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Haemotological Profile of Black-Chinnedtilapia (*Sarotherodon melanotheron*) from Buguma Creek, Niger Delta

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Abstract: The haematological characteristics of sarotherodon melanotheron (mean weight 30.12g±0.32 SD; mean length 10.22cm±0.15 SD) from the brackish water creek of Buguma, Niger Delta were assessed and the values recorded were (mean±SD), Haemoglobin (Hb) 6.44±0.43 g dL^{-1}; Haematocrit (Ht) 20.80±0.43 %; Leucocrit (Lct), 6.93±0.29%; White Blood Cells (WBC), 29.64±0.67×10^{9}cells L^{-1}; Red Blood Cells (RBC) 2.53±0.03×10^{12} cells L^{-1}; Mean Corpuscular Haemoglobin (MCHC), 31.36±0.98 g dL^{-1}; Mean Corpuscular Haemoglobin (MCH) 25.60±0.81pg; Mean Corpuscular Volume (MCV) 81.16±1.81f1; Thrombocytes (Thr), 173.93±3.46 %, Neutrophils (Neut) 35.81±0.85 %; Lymphocytes (lymp) 46.09±1.01 %; Monocytes (Mon) 2.25±0.09 %. The highest range of the parameters was recorded in thrombocytes platelets, while the lowest was observed in RBC. Significant differences ($p< 0.05$) between males and females were observed in (Hb), (Ht), (RBC) and thrombocytes, whereas MCHC, MCH, MCV, WBC, neutrophils, lymphocytes and monocytes were not. The female appeared to have more blood than the female fish based on the amount collected. Data obtained from this study will serve as good basis for assessing changes in the values of these parameters as indicators of health status under the various culture systems and conditions.

Key words: Haemotology, black chin tilapia, profile, Niger Delta

INTRODUCTION

Tilapias are an important food fish species in many tropical and subtropical countries in the world. They are very prominent in the ecology of tropical waters as well as in the resources of their aquatic systems (Guerrero, 1983; Akinwunmi, 2001; Owusu-Frimpong *et al*., 2005). Tilapiine fishes (Family Cichilidae) are the most popular fish for culture in Nigeria (Adesulu, 2001; Anyanwu *et al*., 2002; Ugwumba and Ugwumba, 2003). *Sarotherodon melanotheron* is the most common species of tilapia in the brackish water zone of Nigeria, especially in the Niger Delta. Culture of these species dominate aquaculture production in the brackish water environment with a tremendous potential in contributing to higher aquaculture production in the region (Jamu and Ayinla, 2003; Ezenwa, 2006).

According to Wedemeyer *et al.* (1983) study of haematological parameters are carried out on fish to ascertain the normal range of blood parameters to determine variation with age, sex and season, disease conditions effect of certain culture stress and aquatic pollutants such as pesticides heavy metals, petroleum products. Heamatological profile is the establishment of baseline values of haematological parameters of fish, which will serve as standard, in a particular locality with acceptable limits (Gabriel *et al*., 2004). According to Babatunde *et al.* (1992) any changes in the constituents component of blood sample when compared to the blood profile could be used to interpret the metabolic state of fish and the state of health.

Available information on haemotological profiles some cultured fish species in the Niger Delta region includes that of; *Clarias isheriensis* (Kori-Siakpere, 1985) *Clarias gariepinus, Heterobranchus longifilis* and *C. nigrodigitatus* (Erondu *et al*., 1993; Sowunmi *et al*., 2003). *Oreochronus niloticus* (Omoregie, 1998) *Hemichromis fasciatus* and *Tilapia zilli* (Egwuyenga *et al*., 1999) *Heterotis niloticus* (Adedeji *et al.,* 2000). There are no report on the haematological profile *S. melanotheron* from

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Table 1: Haematological proielse of male and female *S. melanotheron* from the brackish water of Buguma Creek, Niger Delta

