Egyptian Journal of Aquatic Biology & Fisheries
Zoology Department, Faculty of Science,
Ain Shams University, Cairo, Egypt.
ISSN 1110 –6131
Vol. 26(4): 969– 979 (2022)
www.ejabf.journals.ekb.eg

Some Morphometric Relationship Traits of *Pangasius pangasius* from Multan, Pakistan

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ARTICLE INFO

Article History:
Received: June 23, 2022
Accepted: July17, 2022
Online:Aug. 19, 2022

Keywords:
Morphometric characters,
Length-weight relationship,
Condition factor,
Pangasius pangasius

AABSTRACT

Pangasius pangasius is a yellow tail catfish belonging to the family Pangasiidae which is widely distributed in Bangladesh, Java, Myanmar, India, Vietnam, Thailand, and Pakistan. This species is ideal for human consumption due to its good taste and tender flesh. In the current study, 77 samples of *P.pangasius* of different body sizes, with ranges from 10 to 19cm were collected from Ada Band Bosan Multan Punjab, Pakistan. Samples were used to examine the length-weight relationship among them. To address the parameters, condition factor, and their relations with respect to different morphometric characters such as total length (TL), standard length (SL), head length (HL), body girth (BG), body depth (BD), fork length (FL), dorsal fin length (DFL), dorsal fin base (DFB), pelvic fin length (PvFL), pelvic fin base (PvFB), pectoral fin length (PtFL), pectoral fin base (PtFB), anal fin length (AFL), anal fin base (AFB), caudal fin length (CFL) and eye diameter (ED) were determined. Results showed an extremely significant correlation amongst those parameters, regarding the increase in body weight and total length. Moreover, the 'b' value recorded for the coefficient of regression was 3.12, indicating a positive allometric growth in fish. The present study aimed to sum up the available information on different aspects of *P. pangasius* fish of different variants, which would improve body weight for commercial growth and fish breeding.

INTRODUCTION

The study of variations in shape and size of organisms is known as morphometry **(Webster, 2006)**. Fish total length and body weight are two important experimental variables used in population's estimation and often in stock assessment investigations (**Jellyman *et al*., 2013)**. Yellow tail catfish, often known as *Pangasius*, is a popular freshwater game and food fish **(Talwar & Jhingram, 1991)**. Young individuals are discovered in the high estuaries (freshwater tidal zone); they make a transition to brackish water as adults and sub-adults, they are found at rivers' mouths and inshore zone **(Rainboth, 1996)**. *Pangasius* (catfish) is a member of the family Pangasiidae widely distributed throughout the Mekong basin in south-east Asia. **Guimares *et al*. (2015)** reported that, various sub-species belong to this species; namely, *P. hypophthalmus*, sutchi, striped or tra catfish). There are common ways to determine morphometric measures, including the percentage of the total length, fork and standard length, body weight, and condition factor **(Naeem *et al*., 2010, 2011)**. The condition in which W = aLb; where, "a" stands for intercept and "b" for slope of the log-transformed relation demonstrates that the weight (W) of fishes is exponentially increasing with their length (L) **(Le Cren, 1951; Froese, 2006)**.When analyzing the biomass using length data and stock assessment model, the relationship of length-weight can help with the variety of growth in weight and length equations **(Moutopoulos & Stergiou, 2002)**. Numerous physiological and morphological characteristics (including length, growth rates, age structures and other processes of population dynamics in fish) are estimated using these correlations, which are regarded as essential **(Kolher*et al*., 1995)**. Additionally, to describe the "condition" of each individual fish, condition factor (K) is determined using the connection between a fish's length and weight **(Froese, 2006)**. Different values of "K" reflect the accessibility of food sources, a sex and age, their level of sexual maturation, and their surroundings **(Gomiero & Braga, 2005)**. The current study focused to estimate the several external morphometric relationships of *Pangasius pangasius* from the culture system of Ada Ban Bosan Multan, Pakistan.

