



**STUDIES ON LENGTH WEIGHT RELATIONSHIP OF SPINY EEL,
MASTACEMBELUS ARMATUS FISH FROM DISTRICT BADIN SINDH,
PAKISTAN**

Muneer Ahmed korejo^{1*}, Shaista Jalbani², Muhammad Haneef Mugheri³, Majid Hussain Soomro⁴, Abdul Haleem Korejo⁵, Hafeez ur Rehman⁶, Sahir Odhano⁷

¹ Department of Fisheries & Aquaculture, Shaheed Benazir Bhutto University of Veterinary and Animal Sciences, Sakrand Sindh, Email: muneerahmedkorejo9@gmail.com

² Department of Fisheries & Aquaculture, Shaheed Benazir Bhutto University of Veterinary and Animal Sciences, Sakrand Sindh, Email: shaista.j@faculty.sbbuvas.edu.pk

³ Department of Biochemistry, Shaheed Benazir Bhutto University of Veterinary & Animal Sciences Sakrand, Email: biochemisthaneef@gmail.com

⁴ Department of Veterinary pathology Shaheed Benazir Bhutto University of Veterinary and Animal Sciences, Sakrand Sindh, Email: majidsoomro@hotmail.com

⁵ Ashia Bawany Government College 02 Karachi, Email: korejohaleem@gmail.com

⁶ Department of Fresh Water Biology and Fisheries, University of Sindh, Jamshoro, Email: hafeeznarejo2009@gmail.com

⁷ Department of Fisheries & Aquaculture, Shaheed Benazir Bhutto University of Veterinary and Animal Sciences, Sakrand Sindh, Email: odhano.sahir@gmail.com

ARTICLE INFO:

Keywords:

Length, Weight, Freshwater, Spiny Eel

Corresponding Author:

**Muneer Ahmed korejo,
Muhammad Haneef
Mugheri**

Department of Fisheries & Aquaculture, Shaheed Benazir Bhutto University of Veterinary and Animal Sciences, Sakrand Sindh, Department of Biochemistry, Shaheed Benazir Bhutto University of Veterinary and Animal Sciences, Sakrand

ABSTRACT

Mastacembelus armatus is an important freshwater spiny eel locally recognized as Bam. This fish is liked by many people of the world for its attractive flavor and comparatively tough texture. The current experiment was designed to enumerate the relationship between length-weight and condition factor for spiny eel accordingly. Collection of samples were done from district Badin Sindh Pakistan during three Months from March to May 2018. The total ninety specimens ranged from smallest fish 28.5cm and larger fish about 51.3 cm in length and from 56.5g to 246.5 g in weight procured from the local fishermen. The coefficients of correlation were calculated by methods of LeCren (1951) resulted in the equation given below: $\text{Log } w = -3.20 + 3.10$ (male) $\text{Log } w = -3.26 + 3.21$ (female) and $\text{Log } w = -3.0 + 3.15$ (combined), finally it was decided that the length-weight equation exhibited positive allometric type of growth of *Mastacembelus armatus* from District Badin, Sindh.

Sindh,

Email:

muneerahmedkorejo9@gmail.com

[com](mailto:biochemisthaneef@gmail.com)

biochemisthaneef@gmail.com

Article History:

Published on November 06,

2025

INTRODUCTION

Mastacembelus armatus, *Mastacembelus pancalus* and *Mastacembelus aculeatus* are called freshwater eels and are regarded as minor native fish species. [1] The freshwater eel is common in Pakistan, India, Bangladesh, Nepal and Myanmar and occurs in both standing and running waters [2]. Considering the consumer's preference, nutritional value, market preference and preserving biodiversity, *Mastacembelus sp.* should be protected from being extinct. However, the development of culture technologies and biological studies of these species are indispensable. Very little attempt has been made in the country to promote their breeding and culture techniques. The length-weight relationships (LWR) of fish are significant in fisheries and fish biology [3] Including other morphometric traits, the LWR can be used to distinguish taxonomic groups, and to depict other life events like metamorphosis, growth, and the beginning of maturity changes over time [4]. LWR can also be used to set yield equations, which can be used to calculate the number of fish landed and compare the population across time and space. Fisheries researchers can apply the LWR parameters (a and b), to estimate a fish's weight from its length, to compute condition indices, to compare the life history and morphologies of populations from various regions [5] and to investigate ontogeny allometric changes. In studies on fisheries and fish biology, Fulton's condition factor (K) is frequently utilized. To describe the "condition" of a certain fish, this component is derived using the relationship between a fish's weight and length [6]. The condition of sexual development, the availability of food sources, the age, and the sex of some species are indicated by a fish's K values. However, no work has been reported so far from this region. Henceforth the present investigation has been taken up to provide baseline data for further studies, management and conservation of *Mastacembelus armatus*.