	Male			Female		
	*Mean±SD	Maximum	Minimum	*Mean± SD	Minimum	Maximum
Hb	5.99±0.28[b]	1.00	7.6	6.94+0.27[a]	1.60	8.20
PCV	19.91±0.37[b]	16.20	23.40	21.80+0.78[a]	10.10	27.30
Lct	7.05±0.41[a]	3.60	12.60	6.8±0.44[b]	3.20	11.70
WBC	29.57±0.81[a]	22.00	40.00	29. 7±31.11[a]	17.00	38.00
RBC	2.46±0.04[b]	1.90	2.80	2.60±0.05[a]	1.90	2.9
MCHC	30.50±1.46[a]	4.67	41.46	32.36±1.27[a]	15.84	44.31
MCH	24.62±1.18[a]	4.54	34.00	26.69±1.08[a]	8.42	34.16
MCV	81.20±1.83[a]	65.60	103.00	81.12±3.28[a]	38.33	100.83
Thromb	176.32±5.13[a]	78.00	220.00	171.24±4.60[b]	112.00	210.00
Neut	34.90±1.12[a]	20.40	41.30	36.83±1.31[b]	21.4	48.6
Lymp	45.79±1.41[a]	32.70	60.20	46.21±1.49[b]	33.70	59.60.20
Monocyte	2.23±0.11[a]	1.20	3.60	2.28±0.16[b]	1.10	3.70

Key: Hb: Haemoglobin (g dL^{-1}), Ht: Haematocrit (%), Lct: Leucocrit (%) MCV: Mean Corpuscular Valume (fL) WBC: White Blood Count ($\times 10^9$cells L^{-1}); RBC - Red Blood Cells ($\times 10^{12}$cells L^{-1}). MCH: Mean Corpuscular Haemoglobin (pg). MCHC: Mean Corpuscular Haemoglobin Concentration (g dL^{-1}), Plt- Platelets ($\times 10^9$cells L^{-1}) Neut: Neutrophils (%),Lymp: Lymphocytes (%), Mono: Monocytes(%). Means with similar superscripts in the same row (*) are not significantly different ($p>0.05$)

Buguma Creek, Niger Delta. Hence, the need to study the haematological profile to provide some useful information on this aspect of its biology.

MATERIALS AND METHODS

Six hundred and twenty adult *S. melanotheron* (mean weight; 30.12g±0.32 SD; mean length 10.22± 0.14 SD) were collected from 3 recruitment ponds of African Regional Brackish water fish farm, Buguma during the low tide and sexed. Fifty four male and female fish were sampled and blood sampled collected from the kidney behind the anal fin. Blood samples were obtained with heparinized plastic syringe, fitted with 21 gauge hypodermic needle and preserve in disodim salt of Ethylene Diamine Tetraacetic Acid (EDTA) bottles for analysis. Physico-chemical parameters of the waters in the recruitment ponds were taken by using standard methods of APHA (1985).

Standard haematological procedures described by Brown (1980) were employed in the assessment of the various blood parameters. Haemoglobin (Hb) was done by the cyanomethaemoglobin method, Packed Cell Volume (PCV) by microhaematocrit method by the Micro-Wintrobe method WBC was determine with the improved Neubauer counter; differential count was done on blood film stained with may Grumwald-Giemsa stain RBC was estimated using the relationship between Hb are PCV (Miale, 1982). The following indices: Mean Corpuscular Haemoglobin Concentration (MCHC) and Mean Corpuscular Volume (MCV) were calculated according to Brown (1980). Leucocrit was done according to Wedemeyer *et al.* (1983).

Data obtained from the experimental fish were subjected to analysis with the General Linear Model (GLM) of ANOVA at 0.05 % probability and differences among means were separated with the significant difference using SAS soft ware.

Table 2: Haematological Profiles of *S. melanotheron* from Buguma Creek, Niger Delta

	Mean value	Minimum	Maximum
Hb	6.44±0.43	1.00	8.20
Ht	20.80±0.43	10.10	27.30
Lct	6.93±0.29	3.20	12.60
WBC	29.64±0.67	17.00	40.00
RBC	2.53±0.03	1.90	2.900
MCHC	31.36±0.98	4.07	44.31
MCH	25.60±0.81	4.54	34.16
MCV	81.16±1.81	38.33	103.00
Plat	173.93±3.46	78.00	220.00
Neut	35.81±0.85	20.40	48.60
Lymp	46.09±1.01	32.70	60.20
Mono	2.25±0.09	1.10	3.70

Key: Hb: Haemoglobin (g dL^{-1}), Ht: Haematocrit (%), Lct: Leucocrit (%) MCV: Mean Corpuscular Valume (fl) WBC: White blood count (cells$\times 10^9$cells L^{-1}); RBC-Red blood cells (cells$\times 10^{12}$ 1^{-1}). MCH: Mean Corpuscular Haemoglobin (pg). MCHC: Mean Corpuscular Haemoglobin Concentration (g dL^{-1}), Plt (platelets$\times 10^9$ L^{-1}) Neut: Neutrophils (%), Lymp: Lymphocytes (%), Mono: Monocytes(%)