MATERIALS AND METHODS

A number of 77 *Pangasius pangasius* specimens were randomly collected usingwith the fish ponds' net located near Ada Band Bosan Multan, Punjab, Pakistan. Fish specimens were transported to the Fisheries Research Lab., Bahaudin Zakariya University, Multan. The morphometric parameters showed differences in length and weight. Fish measurement includes the lengths of fish body and the weight of different parts of their anatomy. Each fish sample was weighed using an electric balance to the nearest 0.01g. The external morphometry was assessed as rom the snout to the longest portion of the caudal blades, and their total length was measured. Using a measuring board, the forked length was measured from the snout to the end of the bifurcation, which is similar to the way the total length is measured. The measurement of a fish's standard length is the distance between its caudal blade and snout inception. The distance between the margins of the cartilaginous eyeball over the cornea was used to determine eye diameter. The head length is measured from the end of the opercular bone to the nostril of the nose. The length of the longest fin ray is known as the pectoral fin length.The area of the body that is the most swollen was measured with the use of a measuring scale. The distance between the anterior point of interaction with the body and the blade's end is known as the pelvic fin length. The greatest dorsal fin's length is referred to as the dorsal fin. The length of the longest anal fin is known as the anal fin. The caudal fin was measured from the base of the caudal blade to the length of the fish caudal balance. Microsoft Excel was used to conduct statistical studies using regression analysis.

The length-weight relation is in an exponential form as described by the following formula:

$$W=aL^b$$

While, the equation in the form of a log is as follows:

$$LogW=\log a \pm b \log L$$

Fulton's condition factor (K) was determined using the following formula:

$$K = 100\times W/L^3$$

On an electronic scale or a modern digital balance with a resolution of less than 0.01g, all fish samples were weighed. Fish samples were dried and their bodies were completely free of dirt before calculating the wet body weight.

RESULTS

A total of 77 samples of *P.pangasius* were collected from Ada Band Boson, Multan Punjab, Pakistan. The wet body weight and total body length ranged from 7 to 65g and 10 to 19cm, respectively. The mean and standard deviation was 22.93 ± 11.22 for weight, while for the total length, the value recorded was14.02 ± 2.09. Those values for different morphometric variables concerning *P. pangasius* are presented in Table (1).

Table 1. Various external morphometric parameters of *P.pangasius*(n = 77)

Morphometric parameter	Mean ± S.E	Range
Body Weight (BW)	22.93 ± 11.22	7- 65
Total length (TL)	14.02 ± 2.09	10-19
Condition Factor (K)	0.77 ± 0.08	0.53-1.07
Fork Length (FL)	12.30 ± 1.70	8.6-16.5
Standard length (SL)	11.60± 1.68	8.1-16
Head length (HL)	2.71 ± 0.46	1.8-4
Body depth (BD)	2.87± 0.68	1.8-4.6
Body girth (BG)	6.78± 1.34	4.5-9.8
Dorsal fin length (DFL)	2.07± 0.36	1.4-2.9
Dorsal fin base (DFB)	0.70± 0.19	0.3-1.6
Pectoral fin length (PtFL)	1.81± 0.33	1.3-2.7
Pectoral fin base (PtFB)	0.51± 0.16	0.3-1.6
Pelvic fin length (PvFL)	1.34 ± 0.27	1-1.9
Pelvic fin Base (PvFB)	0.51 ± 0.11	0.3-0.8
Anal fin length (AFL)	1.35± 0.25	0.5-1.9
Anal fin base (AFB)	3.52 ± 0.52	2.4-4.9
Caudal fin length (CFL)	2.51 ± 0.45	1.7-3.5
Eye diameter (ED)	0.46 ± 0.09	0.3-0.7

The relation of the body weight with their different morphometric parts revealed that all the parameters increased with the increase in the wet body weight. The relationship among variables showed highly significant positive correlations between the wet body weight and the length of all the external morphometric parts (Table 2). Given that all the b values are shown in Table (3) and Fig. (1), all studied parameters based on external morphometric recorded a highly significant correlation with the wet weight of the body. The values of regression coefficient ‘r’ are shown in Tables (4, 5).

Notably, the relation between the total body length and different body variables displayed a highly significant positive correlation. Moreover, all those factors of different body variables increased with the increase in the total body length, showing a positive relationship trend. While, the log total length with external morphometric study indicated a positive trend (Table 2). The analysis of regression between the wet body weight and other different morphometric body parameters increased with the increase in body weight, showing a positive correlation with the body weight. In log analysis of body weight with different body parameters, all showed a positive correlation as shown in Tables (4, 5).

Length-weight relationship is expressed as: **Log W = 2.25 + 3.12 log TL** (r=0.974) (Table 3). The regression analysis between weight and total length revealed a highly significant correlation ($P < 0.001$), with log data value of 0.948. The b value for the coefficient of regression was 3.12, which indicates an allometric relation much closed to the isometric value. The measurement of the relation between the total length and wet body weight was linear with a highly significant correlation (Table 3). Growth parameters, mostly length-weight was found to be allometric in *P.pangasius*. Moreover, a highly significant correlation ($P<0.01$) was noticed in the relation between total length with head length, standard length, body girth, head width, body depth, eye diameter, pelvis, anal, dorsal, caudal, and pectoral fin length along with caudal fin width.

