



Haematological study of *Clarias batrachus* Linn fish of different agro-climatic zone's water bodies with reference to Madhya Pradesh

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Abstract

Haematological analyses are linked to health of fish. This species are contact with pollution, water quality and microorganisms in natural habitat. They are empowered to adapt somehow in adverse conditions by changing their physiological activities. Findings of reference haematological value for fish species can help to establish and identify the causes of health problems in fish. In this study mean values of RBC (10^6 mm^{-3}) 2.7, 2.6, 2.9; WBC (10^6 mm^{-3}) 8.4, 8.5, 8.4; PCV % 22.8, 22.7, 22.9; Hb(gm/dL) 7.9, 8.1, 8.2 in samples of Upper Lake (Vindhya Plateau), Halali Reservoir (Vindhya Plateau), Narmada River (Central Narmada Valley) respectively were reported.

Key words: Haematology, *Clarias batrachus* Linn, Agroclimatic zone, Upper Lake Bhopal, Halai Reservoir Raisen, Narmada River Hoshangabad.

Introduction:

Madhya Pradesh is divided into eleven agro-climatic zones and has special cropping patterns, soil types and varying degrees of rainfall (Mall *et al.*, 2016). There were two different agro-climatic zones taken for this study comprising Central Narmada Valley and Vindhya Plateau. Central

Narmada Valley having deep black soil, rainfall 1200 to 1600mm comparising Narsinghpur, Hoshangabad, Harda Sehore (Budhni tehsil), Raisen(Bareli Tehsil) districts. Vindhya Plateau having medium black and deep black (medium/heavy soil, 1200 to 1400 mm rainfall comprising Bhopal, Sagar, Damoh, Vidisha, Raisen (except Bareli Teh.), Sehore (except Budni Teh.), Guna (Chanchoda, Raghogarh & Aron Tehsils) districts (Department of Farmer Welfare & Agriculture Development, MP). Mangur is a local name of freshwater air breathing catfish species *Clarias batrachus* Linn. This fish has different names in many areas including walking catfish. This name for this fish is due to walk and wiggle on dry land (Catfish, 2019; Masterson, 2007; Fish Base, 2003). Habitat of this fish is wide spread from Southeast Asia, Africa, North America. This is found in muddy water in pond, streams, rivers, paddies field, and nearly dry pools. Sometimes researchers confuse this species with some close relatives of this species (Ng and Kottelat, 2008). Haematological test are widely used to know the physiological and pathological status of fish (Adeyemo *et al.*, 2009; Clauss *et al.*, 2008; Siwicki *et al.*, 1994). Seasons, water pollution, age, sex, fish species, stress and physiological conditions of water may also effect on haematological and biochemical parameters of fish (Nikoo *et al.*, 2012). Haematological parameter viz. RBC, WBC, PCV and Hb% was studied.

Materials and Methods:

The Blood film was stained with Giemsa for morphology, micrometry and differential counts. Blood parameter like RBC, WBC, PCV and Hb% was calculated by following the methods of Dacie and Lewis (1977).

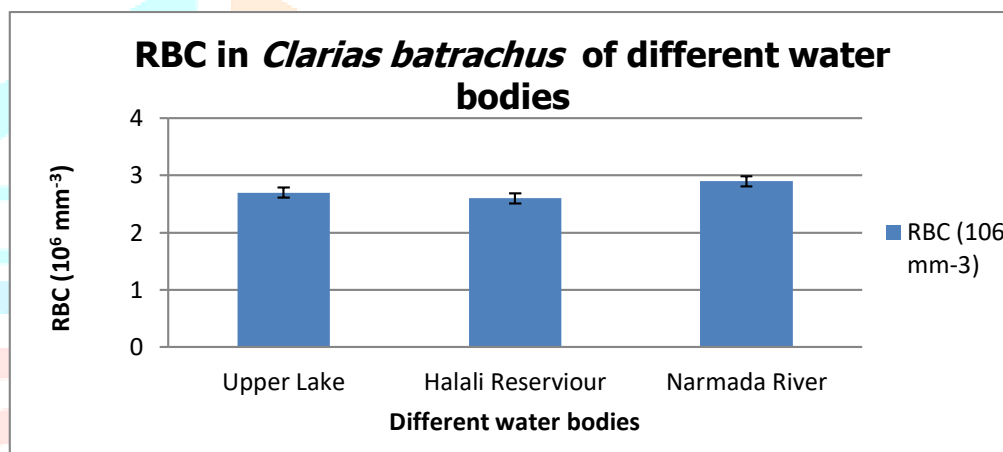
Results and Discussion:

RBC (10^6 mm^{-3}), WBC (10^6 mm^{-3}), PCV %, Hb (gm/dL) parameters for haematological studies of *Clariious batrachous* of Upper Lake, Halali Reservoir and Narmada River results was done and recorded below in Table 01.