MATHODOLOGY

COLLECTION AND PRESERVATION

The samples of *Mastacembelus armatus* were collected from District Badin Sindh Pakistan during three Months from March to May 2018. The total 90 specimen ranged 28.5to 51.3cm in length and 56.5-to-246.5-gram weight respectively were procured from the catch of local fishermen. The collect specimen was brought to the laboratory and preserved in 5% formalin. Collected samples were analyzed in virtue of total length and weight by use of scale (measuring board) and balance (digital balance). The analysis of percentage occurrence of different food items was determined by summing the total occurrences of all items, from which the percentage occurrence of each item was calculated (Hynes, 1950). The feeding rate of the fish was assessed by calculating the gut content in relation to the gut weight, expressed as the Gastro-Somatic Index (GSI).

RESULT

Computation of LWR analysis

In present study of computation of LWR analysis was performed during March- May 2018 procured from district Badin, Sindh. The total 90 specimens ranged from smallest fish were 28.5

and large fish about 51.3 cm, and from 56.5 to 246.5 g in length and weight respectively. The coefficients of correlation were calculated by [5] methods at 5.0 cm length interval. The computation of length and weight of *Mastacembelus armatus* was taken into consideration for both sexes and combined and their data exhibited in (Table 1). The computed weight values of the fish were tabulated against their corresponding total lengths. These data were plotted on ordinary graphs to illustrate the relationship between length and weight. The plotted figures provided a clear representation of the growth pattern of the studied species. Each figure highlights the variation in weight with respect to total length. The graphical trends indicate a consistent relationship between the two parameters. The results are presented in Figures 1, 2, 3, 4, 5, and 6, respectively.

The coefficients of correlation were calculated by [7] methods of *Mastacembelus armatus* varied between 28.5 to 51.3 cm resulted in the equation given below.

$$\text{Log } w = -3.20 + 3.10 \text{ (male)}$$

$$\text{Log } w = -3.26 + 3.21 \text{ (female)}$$

$$\text{Log } w = -3.0 + 3.15 \text{ (combined)}$$

It was perceived from the above-mentioned calculations that the b values resulted as positive allometric growth in both sexes and for combined in the present investigations.

Wellbeing Index

Obesity of fish *Mastacembelus armatus* was enumerated from district Badin, Sindh separately for male, female and for combined sexes. Mean values of obesity were 0.94, 1.1, 0.83 case male, females and combined respectively (Table 2) finally, the relationship between weight, length, and condition (obesity) values was analyzed for *Mastacembelus armatus* from the River Indus. The findings revealed a significant positive correlation among these parameters. Both male and female specimens exhibited positive allometric growth patterns. This indicates that the species tends to gain weight at a faster rate than length as it grows. The combined analysis of sexes also confirmed this positive allometric trend. Therefore, *Mastacembelus armatus* from the River Indus demonstrates an acceptable and healthy growth performance.

Table 1. Data on weight- length relationship of *Mastacembelus armatus* from district Badin, Sindh

Length Length group (cm)cm)	Female					
	Ave. length	Ave. Weight				
25.5 - 30.0	28.6±1.09	50.2 ± 0.9	28.5±0.5	28.5 ±0.2		
30.1 - 35.0	31.8± 0.8	70.2± 2.01	33.3±1.9	110.1±2.5	32.6 ±1.5	82.5±2.88
35.1 - 40.0	38.2± 1.5	98.0± 2.0	37.8±1.5	162.5±2.5	38.0 ±1.0	130.3±2.75
40.1 - 45.0	41.0±1.0	120.0± 2.0	43.0±1.0	180.0±1.0	42.0 ±0.8	150.0±2.0

45.1 - 50.0			46.2±1.8	210.0±2.0	46.2 ±0.8	210.0±2.0
50.1 - 55.0			51.3±0.7	246.0±3.0	51.3± 0.7	246.0±3.0