Table 2. Regression and statistical parameter of total length with different morphometric parameters for *P. pangasius*

Correlation coefficient	Parameter relationship		95% CI of ‘a’	95% CI of ‘b’	R	r^2
	a	B				
W = a + bTL	-47.3199	5.01031	-53.4501,41.1896	4.5779, 5.4427	0.936264	0.876591
K = a + bTL	0.653780389	0.008381993	0.5184, 0.7892	0.0012,0.0179	0.197833475	0.039138084
FL = a + bTL	1.245827029	0.788896285	0.6011; 1.8905	0.7434, 0.8344	0.970003205	0.940906219
SL = a + bTL	0.493147198	0.792467969	0.0942, 0.8921	0.7643, 0.8206	0.988292767	0.976722594
HL = a + bTL	-0.110391553	0.201444984	-0.4174, 0.1966	0.1798, 0.2231	0.905951545	0.820748201
BD = a + bTL	-0.935533108	0.271682921	-1.5398, -0.3312	0.2291, 0.3143	0.826115952	0.682467567
BG = a + bTL	-1.380980599	0.582324262	-2.2469, -0.5151	0.5212, 0.64341	0.909861892	0.827848663

DFL = a + bTL	-0.183247222	0.16070208	-0.4049, 0.0384	0.1451, 0.1763	0.921003201	0.848246896
DFB = a + bTL	-0.3020053	0.071551735	-0.5036, -0.1004	0.0573, 0.0858	0.756720041	0.572625221
PtFL = a + bTL	-0.073950398	0.134754266	-0.3620, 0.2141	0.1144, 0.1551	0.836356434	0.699492085
PtFB = a + bTL	0.003485353	0.036243056	-0.2235, 0.2305	0.0202, 0.0523	0.461835379	0.213291917
PeFL= a + bTL	0.024929902	0.094452531	-0.2609, 0.3107	0.0743, 0.1146	0.733013234	0.537308401
PeFB= a + bTL	-0.304917779	0.03042676	-0.3935, -0.2164	0.0242, 0.0367	0.746152424	0.556743439
AFL= a + bTL	0.326810192	0.073201459	0.0029, 0.65079	0.0504, 0.0961	0.593239502	0.351933107
AFB= a + bTL	0.443304675	0.219473502	0.0446, 0.8420	0.1914, 0.2476	0.873599963	0.763176895
CFW= a + bTL	-0.14310813	0.189792837	-0.4752, 0.1890	0.1664, 0.2132	0.881153396	0.776431308
ED= a + bTL	-0.025349362	0.034872558	-0.1249, 0.0742	0.0279, 0.0419	0.752502302	0.566259715

Table 3. Descriptive regression and statistical parameter of log total length with different morphometric parameters for *P.pangasius*

Correlation coefficient	**Parameter relationship**		**95% CI of ‘a’**	**95% CI Of ‘b‘**	**R**	**r^2**
	a	**B**				
LogW = a +bLog TL	-2.254081003	3.121338215	-2.4445,-2.0636	2.9548,3.2878	0.9741487	0.9489657
LogK = a + bLog TL	-0.2540810	0.1213382	-0.4445,0.0636	-0.0452,0.2878	0.165323074	0.027331719
LogFL = a + bLog TL	0.0727678	0.8873485	0.0134, 0.1321	0.8354, 0.9393	0.9691502	0.9392523
LogSL = a+ bLog TL	-0.027915152	0.9527881	-0.0662,0.0104	0.9193,0.9862	0.988549223	0.977229566
LogHL = a+ bLog TL	-0.734109658	1.017151777	-0.8577,-0.6105	0.9091,1.1252	0.907891509	0.824266992
LogBD = a+ bLog TL	-1.019107215	1.283655989	-1.2317,-0.8065	1.0978,1.4696	0.84624223	0.716125912
LogBG = a+ bLog TL	-0.538818613	1.192670632	-0.6740,-0.4036	1.0745,1.3109	0.91837438	0.843411501
LogDFL=a+ bLog TL	-0.9037308	1.062336294	-1.0214,-0.7861	0.9595,1.1652	0.921656638	0.849450958
LogDFB = a + bLog TL	-1.658512345	1.303939669	-1.9584,-1.3586	1.0417,1.5661	0.752886297	0.566837777
LogPtFL = a + bLog TL	-0.870913513	0.983387895	-1.0359,-0.7059	0.8391,1.12766	0.843122704	0.710855895
LogPtFB = a + bLog TL	-1.388455761	0.947660131	-1.7395,-1.0375	0.6408,1.2546	0.579095521	0.335351622
LogPeFL= a + bLog TL	-0.947073637	0.936029843	-1.1769,-0.7173	0.7351,1.1369	0.731162071	0.534597974
LogPeFB= a + bLog TL	-1.421509846	0.982581569	-1.7442,-1.0988	0.7005,1.2647	0.625222575	0.390903268
LogAFL= a + bLog TL	-0.781718855	0.79205989	-1.0725,-0.4909	0.5378,1.0463	0.582509664	0.339317509
LogAFB=a+ bLog TL	-0.449100902	0.86775232	-0.5751,-0.3231	0.7576,0.9779	0.875479607	0.766464543
LogCFW=a+ bLog TL	-0.807007803	1.051819785	-0.9545, -0.6595	0.9229, 1.1808	0.88250361	0.778812622
LogED=a+ bLog TL	-1.522019649	1.0323725	-1.7568,-1.2873	0.8272,1.2376	0.756616778	0.572468949