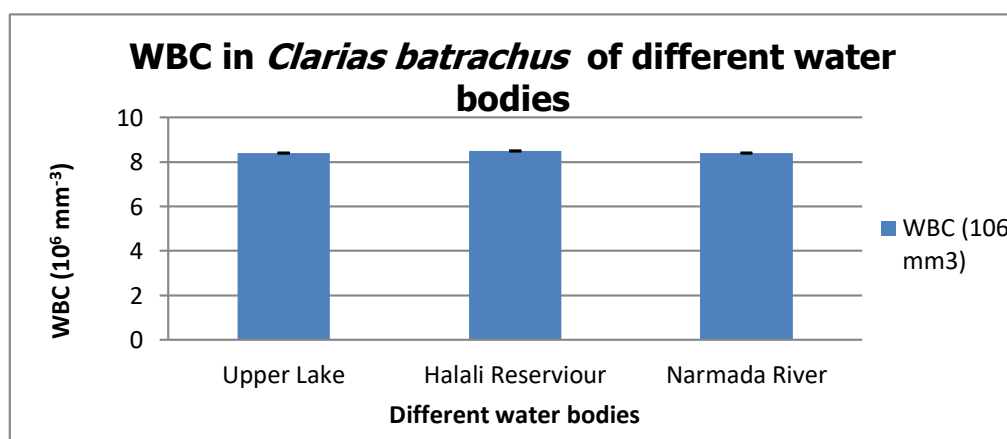
Table 01. Haematological studies of *Clarius batrachus* of different sampling sites of water analysis

Parameters	Upper Lake	HalaliReservoir	Narmada River
RBC (10^6 mm^{-3})	2.7	2.6	2.9
WBC (10^6 mm^{-3})	8.4	8.5	8.4
PCV %	22.8	22.7	22.9
Hb(gm/dL)	7.9	8.1	8.2

RBC (10^6 mm^{-3}): Mean RBC (10^6 mm^{-3}) was recorded 2.7 in sample of Upper Lake, 2.6 in sample of Halali Reservoir and 2.9 in sample of Narmada River. Graphical presentation of observed values is shown in Fig. 01.

Fig. 01 Mean RBC (10^6 mm^{-3}) in samples of different water bodies

WBC (10^6 mm^{-3}): Mean WBC (10^6 mm^{-3}) was recorded 8.4 in sample of Upper Lake, 8.5 in sample of Halali Reservoir and 8.4 in sample of Narmada River. Graphical presentation of observed values is shown in Fig. 02.

Fig. 02 Mean WBC (10^6 mm^{-3}) in samples of different water bodies

PCV %: Mean PCV % was recorded 22.8 in sample of Upper Lake, 22.7 in sample of Halali Reservoir and 22.9 in sample of Narmada River. Graphical presentation of observed values is shown in Fig. 03.

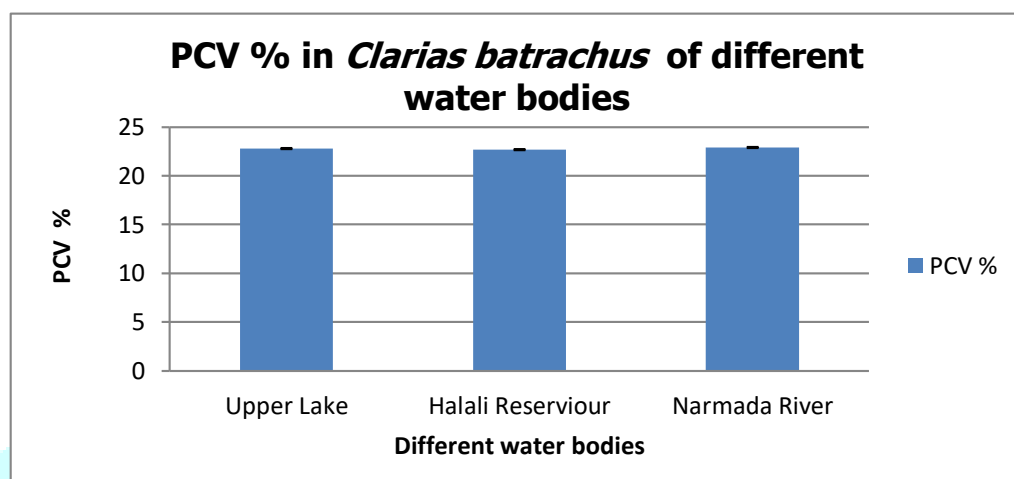


Fig. 03 Mean PCV % in samples of different water bodies

Hb(gm/dL): Mean Hb(gm/dL) was recorded 7.9 in sample of Upper Lake, 8.1 in sample of Halali Reservoir and 8.2 in sample of Narmada River. Graphical presentation of observed values is shown in Fig. 04.

