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HAEMATOLOGICAL CHARACTERISTICS OF *C.GARIPIENIUS* COLLECTED FROM WHITE NILE AND BLUE NILE AT KHARTOUM STATE

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ABSTRACT: *This study was conducted at Sudan University of Science and Technology Collage of Animal Production Science and Technology Department of fisheries science and wildlife to determine haematological characteristics of Clarias garipienius collected from White Nile and Blue Nile River. Values of some haematological parameters of twenty C. gariepinus were in the range 41- 49 cm in length and 709 – 806 gm in weight were analyzed to determine the mean values obtained for White Blood cells Count (WBC) and Erythrocytes Count (RBC), Hemoglobin Concentration Rates (Hb), Packed Cell Volume (PCV) and Mean Corpuscular Volume (MCV/cl) and Leukocytes Differential Counts and chemical analysis of total protein and Blood Glucose. The result of this study show that there are no significant different in all parameters between samples collected from White Nile and Blue Nile at p (<0.05), expect in hemoglobin concentration there is highly significant different at p (<0.01). The main target of this study is to investigate the hematological parameters and some blood chemistry of Clarias garpieninus collected from White Nile River and Blue Nile River in Khartoum State.*

ORIGINAL ARTICLE

Key words: *Haematologocal parameters, Nile fishes, C.garpinus*

INTRODUCTION

High quality proteins, such as the protein in most fresh fish, can be used to maintain an active metabolism. Low quality protein does not contain all essential amino acids required for use in protein synthesis and means the protein must either be used for energy or converted to fat Fagbenro et al. (2003).

Fishes are rich in Omega–3 fatty acids which plays very important role for normal growth particularly for the blood vessels and the nerves as well as keeping our skin and other tissues youthful. Research studies have revealed that in populations that consume large quantities of fish, with a high utilization of omega3s, there is a reduced risk of heart disease. Fish is important in diets and livelihoods of many poor people suffering from vitamin and mineral deficiencies (Toft et al., 2001).

Many environmental and physiological factors are known to influence fish hematology. These include stress due to capturing, transportation, sampling, age and sex. Therefore, hematological studies have been widely used as means of assessing the state health of fishes. The establishment of hematology of fishes generally serves as standard for physiology, pathological and toxicological studies (Martinez et al., 2004).

Fish hematological analysis can provide valuable knowledge for monitoring the health and condition of the both wild and culture fish. Hematological indices changes depend of the fish species, age, the cycle of sexual maturity and health condition (Blaxhall, 1972). Moreover, hematological tests and analysis for serum constituents have showed useful information in detection and diagnosis of metabolic disturbance and diseases in fishes (Omozusi, 2000).

Blood tissue reflects physical and chemical changes occurring in organisms, therefore detailed information can be obtained on general metabolism and physiological status of fish in different grouping of age and habitat (Kocabatmazve and Ekingen, 1978). Blood parameters have been commonly used to observe and follow fish health, since variations in blood tissue of fish are caused by environmental stress (Shah and Altindag, 2005).

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The aim of the study is to investigate the hematology and blood chemistry of *Clarias garpieninus* collected from White Nile River and Blue Nile River in Khartoum State.

MATERIALS AND METHODS

Locality: This study was conducted at Sudan University of Science and Technology, college of Animal Production Science and Technology, department of Fisheries Science and Wildlife.

Collection of fish samples: The samples were collected by different methods of catch by using gill net and cast net. A total of twenty blood samples of *Clarias gariepinus* were collected from two different localities White Nile River and Blue Nile River.

Blood collection: Blood samples were taken by puncturing posterior caudal vein using 5ml .syringe .then the blood was canted in bottles containing ethylene di amine tetra acetate (EDTA)as anticoagulant (sun-mitt et al., 1999) for determination of blood parameters.

Collected of plasma: Blood plasma was obtained by centrifuging 5ml of whole blood for 6 min and then the supernatant plasma was collected and stored in plastic tubes at -20c for analysis.

Statistical analysis

The findings of this experiment were analyzed by T-test (student test) and SPSS version 17 as described by Comez and Comez 1984.

RESULTS

The mean values for the haematological parameters of *C. gariepinus* studies are shown in Tables 1, 2 and Figure 1 revealed that the total weight (TW), of fish collected from White Nile River was (806.00±156.15) and in Blue Nile River was (709.00±263.62). There was no significant different in the total weight between White Nile and Blue Nile (P>0.05).