Table 4. Descriptive regression and statistical parameter of body weight with different morphometric parameters for *Pangasius pangasius*

Correlation coefficient	Parameter relationship		95% CI of 'a'	95% CI Of 'b'	R	r^2
	a	b				
TL= a + bW	10.00941818	0.174957418	9.6243,10.3945	0.1599,0.1901	0.936264406	0.876591038
K = a + bw	-0.161312371	0.001996112	-0.1842, -0.1385	0.0011,0.0029	0.456914445	0.20877081
FL = a + bw	9.13926206	0.13815222	8.7677,9.5108	0.1236,0.1527	0.909028041	0.826331978
SL = a + bW	8.390234932	0.14017662	8.0797,8.7008	0.1280,0.1524	0.935503969	0.875167676
HL = a + bw	1.897457839	0.035614805	1.7719,2.0230	0.0307,0.0405	0.857127125	0.734666909
BD = a + bw	1.629713698	0.054253706	1.4604,1.7991	0.0476,0.0609	0.88282421	0.779378586
BG = a + bw	4.243386529	0.11079232	3.9792,4.5076	0.1004,0.1212	0.926374089	0.858168953
DFL = a + bW	1.437279158	0.027593151	1.3354,1.5392	0.0236,0.0316	0.846266388	0.716166799
DFB = a + bw	0.380607645	0.013982566	0.3172,0.44398	0.01150,0.0165	0.791349065	0.626233343
PtFL = a + bw	1.283493173	0.023199901	1.1709,1.39601	0.0188,0.0276	0.770550611	0.593748244
PtFB = a + bw	0.3757582	0.005926738	0.2971,0.4545	0.0028,0.0090	0.404151538	0.163338466
PeFL= a + bw	0.954800625	0.017202917	0.8560,1.0536	0.0133,0.02108	0.714441163	0.510426175
PeFB= a + bw	0.370028099	0.006346453	0.3222,0.4178	0.0045,0.00822	0.614556868	0.377680144
AFL= a + bw	1.089171472	0.011514041	0.9720,1.2064	0.0069, 0.0161	0.49934908	0.249349504
AFB= a + bw	2.592511296	0.040473743	2.4530,2.7321	0.0350,0.0460	0.862124596	0.743258819
CFW= a + bw	1.760700512	0.033027214	1.6257,1.8957	0.0277,0.0383	0.820558974	0.67331703
ED= a + bw	0.31175692	0.00662215	0.2790,0.3445	0.0053,0.0079	0.764696675	0.584761005

Table 5. Descriptive regression and statistical parameter of log body weight with different morphometric parameters for *Pangasius pangasius*

