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Morphometry and length-weight relationship of sucker head, *Garra gotyla gotyla* (Gray, 1830) in hill streams of Kashmir

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Abstract
Garra gotyla gotyla (Sucker head) belongs to endemic icthyofauna of hill streams of Kashmir. 46 specimens of this species were collected from preselected hill streams of Kashmir March 2014 to March 2015 by electro fishing and drag netting. The specimens ranged in size from 10-24 cm in total length. The regression equation for LWR was estimated as Log Wt = 2.869Log L – 1.878. The results indicated that populations of *G. gotyla gotyla* in hill streams of Kashmir followed an isometric like growth pattern with 'b' values close to cubic law.

Keywords: *Garra gotyla gotyla*, Hill streams, Kashmir, Morphometry, length weight relationship.

1. Introduction
Morphometric and meristic study are efficient tools for measuring discreteness of the same species [1]. Indeed, a mathematical data of length-weight relationship gained from investigation of different sexes and sizes from a specific area is very beneficial tool for research of biology, physiology, ecology, stock assessment, health management and population dynamics [2].
Length and weight data are very useful and standard information and output of fish sampling programs [3]. Such data are essential for a number of studies, for example growth estimation rates, age structure and other aspects of fish population dynamics. Study of the size structure (length frequency) in riverine fish reveals many ecological and life-history of fish species. Length weight relationship complements in establishing the production and biomass estimations of fish species. The size structure of a fish population at any time can be considered a 'snapshot' that reflects the interactions of the dynamic rates of recruitment, growth and mortality [4].
This paper presents the morphometric characteristics and length weight relationship of sucker head, *Garra gotyla gotyla* (Grey, 1830), a commonly found fish of Kashmir hill streams. This fish is reported from Afghanistan, Pakistan, India, Nepal, Bangladesh, Bhutan and Burma. It is found in streams and lakes of the Himalaya and is a valued food fish in some specific hilly regions of Kashmir valley. The importance of fish has been mentioned as minor commercial [5].

2. Materials and methods
The samples were collected from 8 hill streams in Kashmir. The main objective of area selection was based on the importance of fish as food and also on the magnitude of occurrence. The streams flowing along the hilly areas of Ganderbal, Bandipora and Baramulla districts were studied. The present study provides the baseline information of the growth of species in these streams.
Fish sampling was done using electro fishing gear and by the application of Dip net and small Drag nets. Electrofishing method followed was simple but standard wading type with a person carrying a backpack electro-fishing unit. He was assisted by 2-4 persons, each carrying long dip nets for collection of electrocuted fish and other person carrying a bucket to empty the nets. For safety purpose, long insulated boots were worn by all the persons involved in fishing.
During the study, a total of 46 fish specimens of *Garra gotyla* of different age groups and size were studied for morphometric characters and length weight relationship.

Fresh Fish samples were transferred to the laboratory, where all morphometric and meristic characteristics were measured according to Ali and McNoon [6]. The Morphometric characters of specimens were measured with a Varnier caliper up to the nearest 0.1 cm and weighted with a sensitive electrical analytical up to the nearest 0.01 g (AND, FX-100). Sex of the specimens was recorded by observation and examination of gonad tissue either with eye or with the aid of a binocular. The length-weight relation in both sexes were provided by exponential fitting as per the formula $W= aL^b$ [7]. The weight method was used to analyze the stomach contents [8]. The length of gut was measured with the accuracy of 0.5 cm in order to obtain the Relative Length of Gut (RLG) and the same value was recorded. The Relative Length of Gut (RLG) was calculated based on the methods explained by Al-hussaini [9].

3. Results and Discussion

In this study, morphometric and meristic characteristics were measured in total of 46 samples of *Garra gotyla gotyla* ranging from 10.8-24 cm length and 17.3-800 g body weight. All data of Morphometric and meristic factors are listed in Table 1 and 2, respectively.

Table 1: Morphometric measurement of the *Garra gotyla gotyla* specimens (n= 46), captured from different Hill streams of Kashmir

Measurement (cm)	Min	Max	Mean±SD	TL (%) / Mean
Total Length (TL)	10.80	24	14.90±3.24	-
Standard length (SL)	9.1	19.5	12±2.54	80.53%
Head length (HL)	2.1	4.5	2.82±0.53	18.93%
Pre-pelvic length (PpL)	4.9	9.1	6.18±1.15	41.48%
Pre-anal length (paL)	6.7	14	9.06±1.83	60.81%
Pre-dorsal length (PdL)	2.3	8.5	5.13±1.37	34.43%
Snout length (SL)	0.8	1.9	1.18±0.27	7.92%
Eye diameter (ED)	0.3	0.7	0.44±0.11	2.95%
Inter-Orbit length (IOL)	0.8	2.3	1.21±0.37	8.12%
Caudal depth (CD)	1.1	2.5	1.49±0.37	10.00%
Body depth (BD)	2.1	5	3.05±0.71	20.47%
Anal fin length (AFL)	1.1	3.5	1.80±0.61	12.08%
Gut length (GL)	60	136	82.55±17.70	554.02%

As in table 1: measured factors, the maximum value recorded for intestinal length which alters between 60 to 136 cm and the minimum value recorded for Eye diameter which alters from 0.3 to 0.7 cm. This species is characterized by two pairs of barbells which are thick and short. No scales are present on the abdomen. Mouth has got an adhesive sucker at the posterior side. The LWR was subsequently determined using the equation $W = aL^b$ [10] and logarithmically transformed into log W = log a + b log L where W is the weight of the fish in gram and L is the total length of the fish measured in millimeter. The parameters 'a' (proportionality constant) and 'b' (exponent) of the LWR were estimated by least square regression [11]. The LWR in the form of a regression equation was estimated as Log Wt = 2.869Log L – 1.878. The statistical analysis shows that the value of b (2.9869) was not significantly different from the cubic value as expected by isometry.

