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COMPARATIVE STUDY ON HAEMATOLOGICAL PARAMETERS OF MUGIL CEPHALUS AND CATLA CATLA

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ABSTRACT

The aim of the study is to compare the haematological parameters of *Mugil cephalus* (Linnaeus ,1758) and *Catla catla* (Hamilton,1822). *Mugil cephalus* is a marine fish and *Catla catla* living in fresh water. The blood parameters RBC, WBC, Hb, haematocrit, MCV, MCH and MCHC are compared between the two species. Higher RBC, Haematocrit and MCV mean value were observed in *Mugil cephalus* shows the carrying capacity and the activeness is more in comparison with *Catla catla.* Higher WBC are found in *Catla catla* with respect to *Mugil cephalus.* Nearly same Hb are found in both the species. Higher MCH and MCHC are observed in *Catla catla* with respect to *Mugil cephalus*.

Keywords:- *Mugil cephalus* , *Catla catla* , Marine fish, Fresh water fish , Haematological parameters.

INTRODUCTION

Aquaculture is the important sector for food production worldwide. Aquaculture fulfills the food demand of growing population. Haematological analysis is an important tool used in aquaculture for determining of fish(Acharya et al.2014; Fazio et al.2016).Blood is essential and active constituent for metabolic processes and gaseous exchanges. Blood parameters mostly affected by fish species, age, sex and nutritional behavior (Acharya et al.2014;Blaxhall 1972; Chaudhuri et al. 1986; Hrubec et al.2001; Fazio et al.2016). Changes in environmental factors such as quality of water, oxygen availability, temperature, PH and salinity also causes variation in blood parameters (Fazio et al.2013; Ghanbari et al.2012; Parrino et al. 2018). Blood parameters such as TEC, WBC count, Hb,PCV/ haematocrit, MCH,MCV and MCHC are extensively used as indicators for physiological status, stress response and disease condition in fishes(Cataldi et al.1998; Belanger et al.2001). The assessment of fish relationship among species, evaluation of physiological status and adaptability to haematology relies on reference values in understanding phylogenetical habitat.

Mugil cephalus(Linnaeus 1758)(Osteichthyes:Mugilidae) commonly called grey mullet have been distributed world in marine and wide and inhabitates estuarine environment. Grey mullets have high tolerance of wide range of salinities(Cardona 2006; Capello et al.2016).The larvae and juvenile normally feed on zooplankton. Change in feeding behavior observed in adult fishes. Adult fishes feed mainly on algae, diatoms and detritus (Whitefield et al.2012).*Mugil cephalus* is an important source of aquaculture(Cardona 2006; Whitefield et al.2012). *Catla catla* or major Indian carp are distributed in India, Bangladesh, Myanmar,Nepal. *Catla catla* is an omnivorous fish and feeds mainly on zooplankton(Natarajan and Jhingran ,1961). It is non predatory and rich in protein and extensively used in aquaculture and popular fish among people.

MATERIALS AND METHODS

STUDY AREA AND SAMPLE COLLECTION

The study was carried out between November 2019- February 2020. Adult specimen of *M.cephalus* used in this research work were captured from Ambiki(20.14°N, 86.45°E) of Jagatsinghpur district. *C.catla* were collected live from commercial vendors of jaydev vihar fish market, Bhubaneswar. Total 10 individuals of each species were measured by measuring tape and weighed by digital weighing machine.

BLOOD SAMPLE COLLECTION

Blood samples were collected from caudal peduncle of fishes using 2.5 ml of plastic syringes and transferred into vials containing K3 EDTA. Within 2 hours of extraction blood samples were analysed.

HAEMATOLOGICAL ANALYSIS

Total erythrocyte count and total leucocyte count were determined by using Improved Neubaer´s chamber (Blaxxhall and Daisley 1973). Haemoglobin was estimated by Sahli´s acid haematin method (Sahli et al.1909). PCV or haematocrit were determined by the haematocrit method. The erythrocyte indices mean corpuscular volume(MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration were calculated (Seiverd).