Correlation coefficient	Parameter relationship		95% CI of 'a'	95% CI of 'b'	R	r^2
	a	B				
LogTL = a + b LogW	0.743570906	0.304025282	0.7221,0.7651	0.2878,0.3202	0.974148722	0.948965732
LogK = a + b LogW	-0.230712717	0.087924153	-0.2953,-0.1661	0.0393,0.1366	0.383848303	0.14733952
LogFL = a + b LogW	0.731018083	0.270964434	0.7033,0.7587	0.2501,0.2918	0.948254151	0.899185935
LogSL = a + b LogW	0.676359517	0.292870768	0.6554, 0.6973	0.2771,0.3087	0.973629144	0.94795371
LogHL = a + b LogW	0.022183623	0.309263663	-0.0276,0.0720	0.2717,0.3468	0.884489441	0.782321571
LogBD = a + b LogW	-0.111623433	0.426145698	-0.1746,-0.0487	0.3787,0.4736	0.900160012	0.810288047
LogBG = a + b LogW	0.313237375	0.389150874	0.2787,0.3478	0.3631,0.4152	0.960136122	0.921861372
LogDFL = a + b LogW	-0.10980932	0.319924343	-0.1600,-0.0596	0.2821,0.3578	0.889344424	0.790933505
LogDFB = a + b LogW	-0.695751369	0.401629546	-0.8062,-0.5853	0.3184,0.4848	0.743041575	0.552110782
LogPtFL = a + b LogW	-0.132531279	0.293506414	-0.1983,-0.0668	0.2440,0.3430	0.806304505	0.650126955
LogPtFB = a + b LogW	-0.677485022	0.283289585	-0.8072,-0.5478	0.1855,0.3810	0.554681612	0.30767169
LogPeFL= a + b LogW	-0.261998636	0.292919862	-0.3450,-0.1791	0.2304,0.3554	0.733142412	0.537497796
LogPeFB= a + b LogW	-0.683439332	0.293041545	-0.8035,-0.5634	0.2026,0.3835	0.5974627	0.356961678
LogAFL= a + b LogW	-0.179643521	0.230789005	-0.2884,-0.0709	0.1489,0.3127	0.543845818	0.295768274
LogAFB= a + b LogW	0.186760058	0.270974647	0.1412,0.2323	0.2367,0.3053	0.875980573	0.767341965
LogCFW= a + b LogW	-0.023835858	0.318963511	-0.0823,0.0346	0.2749,0.3630	0.857495249	0.735298102
LogED= a + b LogW	-0.771951135	0.327282256	-0.8551,-0.6888	0.2646,0.3900	0.768559622	0.590683893