Note: Ave= Average, cm= Centimeter

Table 2 Data on obesity of male, female and mutual sexes of *Mastacembelus armatus* from district Badin, Sindh

Length group (cm)	Male			Female			Mutual sex		
	Obs. Wt	Cal. Wt	Kn	Obs. Wt	Cal. Wt	Kn	Obs. Wt	Cal. Wt	Kn
20.1 - 25.0	1.75	1.75	1.0	1.45	1.73	1.1	1.1	1.7	0.62
25.1 - 30.0	1.82	1.84	0.98	2.0	1.90	1.0	1.1	1.92	1.0
30.1 - 35.0	1.60	2.0	0.90	2.24	2.03	1.1	1.0	2.01	0.49
40.1 - 45.0	2.56	2.30	0.89	2.29	2.36	0.97	2.4	2.33	1.0
				2.36	2.46	0.95	2.36	2.46	0.95
				2.45	2.60	0.94	2.45	2.60	0.94
Mean Kn =			0.94			1.01			0.83

Note: Obs= Observation, Cal= Calculated, wt= Wight, kn= condition factor

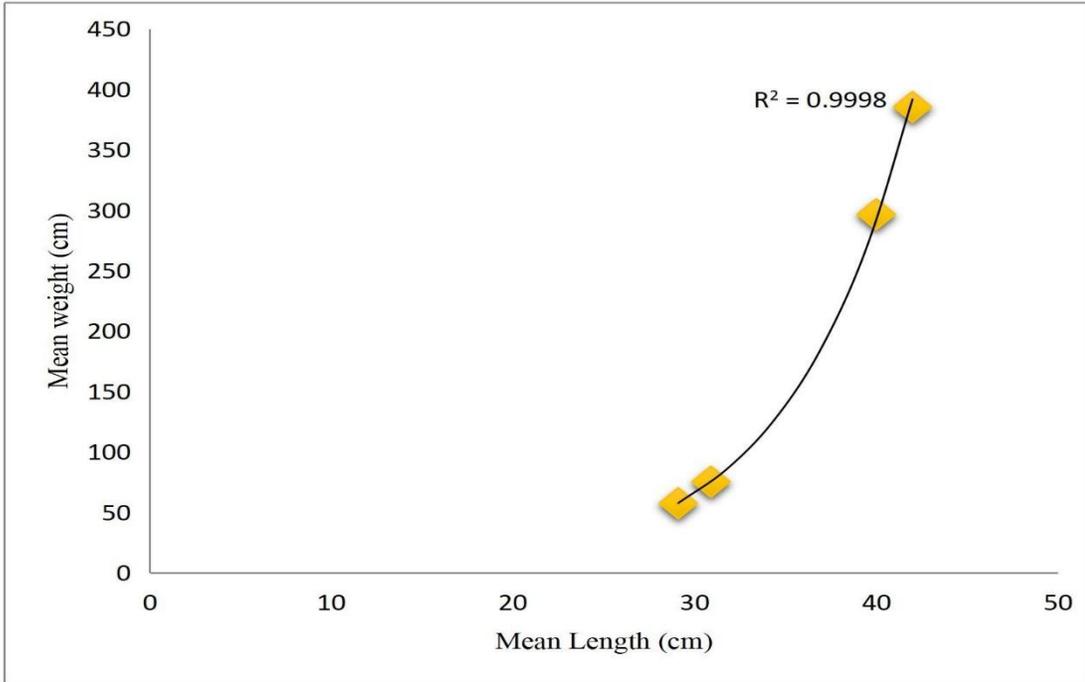
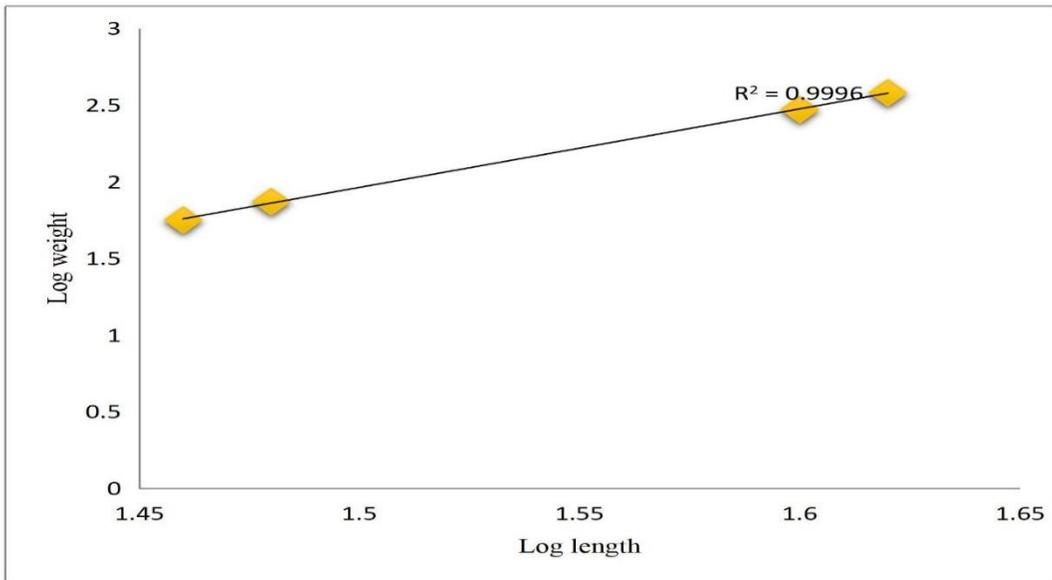