STATISTICAL ANALYSIS

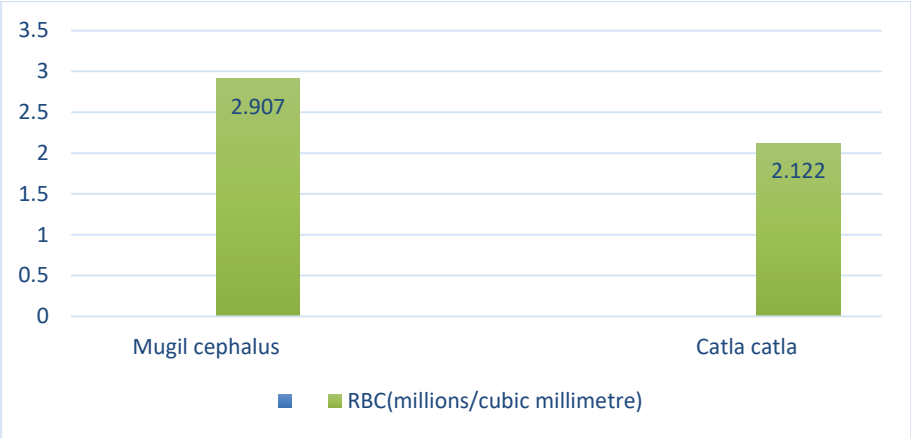
The data were analysed and expressed as mean± standard deviation (SD) by using Microsoft office excel 2007.

RESULT AND DISCUSSION

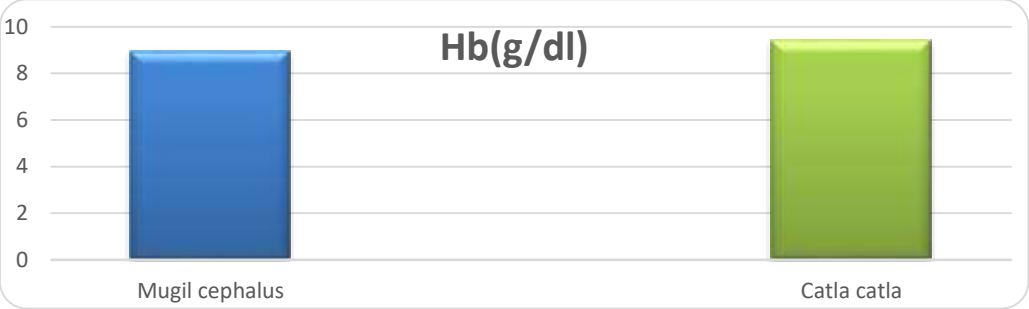
Habitat and environment where they live is important as they fully dependent upon it(Parrino et al., 2018; Acharya and Mohanty,2014). Haematological parameters act as biomarker of fish health status and helps to monitor conditions like habitat change, nutritional changes and environmental changes (Fazio et al.2012a,2012b,2012c,2013; Gabriel et al.2004). The values of blood parameters shown in the Table-1 shows significant difference between the two species. Higher value of RBC, haematocrit/PCV with higher MCV value were observed in *Mugil cephalus* as compared to *Catla catla.* Increased number of RBC may be due to habitat difference as the grey mullets living in higher saline condition and different environmental condition than the Indian major carp (Witeska ,2013; Parrino et al.,2018). The oxygen carrying capacity is also directly depend upon number of RBC (Acharya and Mohanty,2014).The grey mullets may have more oxygen carrying capacity than the Indian major carp. The study governed by Wilhelm et al.,1992 on marine fishes reported higher haematocrit, Hb and RBC value were found in more active species than less active species. Hb mean values were nearly same in both the fishes. WBCs act as defensive soldiers of fish immune system. Higher WBC level in species fights with infection more effectively than other fish species (Fazio et al.,2013). A study reported by Fazio et al.2013 of four Tyrrhenian fish species including *Mugil cephalus* shows inverse relationship between WBCs and RBCs. In this study Increase WBC level found in *Catla catla* with respect to *Mugil cephalus.* It shows inverse relationship of WBCs and RBCs. Recent study of haematology of *Mugil cephalus* and *Carassius auratus* by Parrino et al.2018 0bserved lower WBC in the mullets compared to the gold fish due to different feeding habits .Besides this, high salinity condition may responsible for lower WBC value in the grey mullets. This inverse relationship of salinity and WBCs were observed in the study of grey mullets collected from different habitat (Fazio et al. 2012). The findings of Kadeepan(2014) showed *C.catla* and *L.rohita* have highest WBC level among the other studied fresh water teleost and able to fight with infection than other studied species. *M.cephalus* showed higher MCV than *C.catla* due to the increased RBC and PCV as indirectly depends upon RBC and PCV. *C.catla* showed higher value of MCH and MCHC than *M.cephalus.* This comparative study reported the difference in blood parameters and able to set a reference value of blood parameters for this two species for further studies.