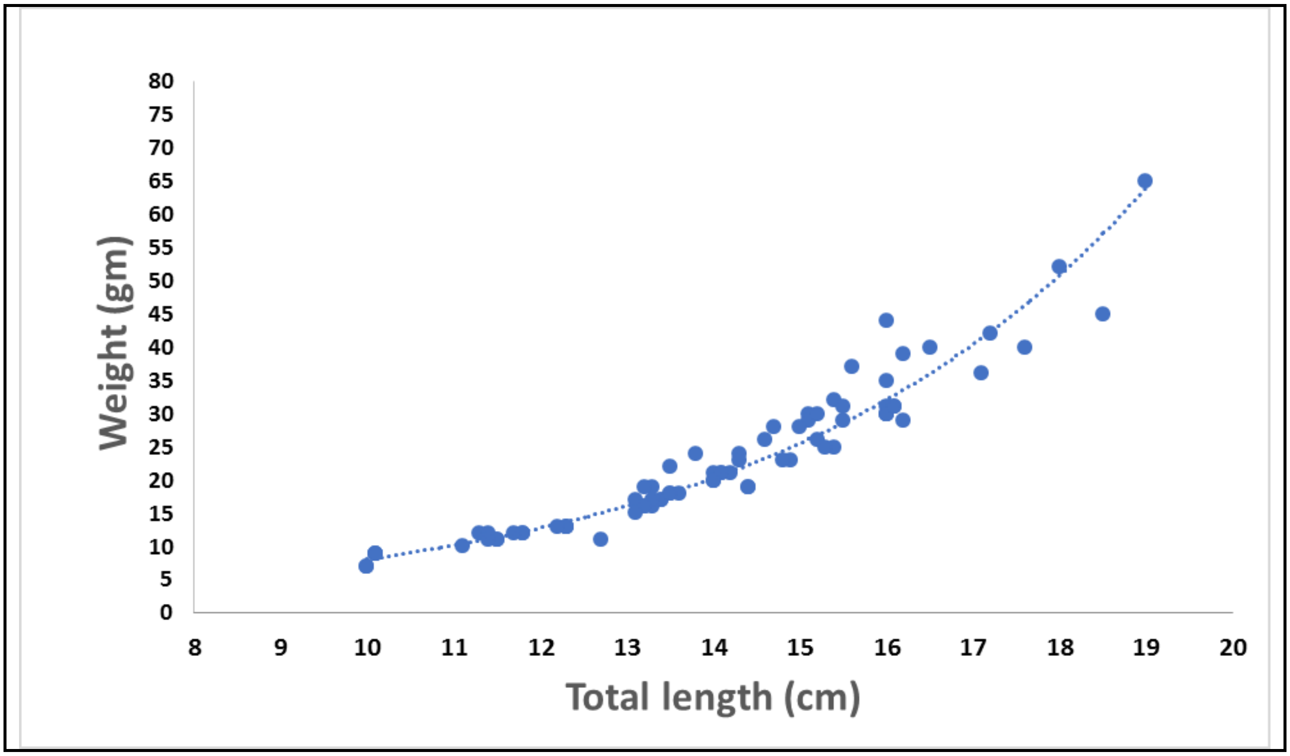

Fig.1. Analysis of correlation between fish body weight and total length

DISCUSSION

The perspective of this research was to determine the morphometric analysis in *Pangasius pangasius*. For a morphological research, exact length and weight measurements in fish are analyzed. Morphometry is significant because it can alter the biology of a species, hence it is widely used to determine animal growth patterns **(Miller, 1986)**.The relationship between length and weight and the condition factor is most important and essential for studying the population of fish **(Wetherley & Gill, 1987)**. In morphometric studies, the relationship of the total length of body and body weight is mutually coordinated **(Froese, 2006)**.

Some difficulties were faced in sampling the small- sized fish individuals and examining them for this research. The study of length and weight relationship demands the measurement of length and weight of the species under study. However, obstacles were found during the study of weight and length, including the reduction in weight due to loss of water from the surface of the fish body. To avoid this problem, either seventy percent alcohol is used or samples are carried to laboratory in water bags filled with oxygen to prevent dehydration **(Olentino *et al.*, 2021)**. There are hurdles in doing experimentation on the small- sized species used to study the length- weight reltionship.

Different variation in values were recorded in the range between 2.4 to 3.6 for the coefficient of allometry. The increase or decrease in the value of b has an effect on the length and weight of fish bodies. It can be understood by the fact that if the value of b is greater than 3 then there is sudden change in height but there is no change observed in parameter of length. But if the value of b is less than 3 then the fish body increase lengthwise. This all occurs in the fishes that are larger in size. When the value of b is equivalent to 3, the change in length of small fishes and large fishes are same. The fish species have different relationships between length and weight because of variety of different habitats, environment and time of growth**(Froese, 2006)**. Analysis of morphometric parameters through regression includes the values of average of a parameter with the standard deviation. Determination coefficient is more related to LWRs as compared to the relationship of condition factor with LWRs **(Naeem *et al*., 2012)**. The value of coefficient of regression (n) stays in the range between 2.4- 4.1 and for perfect body shape in fish it must be equals to three. When there are rise in the value of n rises up then it suggested that it has an impact on LWRs and LWRs are affected by sex condition of fish and the amount of food they receive**(Pervin and Mortuza, 2008)**. The values of parameters like a and b don't have the exact same values, rather they get a rise and fall in the digits because of the variety of the environment and the way of collecting samples **(Lubich *et al*., 2020)**. In present study 'b' value is found 3.12 which showed positive allometric relation.

The study of different kinds of fishes though they collected from natural water bodies or commercial water bodies depicts that commonly many fishes do not obey cube law the reason is that the shape of fish vary with respect to growth. When the growth of fish remain constant and it sustains same shape throughout its life span then growth of fish is Isometric and the "b" value will be 3.00. But if the value of "b" exceeds from 3 it depicts that fish is gaining more weight as it is growing **(Wooton, 1990)**.

Length weight relation (LWRs) are important component of fishbase**(Froese & Pauly, 1998)** and are valuable for fisheries study because it permit the alteration of growth-in-length calculations to growth-in-weight for usage in stock taxation copies, permit the estimation of mass of living organisms from length explanations, and permit the estimation of fish state, also valuable for the juxtaposition of some assured species in order to determine the difference between primery developmental stages to natural death of these species between different regions **(Froese and Pauly,1998)**.

Increase in mass in three dimensions and length increases in one, the cube rule states that if one unit of length is increased, three units of mass are increased. At any given age, the mass of a fish can be compared to the cube of length. As a result, the optimal b value for isometric mass increase with respect to length is 3. Fish growth is positive allometric when b is larger than 3 and significantly different from 3. It means that as time passes, the fish will become heavier in comparison to their length, implying that fish growth is not uniform in all dimensions. Once the worth of b is fewer than three, the fish will get lighter**(Jobling*et al*., 2002)**. As value of b higher than 3 showed more weight gain then length gain.