Figure 1 Showed mean length verses mean weight of male *Mastacembelus armatus* from district Badin, Sindh (Empirical relationship)

Figure 2 Showed log-log relationships of male *Mastacembelus armatus* from from district



Badin, Sindh

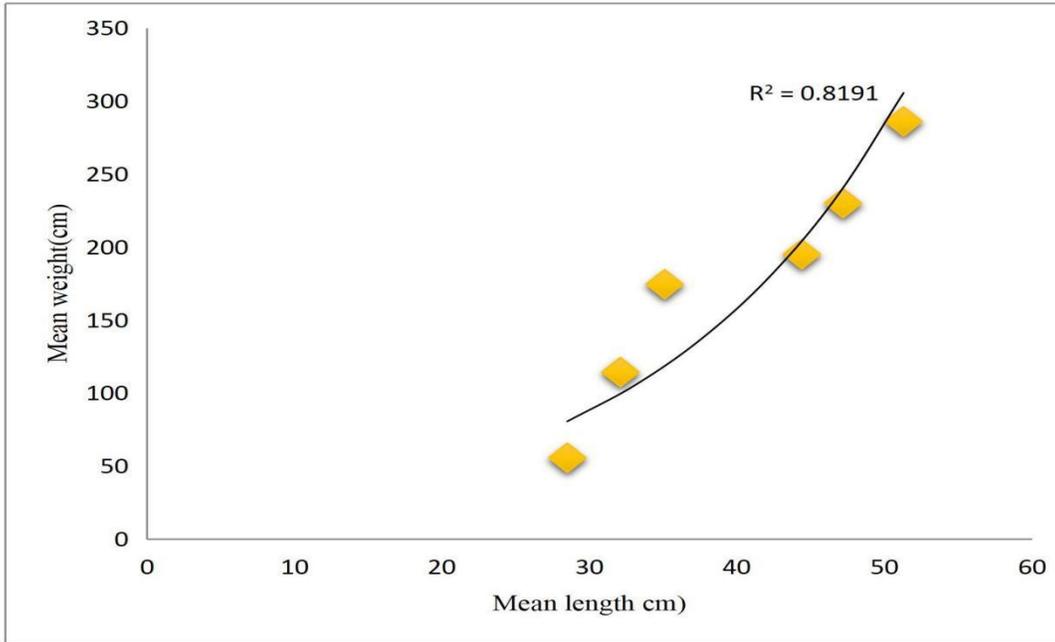


Figure 3 Showed mean length versus mean weight of female *Mastacembelus armatus* from district Badin, Sindh (Empirical relationship)