Exponent of the arithmetic form and the slope of the regression line in the logarithmic form, 'b' is the most important parameter in a LWR. If 'b = 3', the small specimens in samples under consideration have the same form and condition as large specimens. If 'b > 3', then large specimens have increased in height or width more than in length, either as the result of a notable ontogenetic change in body shape with size, which is rare, or because most large specimens in the sample were thicker than small specimens, which is common. Conversely, if 'b < 3', then large specimens have changed their body shape to become more elongated or small specimens were in better nutritional condition at the time of sampling [12]. Differences in 'b' values and its variations from the ideal '3' can also arise due to variations in habitat, gonadal maturity and preservation techniques among others [13, 14]. Recent evidence also indicates that LWR is also subjected to evolutionary selection [15]. In the present study, b value of Garra gotyla gotyla was lower than 3. The reason may be the high energy consumption in high altitude cascade and rapid microhabitats. A significant deviation from the cube law has been earlier reported in *G. gotyla stenorhynchus*. However, the authors did not provide any information on the 'b' value, and also as to from where the samples were collected, thereby making it impossible to make a detailed comparison. The same authors also reported that *G. surendranathanii* also showed deviation from the cube law (without mentioning the 'b' value), and *G. periyarensis*, in which the 'b' value (value not mentioned) did not significantly deviate from the ideal value of '3' [16].

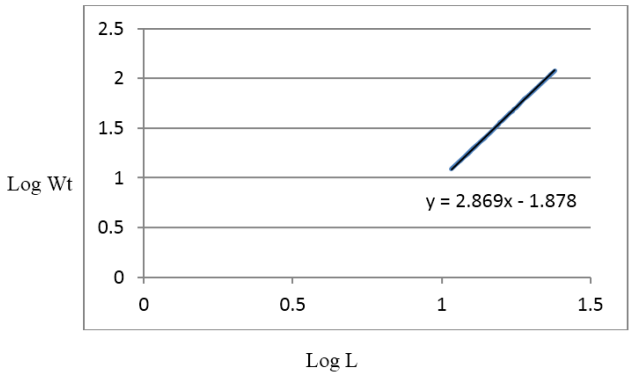

Fig 1: Length weight relationship of *Garra gotyla gotyla* from Kashmir valley.

4. References

1. Naeem M, Salam A. Morphometric study of fresh water bighead carp *Aristichthys nobilis* from Pakistan in relation to body size. Pakistan J Biol Sci. 2005; 8(5):759-762.
2. Le Cren ED. Length-weight relationship and seasonal cycle in gonad weight and condition in perch (*Perca fluvitialis*). J Anim Ecol 1951; 20:201-209.

3. Morato T, Afonso P, Lourhino P. Length-weight relationships for 21 coastal fish species of the Azores, northeastern Atlantic. Fisheries Research. 2001; 50(3):297-302.
4. Neumann RM, Allen MS. Analysis and interpretation of freshwater fisheries data. Department of Natural Resources Management and Engineering, University of Connecticut, 2001.
5. Talwar PK, Jhingran AG. Inland fishes of India and adjacent countries, Oxford and IBH Publishing Company Pvt. Ltd., New Delhi, 1991, 1-2.
6. Ali AM, McNoon AH. Additions to benthopelagic fish fauna of the Aden Gulf-Arabian Sea (Actinopterygii: Bramidae and Sternoptychidae). J Fish Aqua Sci. 2010; 5(1):23-32.
7. Gharaei A, Rahdari A, Ghaffari M. *Schizothorax zarudnyi* as a potential species for aquaculture. Global conference on aquaculture Phuket, Thailand, 2010, 9-10.
8. Angelescu V, Gneri FS, Nani A. La merluza del mar argentino (biologia e taxonomia). Secr Mar Serv Hidrog Nav Publico. 1958; 1004:1-224.
9. Al-hussaini AH. Functional morphology of the alimentary tract of some fishes in relation to their feeding habits. Part I Quart. J Micro Sci. 1940; 90:109-140.
10. Pauly D. Fish Population Dynamics in Tropical Waters: A Manual for Use with Programmable Calculator. ICLARM Studies and Reviews, Manila, Philippines. 1984; 8:325.
11. Zar JH. Biostatistical Analysis. Fourth edition. Pearson Education, India, 1999, 929.
12. Froese R. Cube law, condition factor and weight–length relationships: history, meta-analysis and recommendations. Journal of Applied Ichthyology. 2006; 22:241-253.
13. Tesch FW. Age and growth, In: Ricker, W.E. (ed.). Methods for Assessment of Fish Production in Fresh Waters. Blackwell Scientific Publications, Oxford, 1971, 98-130.
14. Wooton RJ. Ecology of Teleost Fishes. Chapman and Hall, London, 1990, 404.
15. Kharat SS, Khillare YK, Dahanukar N. Allometric scaling in growth and reproduction of a freshwater loach *Nemacheilus mooreh* (Sykes, 1839). Electronic Journal of Ichthyology. 2008; 4(1):8-17.
16. Kurup BM, Radhakrishnan KV, Euphrasia J. Length weight relationship of some of the endangered and critically endangered freshwater fihes of Kerala part of the Western Ghats. In: Life History Traits of Freshwater Fish Population for Its Utilization in Conservation. National Bureau of Fish Genetic Resources (NBGFR)-National Agricultural Technology Program (NATP) Publication No 4. Lucknow, India, 2002; AA2:1-4.