The 'b' value illustrated significant evidence of fish development ability to forecast the well-being condition of the fish. If the value of 'b' exponent is equivalent to 3 then growth is said to be isometric and length and weight is directly proportional to each other **(Santos *et al*., 2002)**. When value of b is greater than 3, there is positive correlation among weight and length and growth is said to be positive allometric, when value b<3 then there is negative correlation and length and weight are inversely proportional to each other means weight does not increase when there is increase in length and the growth is said to be negative allometric**(Jones *et al*., 1999)**.When comparing the temporal and spatial condition of fish, the value of b might be used.The fish's condition would also be determined by the environment, both lotic and lentic, polluted and non-polluted. In the lotic, fish are heavier, while in the lentic, they are lighter **(Mansor *et al*., 2010)**. **Beamish *et al*. (2010)** reported length weight relationship in 11 species of *Channastriata.* This specie showed positive allometric growth with 'b' value 3.44 which significantiy greater than the ideal value (b=3).**Khan *et al*.(2012)**reported lenghth weight relationship *H. fossilis* collected from the Ganga River of India. This specie show positive allometric growth with 'b' value 3.14 which is obviously greater than the ideal value (b=3). The correlation of total length with wet weight was highly significant with 'r' value 0.98.**Naeem *et al*.(2012)** reported length weight relationship in *Labeogonius* collected from Taunsa barrage, Punjab, Pakistan. This specie show appositive allometric growth with 'b' value 3.29 obviously higher than the ideal value (b=3) which suggest that *P.pangasius* become thicker for its length, as it grows in size.The investigation of Length-weight relationship depicts that bulkier fish of particular length is in improved form, showing conductive situation. So, when b= 3, condition factor remain stable. If weight increases more quickly than length, K value would rise with raise in measurement length **(Naeem and Salam, 2005)**. As it is in general agreement with reported studies.

CONCLUSION

The value of "b" (3.12) more than 3 that signifies that *Pangasiuspangasius* positive allometric growth collected from Ada Band Bosan, Multan, Pakistan. The study of morphometric characteristics to find out the length and length and length and weight relationship gives significant information to integrate appropriate requirements which are effective for farming of fish at big scale and it helps the fisheries department to conserve the fish species in future.

REFERENCES

Beamish, R.J.; Lange, K.L.; Riddell, B.E. and **Urawa, S. (eds) (2010)**. Climate impacts on Pacific salmon: Bibliography. N. Pac. Anadr. Fish Comm. Spec. Publ. **2**: 168 pp.

Froese, R. (2006). Cube law, condition factor and weight length relationship: history, meta-analysis and recommendations. *J. Appl. Ichthyol*., **22**: 241–253.

Gomiero, L.M. and **Braga, F.M.S. (2005).**The condition factor of fishes from two river basins in Sao Paulo Stae, Southeast of Brazil.Acta Scientiae Maringa,**27**:73-78.

Guimarães, C.F.M.; Mársico, E.T.; Monteiro, M.L.G.; Lemos, M.; Mano, S.B. and **Junior, C.A.C. (2015).** The chemical quality of frozen Vietnamese *Pangasiushypophthalmus*fillets. Food Sci. &Nutri., Published by Wiley Periodicals, Inc.,pp. 1-11.

Froese, R. and **Pauly, D.** (1998) FishBase 98: Concepts, design and data sources. International Center for Living Aquatic Resources Management, Manila.

Jellyman, P.G.; Booker, D.J.; Crow, S.K.; Bonnett,M.L. and **Jellyman, D.J.(2013).** Does one size fit all? An evaluation of length–weight relationships for New Zealand's freshwater fish species. N.Z. J. Mar. Freshwater Res., **47**(4): 450–468.

Jobling, S.; Beresford, N.; Nolan, M.; Rodgers-Gray, T.; Brighty, G.; Sumpter, J. and **Tyler, C. (2002).** Altered sexual maturation and gamete production in wild roach (*Rutilusrutilus*) living in rivers that receive treated sewage effluents. Biology of Reproduction,**66**: 272-281.

Jones, D.R.; Hannan, C.M.; Russel-Jones, G.J. and **Raison, R.L. (1999).**Selective B cell non-responsiveness in the gut of the rainbow trout (*Oncorhynchusmykiss*). Aquaculture,**172**: 29–39.