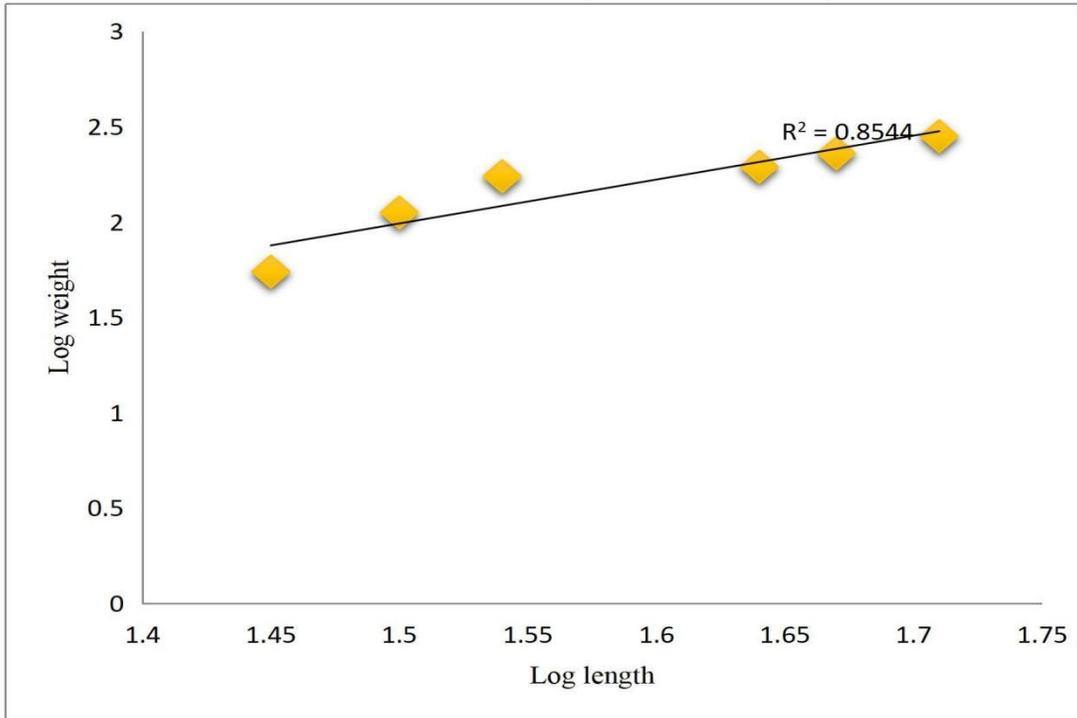


Figure 4 Showed log-log relationship of mean length versus weight of female *Mastacembelus armatus* from district Badin, Sindh

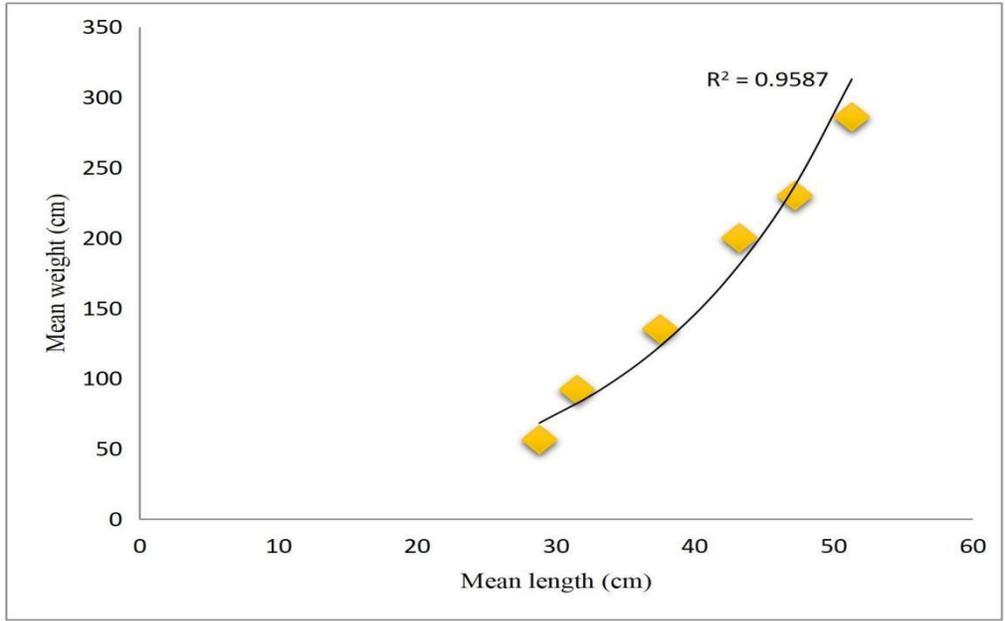


Figure 5
 Showed mean length verses mean weight of mutual sexes of *Mastacembelus armatus* from district Badin, Sindh (Empirical relationship)