Table 1 - Blood parameters of *Clarias garipienius* collected from White Nile and Blue Nile River

Parameters \ Area	White Nile M±SD	Blue Nile M±SD	Significant
W/g	806.00±156.15	709.00±263.62	NS
L/cm	49.10±7.20^{a}	41.40±7.30^{b}	*
TWBCs*10^3	34.60±5.82	38.61±1.95	NS
TRBCs*10^6	2.37±.450	2.42±.185	NS
Hb(g/dl)	9.23±1.58^{b}	11.52±1.76^{a}	**
PCV%	24.20±7.57	30.70±8.58	NS
MCV/cl	39.88±15.58	47.71±6.95	NS
N%	1.50±1.08	1.00±.942	NS
B%	25.40±9.62	24.50±8.00	NS
E%	11.20±8.80	7.40±3.20	NS
L%	30.80±6.78	39.40±9.87	NS
M%	29.90±6.14	27.80±5.83	NS

$^{a.b}$: within the same row followed by different superscript are significantly different (p ≤ 0.05). NS: No significant; *: significant at P<0.05; **: significant at P<0.01. Key: Hb: Hemoglobin concentration rate (%), WBC: White Blood cell counts (×10^3/mm^3), RBC: red Blood cell count (×10^6/mm^3), PCV: packed cell Volume (%), MCV: Mean corpuscular Volume (cemto liter), MCH: means corpuscular Hemoglobin (pico gram), N: Neutrophil (%), B: Basophil (%), E: Eosinophil (%), L: Lymphocytes (%), M: Monocytes (%).

Table 2 - Some blood chemistry of *Clarias garpienius* collected from White Nile and Blue Nile River

Parameters \ Area	White Nile M±SD	Blue Nile M±SD	Significant
Protein	105.58±39.61	127.04±39.15	NS
Glucose	70.48±18.60	72.46±18.75	NS

The total Length (TL), of fish collected from White Nile River was (49.10±7.20^{a}) and in Blue Nile River was (41.40±7.30^{b}). There was significant different in the total length between White Nile and Blue Nile (P>0.05).

White Blood cells (TWBCs) in white Nile River counts were (34.60±5.82 mm3)and in Blue Nile River counts were (38.61±1.95mm^3) there was no significant difference in TRBCS count between white Nile River and Blue Nile River (P>0.05).

Red Blood cells (RBC) in white Nile River counts were (2.37±.450mm3)and in Blue Nile River counts were (2.42±.185mm^3) there was no significant difference in TRBCS count between white Nile River and Blue Nile River (P>0.05).

The Hemoglobin concentrate (Hg), (g/dl) in White Nile River was (9.23±1.58^{b}) and in Blue Nile River was (11.52±1.76^{a}). There was highly significant different in Hg (g/dl) between White Nile River and Blue Nile River (P>.0.01).

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Packed Cells volume (PCV %) in White Nile River counts were (24.20±7.57) and in Nile River counts were (30.70±8.58) there was no significant different in (PCV%) between White Nile River and Blue Nile River (p>.0.05).

Mean Corpuscular Volume (MCV,/ cemto liter, CL) in White Nile River counts were (39.88±15.58) and in Blue Nile River counts were (47.71±6.95) there was no significant different in (MCV) Between White Nile River and Blue Nile River (p≤.05).

The percentages of Neutrophil (N%), Basophile (B%),Esinophil (E%), in White Nile River count were (1.50±1.08), (25.40±9.62), (11.20±8.80) respectively. And in Blue Nile River count were were (1.00±.942), (24.50±8.00), (7.40±3.20) respectively. There was no significant in N%, B%, E%, between White Nile River and Blue Nile River (P>0.05).

The percentages Lymphocytes (L%), in White Nile River were (30.80±6.78) and in Blue Nile River were (39.40±9.87). There was significant different in L% between White Nile River and Blue Nile River (P≤0.05).

The percentages Monotypes (M %), in White Nile River were (29.90±6.14) and in Blue Nile River were (27.80±5.83). There was significant different in M% between White Nile River and Blue Nile River (P≤0.05).