Khan, M.A.; Khan, S. and **Miyan, K. (2012).** Length–weight relationship of giant snakehead, *Channamarulius* and stinging catfish, *Heteropneustesfossilis* from the River Ganga, India. Journal of Applied Ichthyology, **28**: 154 – 155.

Kolher, N.; Casey, J. and **Turner, P. (1995).**Length-weight relationships for 13 species of sharks from the western North Atlantic.Fish.Bull.,**93**:412- 418.

Le-Cren, E.D. (1951). The Length-weight relationship and seasonal cycle in gonad-weight and condition in the perch (*Percafluviatilis*). J. Anim. Ecol.,**20**(2):201- 219.

Lubich, C.C.F.; Aguiar-Santos, J.; Freitas, C.E.C. and Siqueira-Souza, F.K. (2021). Length-weight relationship of 16 fish species from the Negro River basin (Amazonas state, Brazil). J. Appl. Ichthyol. **37**: 342– 346. https://doi.org/10.1111/jai.14112

Mansor, M.I.; CheSalmah, M.R.; Rosalina, R.; ShahrulAnuar, M.S. and **Amir Shah Ruddin, M.S. (2010).**Length-weight relationships of freshwater fish species in Kerian River Basin and Pedu Lake. Research Journal of Fisheries and Hydrobiology,**5**(1): 1-8.

Miller, P.J. (1986). Gobiidae. p. 1019-1085. In: P.J.P. Whitehead, M.-L. Bauchot, J.-C.Hureau, J. Nielsen and E. Tortonese (eds.) Fishes of the North-eastern Atlantic and the Mediterranean.Volume **3**. UNESCO, Paris.

Moutopoutos, D. K. and **Stergiou, K. I. (2002)**. Length-weight and length-length relationships of fish species from the Aegean Sea (Greece) J.Appl. Ichthyol.,**18**: 200-203.

Naeem, M. and **Salam, A. (2005).**Morphometric study of fresh water bighead carp,*Aristichthys nobilis* from Pakistan in relation to body size. Pakistan Journal of Biological Sciences, **8**: 759-762.

Naeem, M.; Salam, A.;Gillani, Q. and **Ishtiaq, A. (2010).** Length-weight relationships of *Notopterusnotopterus* and introduced *Oreochromis niloticus* from the Indus River, southern Punjab, Pak. J. Appl. Ichthyol., **26**:620.

Naeem, M.; Salam, A. and **Ishtiaq, A. (2011).**Length-weight relationships of wild and farmed *Tor putitora* from Pakistan. J. Appl. Ichthyol.,**27**(4):1133-1134

Naeem, M.; Zuberi, A.; Hasan, Z.; Salam,A.; Khalid, M.; Khan, M.J.; Ayaz, M. M.; Ashraf, M.; Nasir, M.F.; Rasool, S.A.; Aziz, M. and **Ishtiaq, A. (2012).**Length-weight and length-length relationships of freshwater wild catfish, *Mystus bleekeri* from NalaDaik, Sialkot, Pakistan. Afr. J. Biotechnol., **11**(50): 11168-11172.

Olentino, D.; Furtado, C.; Leal, M.and **Yamamoto, K. (2021).**Length-weight relationship of six small fish species from the Negro River basin in the Brazilian Amazon. Journal of Applied Ichthyology,**37**: 1-5.

Pervin, M.R. and **Mortuza,M.G. (2008).**Notes on length-weight relationship and condition factor of fresh water fish, *Labeoboga* (Hamilton) (Cypriniformes: Cyprinidae). Univ J ZoolRajshahi Univ.,**27**: 97-98.

Rainboth, W.J. (1996).Fishes of the Cambodian Mekong.FAO Species Identification Field Guide for Fishery Purposes. FAO, Rome, 265 pp.

Talwar, P.K. and **Jhingram, A.G. (1991).**Inland Fishes of India and Adjacent Countries.Vol. **1**.Oxford and IBH Publishing, New Delhi, India.

Weatherley, A.H. and **Gill, H.S. (1987).**The Biology of Fish Growth. Academic Press, London, 444 pp.

Webster, M. (2006). Introduction to Geometric Morphometrics.Department of the Geophysical Sciences, Univ. Chicago.Wootton RJ (1990). Ecology of Teleost fishes. Chapman and Hall, London. 118pp.

Wootton, R.J. (1990). Ecology of Teleost Fishes.First ed. Champman& Hall, London.