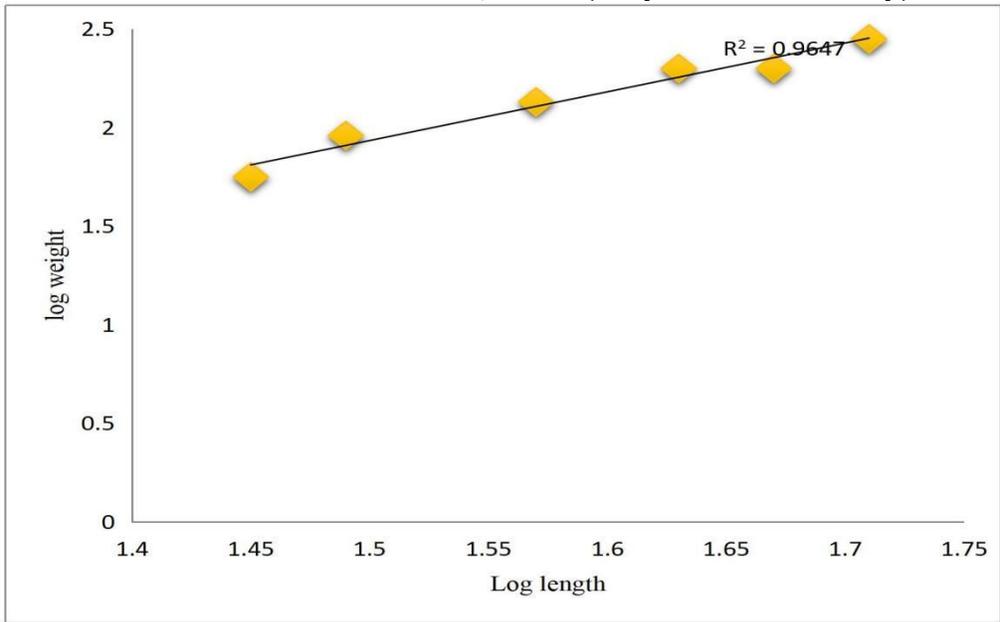


Figure 6
 Showed log-log relationship of mean length verses mean weight of *Mastacembelus armatus* from district Badin, Sindh.

DISCUSSION

During the present investigation, the coefficients of correlation for *Mastacembelus armatus* were calculated by the method of [8], with fish lengths ranging from 28.5 to 51.3 cm. The obtained equations were $\text{Log } W = -3.20 + 3.10$ (male), $\text{Log } W = -3.26 + 3.21$ (female), and $\text{Log } W = -3.0 + 3.15$ (combined). These results indicate a strong correlation between length and weight, showing that the species exhibits a positive allometric growth pattern. Similar studies on length-weight relationships have been reported by numerous researchers on various fish species across the world. Such analyses are essential for understanding the growth dynamics, population structure, and ecological health of aquatic environments. The findings of the present study align well with earlier observations, confirming the general growth trends in freshwater fish species [9] in *Monopterus albus*, [10] in *Labeo calbasu* [11] *Tilapia niloticus*, [12] reported LWR in fish from Zhob River Balochistan, [13] in *Pangasius sp.* [14] fish from Keenjhar lake and [15], in *Lab rohita* from Dalel Dero, Sakrand from. They also computed LWR analysis in diverse fish species and found positive allometric type of growth and their regression values of $b = 3$ in all cases. Their observation is similar with the present study.

CONCLUSION

It was concluded from the length-weight relationship studies that *Mastacembelus armatus* from District Badin, Sindh, was found to be in a healthy physiological condition. The species exhibited a strong and consistent correlation between length and weight parameters. The analysis revealed a positive allometric growth pattern, indicating faster weight gain relative to body length. Such growth behavior reflects favorable environmental conditions and adequate food availability. Both male and female specimens showed similar growth tendencies across the population. Overall, *Mastacembelus armatus* from this region demonstrates a stable and healthy growth performance.

ACKNOWLEDGEMENTS

This research was supported by Prof. Dr. Naeem Tariq Narejo from University of Sindh.

CONFLICT OF INTEREST

Authors have no conflict of interest

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