RESULTS

The mean physico-chemical characteristics of the water in the three recruitment ponds were temperature, 28.14±0.26°C; pH 6.61±0.13; ammonia nitrogen, 0.47.47±0.01mg L^{-1}; ammonium nitrite, 0.0042±0.01mg L^{-1}; dissolved oxygen, 4.26±0.33mg L^{-1}; sulfide, 0.03±0.01mg L^{-1} and salinity,12.34±0.16$^0/_{00}$. The haematology profiles of *S. melanotheron* male and female (Table 1) indicated that thrombocytes (platelets) had the highest value, (78-220$\times 10^9$ cells L^{-1}) for male and (112-210$\times 10^6$ cells L^{-1}) for female, while the lowest value was observed in RBC (1.90-2.80$\times 10^{12}$ cells L^{-1})) for male and [1.90-2.90$\times 10^{12}$ cells L^{-1}) for female. The mean values of pooled data (Table 2) for male and female fish indicated that in most of the parameters, the values for the female were higher than that of the male with significant difference ($p<0.05$) recorded only in Hb, Ht, RBC and thrombocytes. During blood sampling the female appeared to have more quantity of blood than the male, based on the ease of collection with the syringe.

DISCUSSION

The haematological characteristics of a number of culturable fish species have been studied with the aim of establishing normal values ranges with respect to sex, age, size, environmental and physiological conditions (Kori-Siakpere, 1985; Burton and Murray, 1979; Davidson *et al*., 2002). According to Sowunmi (2003) sex of a fish is a fundamental factor in establishment of its haematological profiles. The significant differences ($p<0.05$) between male and female observed in the values of Hb, Ht, RBC and platelets agrees with the findings on *Clarias gariepinus* (Sowunmi 2003; Ezeri, 2001; Gabriel *et al*., 2004), *Clarias isheriensis* (Kori-Siakpere, 1985) *Clarias buthupogon* (Kori-Siakpere and Egor, 1997) *Oreochromis niloticus* (Omoregie, 1998) and *Tilapia guineensis* (Davidsion *et al*., 2002).

The females had higher values of Hb, Ht, Lct, RBC, MCH, neutrophils, lymphocytes and monocytes than the males, corroborating that reports by Gabriel *et al.* (2004) in *Clarias gariepinus*; Etim *et al.* (1999) in *Chrysichthys nigrodigitatus* and *Chrysichthys furcatus;* Ibiwoye *et al.* (2005) in *C. angullaris*. The females having higher values of blood parameters associate with oxygen transport, suggest that under adverse environmental conditions, that impact negatively on available oxygen, the females may be better equipped to handle such stressors than the males. Besides, incase of injury or diseases the female with high number of lymphocytes, neutrophils and monocytes involved body defense may be less vulnerable than the male. Variations recorded in the values of the various blood parameters within the same sex. Similar observations have been made in other fish species and were attributed to intrinsic factors (Burton and Murray, 1979; Etimi *et al*., 1999).

CONCLUSION

There is a fundamental difference in some of the blood characteristics of male and female *S. melanotheron* and within the same sex. This should be taken into consideration when using changes in blood characteristics as indices of health status in the culture of the species.

REFERENCES

Adedeji, O.B., O.V. Taiwo and S.A. Agbede, 2000. Comparative haematology of five Nigeria freshwater fish species. Nig. Vet. J., 21: 75-84.

Adesulu, E.A., 2001. Pisciculture in Nigeria: Essential Production Information. Eternal Communication Ltd. Lagos, Nigeria, pp: 160.

Akinwunmi, F.O., 2001. Food and Feeding Habits of *Tilapia zilli* in Ondo State University fish Farm. In: Eyo and Ajao (Eds). Conf. Proc. Fisheries Soc. Nigeria Maiduguri, Nigeria, pp: 12-18.

APHA, 1985. Standard Method for the examination of water and waste waters (16th Edn.), Washington. Am. Public Hlth. Assoc., pp: 260.

Ayanwu, P.E., A.E. Oladipo P.C. Pepple and B.I. Ebonwo, 2002. The suitability of red snapper *Lutjanus dentatus* for the control of tilapia (*Sarotherodon melanotheron*) population in brackish water ponds. The Zoologist, 1: 54-58.

Babatunde, G.M., A.O. Fajimi and A.O. Oyejide, 1992. Rubber seed oil versus palm oil in broiler chicken diet. Effect on performance nutrient, digestibility, haematology and carcass characteristics. Anim. Feed Sci. Tech., 35: 133-146.