Table-1 :- Blood parameters of *M.cephalus* and *C.catla*

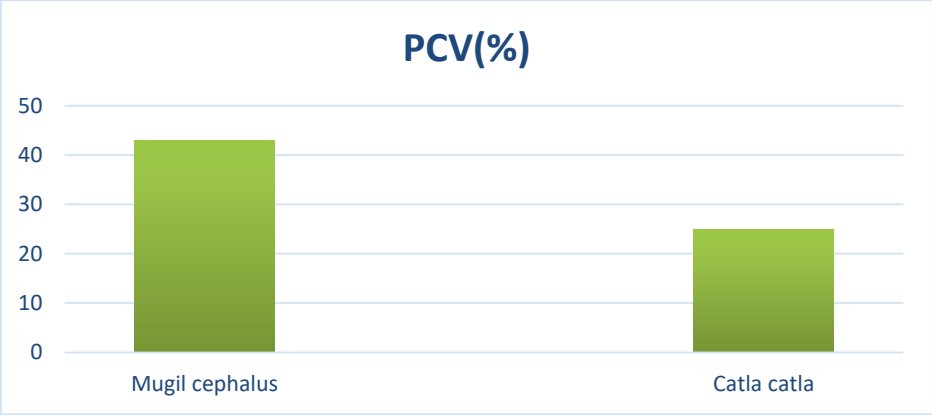
Blood parameters	*Mugil cephalus*	*Catla catla*
RBC(10^6/mm^3)	2.907±0.59	2.122±0.27
WBC(10^3/mm^3)	11.94±1.06	15.63±3.37
Hb(g/dl)	8.96±1.31	9.44±0.81
PCV(%)	42.9±10.84	24.8±4.74
MCV(fl)	148.04±22.65	116.07±10.296
MCH(pg)	31.48±3.96	44.84±3.53
MCHC(%)	21.69±3.77	39.12±6.15



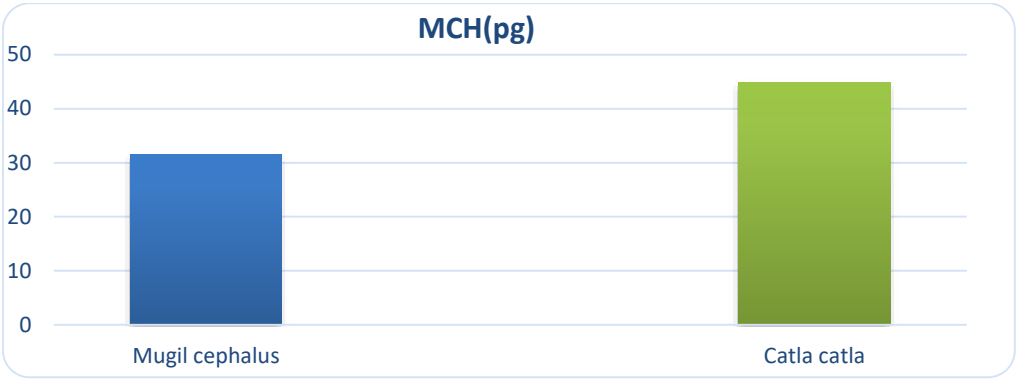
Graph.1-Comparision of RBC between *Mugil cephalus* and *Catla catla*