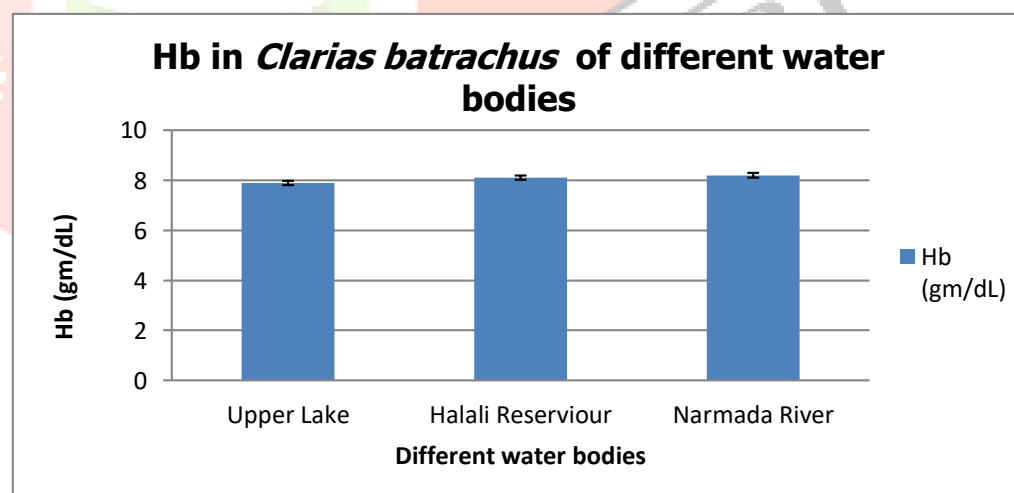


Fig. 04 Mean Hb(gm/dL) in samples of different water bodies

Haematological analyses are linked to health of fish. This species are contact with pollution, water quality and microorganisms in natural habitat. They are empowered to adapt somehow in adverse conditions by changing their physiological activities. Findings of reference haematological value for fish species can help to establish and identify the causes of health

problems in fish. In this study mean values of RBC (10^6 mm^{-3}) 2.7, 2.6, 2.9; WBC (10^6 mm^{-3}) 8.4, 8.5, 8.4; PCV % 22.8, 22.7, 22.9; Hb(gm/dL) 7.9, 8.1, 8.2 in samples of Upper Lake, Halali Reservoir, Narmada River respectively were reported. Concentration of RBC determines the dissolved oxygen carrying capacity in fish. Maheswaran *et al.*, 2009 reported RBC count for male and female *Clarias batrachus* was $2.89 \pm 0.08 \times 10^6 / \text{mm}^3$ and $2.41 \pm 0.07 \times 10^6 / \text{mm}^3$ respectively which is higher than the unsexed $1.77 \pm 0.014 \times 10^6 / \text{mm}^3$. Chauhan and Rao, 2018 reported higher RBC count in males than females. Higher RBC counts observation in male is possibly highly variable blood parameter among fishes. This is shown a remarkable difference in their sex (Mahajan and Dheer, 1979). Hb% obtained for male was $9.6 \pm 0.24 \text{ g/dl}$ but in female it was $8.48 \pm 0.24 \text{ g/dl}$. WBC found $8.59 \pm 0.27 \times 10^3 / \text{mm}^3$ and $9.71 \pm 0.43 \times 10^3 / \text{mm}^3$ in male and female respectively in blood of fish respectively. WBCs in female were significantly higher than values reported in males. This may indicate the female was in egg carriage stage, infection or in adverse condition (Smith, 1986). Robbins *et al.*, 1974 reported slightly higher PCV in males than of females with $29.5 \pm 0.89\%$ and $28.3 \pm 1.04\%$ in male and female respectively. MCH value observed in male and female was $33.37 \pm 0.60 \text{ pg}$ and $34.12 \pm 1.15 \text{ pg}$ respectively. Higher MCH value in female indicates higher likelihood of occurrence of macrocytic anaemia in females than in males (Robbins *et al.*, 1974). There was no significant difference in MCHC between male and female with 32.79 ± 0.59 in male and 32.41 ± 0.4 in female (Robbins *et al.*, 1974).

Conclusion:

Haematological status of fish *Clarias batrachus* Linn. is prescribed for indexing in all different agro-climatic zone's water bodies with reference to Madhya Pradesh.

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