Brown, B.A., 1980. Haematology. Principles and Procedure. (3rd Edn.), Lea and Fabiger, Philadelphia. pp: 356.

Burton, C.B. and S.A. Murray, 1979. Effect of density on gold fish blood. J. Haemotol., 62: 555-558.

Davidson, C.B.B., J.K.E. Ekweozor, E.R. Daka, W.B. Dambo and E.A.S. Bartimacus, 2002. Effects of industrial effluents on some haematological parameters of *Sarotherodon melanotheron* and Tilapia guineensis. Global J. Pure and Appl. Sci., 8: 305-310.

Egwunyenga, A.O., O.P.G. Nmorsi and A.F. Igbinosun, 1999. Haemotological changes in *cichlidae* of Ethiope river (Niger Delta Nigeria) due to intestinal helminthiasis. Bio. Sci. Res. Commun., 11: 361-365.

Erondu E.S., C. Nnubia and F.O. Nwadukwe, 1993. Haemotological Studies on four catfish species raised in fresh water ponds in Nigeria. J. Applied Ichthyol., 9: 250-256.

Etim, L., S.B. Ekanem and A. Utim, 1999. Haemotological profiles of two species of catfish, *Chrysiclthys nigrodigitatus* and *Chrysichthys furcatus* from the great kwa River. Nigeria. Global J. Pure and Applied Sci., 5: 1-8.

Ezenwa, B.I.O., 2006. Aquaculture Research and Fish Farm development potentials in the Niger Delta Paper presented at a work shop on Niger Delta Fishery Training Workshop: Catch your fish, Port Harcourt, Nigeria.

Ezerim, G.N.O., 2001. Heamotological Responses of *Clarias ariepinus* to Bacterial Infection and Prophylactic Treatment with Antibiotic. J. Aqu. Sci., 16: 22-24.

Gabriel, U.U., G.N.O. Ezeri and O.O. Opabunmi, 2004. Influence of Sex, Source, Health Status and Acclimation on the Haematology of *Clarias gariepinus*. Afr. J. Biotech., 3: 463-437.

Guerrero, R.D., 1983. Induced Sex-Reveral of *Tilapia nilotica* with Methyl testosterone. Fish Res. J. Philippines, 1: 46-49.

Ibiwoye, T.I.I., A.M. Balogun, R.A. Ogunsusi and J.J. Agbontale, 2004. Contributions of Haematological Factors to the Distribution and Estimations of Strongloides Africanus Larvae Densities in *Clarias gariepinos* and *C. anguillaris* from Bida Flood plain of Nigeria. In: P.A. Araoye (Ed.), Conference Proceedings of Fisheries Society of Nigeria (PISON), Ilorin, Nigeria, pp: 80-100.

Jamu, D.M. and O.A. Ayinla, 2003. Potential for the development of aquaculture in Africa. NAGA., 26: 9-13.

Kori-Siakpere, P., 1985. Haematological characteristics Of *Clairas isheriensis*. J. Fish Biol., 27: 259-263.

Kori-Siakpere, O. and V.E. Egor, 1997. Haematological characteristics of the African mud fish: *Clarias buthupogon* (Pisces: *Claridae)*. Bull. Sci. Assoc. Nig., 21: 177-185.

Omoregie, E., 1998. Changes in the haemotology of the Nile Tilapia *Oreochromis niloticus* under the effect of crude oil. Hydrobiologia, 40: 287-292..

Owusu-Frimpong, F.U.K. Attipoe and J.N. Padi, 2005. Comparison of Some Traits of Economic Importance in Tilapias with Particular Reference to their Culture in Ghana. NAGA., 22: 33-38.

Miale, J.B., 1982. Laboratory medicine haematology. (6th Edn.), The C.V. Mosby Co., London, pp: 883.

Sowunmi, A.A., 2003. Haemotology of the African Catfish, *Clarias gariepinus* from Eleiyele Reservoir Ibadan South-West Nigeria. The Zoologist, 2: 85-91.

Ugwumba A.A. and A.O. Ugwumba, 2003. Aquaculture Options and the Future of Fish Supply in Nigeria. The Zoologist, 2: 96-122.

Wedemeyer, G.A., R.W. Gould and W. T. Yasutake, 1983. Some potentials and limits of the leucocrit test as fish health assessment method. J. Fish Biol., 23: 711-716.