were mostly found in the month of June to October and then from March to May in Buner. As these seasons have humidity and other constituents responsible for the growth of them.

As habitat has an important function for freshwater crabs. So, management of these species should be taken into account specially the habitats in which it is found abundance (Magalhães, et al., 2010). As reported that they are freshwater so they are found in that localities which have freshwater streams in between their mountains. Pirbaba and Budal were favorable for *Allacanthos yawi*. *Allacanthos smalley* was found mostly in localities of Gokand, Nagrai, Totalai and Malka area.

During our study in this area we come to know that most of the practitioners and Hakeem use this for medicinal purpose, so a clear and intense care is required on these species to prevent them from becoming threaten.

Conclusion

We conclude our study with this remarks that we had only two species *Allacanthos yarwi* and *Allacanthos smalley* in district Buner of Khyber Pakhtunkhwa Pakistan. There is a regular decline in the variety and quantity of these species due to Zoo therapeutic uses and other pollution, so research on crabs and an improved understanding of habitat are necessary to prevent loss of biodiversity.

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