DISCUSSION

Hematological studies have been widely used as means of assessing the state of health of fishes and the establishment of the hematological characteristics of fishes generally serves as a standard for physiology, pathological or toxicological studies.

The main objective of this study is comparison of blood parameters and chemical analysis of *Clarias gariepinus* collected from the White Nile and Blue Nile the results obtained revealed no significant different (p<0,05) between the White Nile River and Blue Nile River in all parameters examined except Hemoglobin concentration (Hb).

In case of White Blood Cells (WBCs) there was no significant different in $TWBC_s$ count between White Nile River and Blue Nile River, White Blood cells in White Nile River and Blue Nile River were count at range (34.60±5.82), (38.61±1.95) respectively in the studied *Clarias gariepinus* were similar to the findings of (Terry, 2000)

Also in case of Red Blood Cells (RBCs) there was no significant different in $TRBC_s$ count between White Nile River and Blue Nile River, Red Blood cells in White Nile River and Blue Nile River were count at range (2.37±.450), (2.42±.185) respectively in the studied *Clarias sp* were similar to the findings of (Adam and *Agab* 2008).

The result revealed that there was highly significant different in Hb between in White Nile River and Blue Nile River (p≤0, 05).but it higher in Blue Nile River because the environment is more contaminate by heavy metals and waste materials also and this may be due to the fact that under the condition of hypoxia caused by the metals, more (Hb) were produced in the poisoned fishes to bind with more oxygen molecules (Joshi et al, 2002a).

This results were in agreement with finding of Barnhart (1969) who found that red blood cells count, haematocrit and haemoglobin concentration vary with diet and strain as well as temperature, season of the year and nutritional status of the fish.

The (Hb) concentration in White Nile River and Blue Nile River ($9.23±1.58^b$), ($11.52±1.76^a$) respectively and this result is similar to those reported by (Gabriel et al., 2004).

There was no significant different in PCV, MCV, between White Nile River and Blue Nile River. Usually RBC system of fish reacts to heavy metal intoxication with anemia but in some cases particularly after short period parameters (RBC, PCV, MCV, HB), may be increased (Blaxhall et al., 1975) Also decrease or increase in blood parameters can be associated with nature of species and the toxicant (Annue,*et.,al* 1994) reported that the RBC elevation attributed to blood cell reserve combined with cell shrinkage as result of osmotic alteration of blood by the action of heavy metals. The PCV can increased from erythrocyte swelling (Heath, 1987).changes in the PCV had been noted with seasonal variation (lane, 1979), and Mahoney and Nulty, 1992).

The range in mean corpuscular volume (MCV) in White Nile River and Blue Nile River count were (39.88±15.58), (47.71±6.95), respectively. This result was similar to finding (Nilza et al., 2003) and (Gabriel et.al., 2004). There was no significant different in (N %, B%, E%, L%, M %) between White Nile River and Blue Nile River (P>0.05). The differential count (N %, B%, E%, L%, M %) in White Nile River and Blue Nile River were count at range (1.50±1.08- 1.00±.942), (25.40±9.62-24.50±8.00), (11.20±8.80-7.40±3.20), (30.80±6.78-39.40±9.87), (29.90±6.14-27.80±5.83), respectively in the studied *Clarias sp* were similar to the findings of (Heath, 1987).

The results revealed variation in differential count finding in agreement with (Joshi et al., 2002b). Who reported that Stress factors due to capture, handling and sampling procedures are factors which can cause intra-species hematological variations.

Total protein there were no significant different between White Nile and Blue Nile River , because they high in it so as to increase in the plasma glucose and total protein can be indicator of a classical general adaptive response to stress in fishes exposed to pollutants (Martinez et al., 2004.also high levels of blood glucose and total protein are caused by disorders in carbohydrate metabolism appearing in the condition of physical and chemical stresses (Wedemeyer and Mcleay, 1981).

The total protein in Nile and Blue Nile River count were (105.58±39.61), (127.04±39.15) respectively in this study were in agreement to Omozusi et al., 2000). Who reported semi similar by results.

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The result also obtained that no significant different in blood glucose between White Nile and Blue Nile River. The blood glucose and in White Nile and Blue Nile River were count (70.48±18.60), (72.46±18.75) respectively there were semi similar to reported by (Olaiya et al., 2003).

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