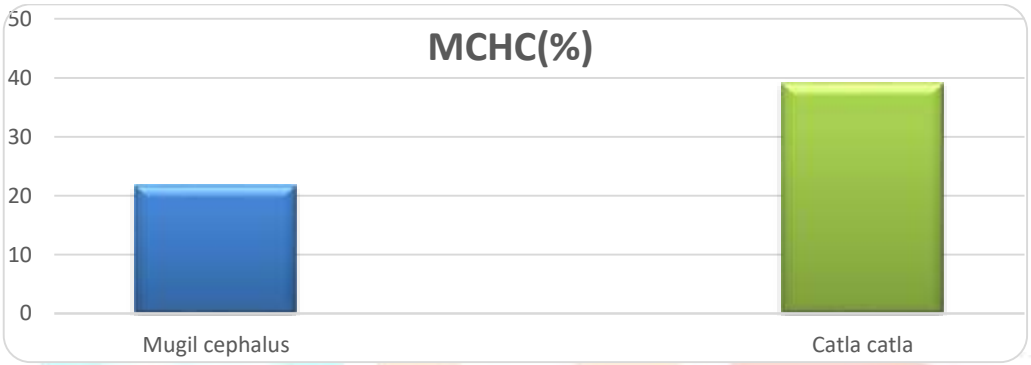
Graph.2- Comparision of haemoglibin content between *Mugil cephalus* and *Catla catla*



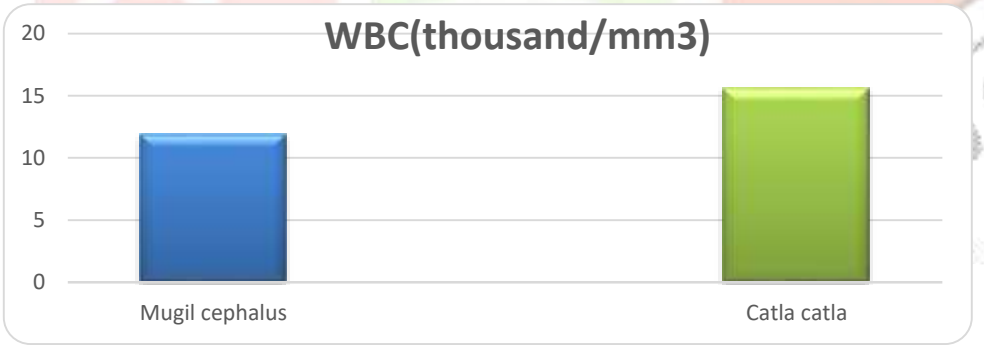
Graph.3- Comparision of PCV between *Mugil cephalus* and *Catla catla,*



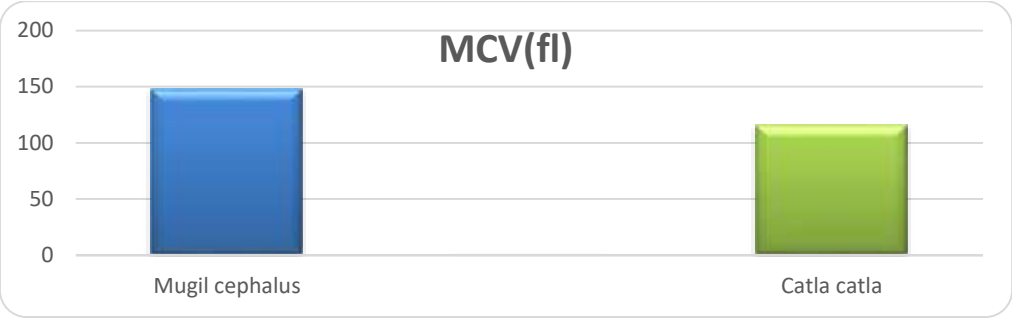
Graph.4- Comparision of MCH content between *Mugil cephalus* and *Catla catla*



Graph.5- Comparision of MCHC content between *Mugil cephalus* and *Catla catla*



Graph.6- Comparision of WBC count between *Mugil cephalus* and *Catla catla.*



Graph.7- Comparision of MCV content between *Mugil cephalus* and *Catla catla*

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