Haematological Studies of Two Edible Fresh Water Fishes of Mawana (Meerut)

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Abstract—*The two edible fresh water fishes have been collected to haematological studies undertaken to analyses the effect of pollutants on blood parameters. The blood parameters can be considered as a potential bio-indicators in assessing the physiological status of fish and the contained in this regard might also provides substantial on the quality of the water body.*

Keyword*: Notopterus notopterus, Heteropneustes fossilis, Erythrocytes and Haemoglobin.*

1. INTRODUCTION

Fish have occupied an important place in human society for thousands of years. Early humans obtained fin fish, shellfish, and other aquatic life along the shores of lakes, rivers, and oceans Arrignon *et al.* , 1990. Fisheries and aquatic resources (Ponds, lakes, rivers, streams and ocean) are exceptionally valuable natural assets enjoyed by human being. They provide citizens with generous long term benefits in return for minimal care and protection.

Fish is one of our most valuable source of protein about 25% of animal protein is obtained from fish and shell fish. Most of pesticide find their way into rivers, lakes and ponds and have been found to be highly toxic not only to fishes but also to the organisms which contribute to the food chain of fishes (Anees, 1975). The use of haematological parameters in assessment of fish Physiology was proposed by Hesser (1960) since then hematology has been used as an index of fish health status in a number of fish species to detect..

2. REVIEW OF LITERATURE

Jordan and speidal (1924) and (1929), first time reported the persence of Neutrophills in the blood of fish. Comparatively little attempt has been made on the morphology of fishes. Gray and Hall (1930), studied blood sugar and the activity of fish. One of the earliest attempts on the morphology of blood in carp and trout was made by Field *et al.* (1943). The streams and rivers flowing through southern part of the WG is a discrete freshwater eco-region Abell *et al*., 2008.

Bell, G.H. have worked on various aspects of protein profile study of fishes. Laemmli (1970) carried out Electrophoresis of proteins in preserve of SDS Band counting method was used as given by Ferguson (1980) described erythrocyte measurements in Fishes, Haider (1972), reported haematological observation on rainbow trout *Salmo qairdneri*. Saxena and Sharma (1978) made observation on plasma erythrocyte in *Notopterus notopterus and Heteropneustes fossilis*.

A review of the literature reveals that the knowledge of fishes blood and protein profile is merge and fragmentary. An attempt therefore has been made to study the Hematology study of some fresh water *Notopterus notopterus and Heteropneustes fossilis,*.

3. MATERIALS AND METHODS:

This section deals in Materials and Methods used is an integrated format for conducting acute and chronic studies for N*otopterus notopterus* and *Heteropneustes fossilis.*

The specimens of live fishes for the present work were collected from different areas like ‘Kalinadi’ of Meerut, ponds and rivers of the Hastinapur and Mawana (Meerut) by the help of fisherman.

The Fishes were brought to the laboratory were kept in glass aquaria to acclimatize the fish with the laboratory conditions. The blood from the fish was collected by taking out the fish from aquaria and made unconscious by stunning. In large size fishes, the blood was collected from the caudal vein while in small fishes; the blood was collected directly from the Heart. The blood was taken with the help of syringe and needle for the total R.B.C and W.B.C counting. Packed cell volume and hemoglobin concentration were analyzed within two hours after collection Red blood cells (R.B.C) and white blood (W.B.C.) were counted by Neubauer's improved haematocytometer using Hayem's and Turk's solution as a diluting fluid respectively.

a. Erythrocytes

The size of erythrocytes was measured in micrometer on air dried methanol fixed blood film by occulometer. A mean of 60 measurements was taken into consideration.

3.1 Total erythrocytes count

It is the number of RBC per cubic millimeter of blood. D'Amour and Blood (1954) method for TEC was followed along with Hayem's diluting fluid and Neubauer's haemocytometer. For the estimation of TEC, the blood was sucked in R.B.C pipette upto 0.5 mark and then it was diluted with Hayem's diluting fluid (0.5 gm mercuric chloride; 1.0 gm sodium chloride: 5.0 gm sodium sulphate in 200 ml. of distilled water) upto 101 mark and mixed thoroughly by rotating the pipette for about three minutes. In this way the dilution of blood becomes 200 times. After discarding first few drops, the improved Neubauer's chamber was charged with diluted blood. The erythrocytes were allowed to settle in the counting chambers for 5 - 10 minutes. After the RBCs got settled, their numbers were counted in the 5 squares, 4 at the corners and one at the centre of haemocytometer chamber. The total number of RBCs in 5 squares was multiplied by 10,000 to obtain total number erythrocyte count per cubic millimeter of blood. The same process was repeated for second haemocytometer chamber.

$$\text{RBC count} = \frac{\text{No. of cells counted X dilution X depth factor}}{\text{Area counted}}$$

Where,

Dilution = 200 times

Depth of blood film=1/10 mm

Area count 80/400=1/5 sq. mm

$$= \text{No. of cells counted X 200 X 10 X } 5$$

$$\text{RBC count} = \text{No. of cells counted X 10,000/ mm}^3$$

3.2. Erythrocyte Sedimentation Rate (ESR)

It presents the time taken for setting of erythrocytes under force of gravity. Wintrobe and Landsbergs's (1935), method for erythrocyte sedimentation rate was followed. The Wintrobe's haematocrit tubes were filled with anti-coagulated blood up to mark of 100 mm with the help of pipette and were places vertically on a stand. At regular intervals of one hour, the reading of the column, to which the erythrocytes had fallen, were noted.

3.3.Haemoglobin (Hb)

It is the concentration of haemoglobin present in the blood. For estimation of haemoglobin concentration, Sahli's method was followed.

The graduated haemoglobin tube was first rinsed with distilled water and then with the methylated spirit or 90% alcohol. After drying the tube, it was filled up to 2 gm mark (on percentage side) with deci normal hydrochloride acid. The blood was sucked in haemoglobin pipette upto 20 mm mark. The blood of haemoglobin pipette was then transferred carefully into the graduated tube containing N/10 HCl. After the blood was expelled, the pipette was rinsed twice or thrice with distilled water. Every time the contents of haemoglobin pipette were expelled into the graduated tube. The blood and N/10 HCl was stirred in the graduated dilution tube with the stirrer and then allowed to stand for about 10 minutes. In this treatment the haemoglobin was changed into acedic haematin and the mixture became dark brown in colour. Now N/10 HCl was added drop by drop and stirred continuously with stirrer till the colour of the content matched with that of the standard glass tube. The reading was noted to denote the concentration of haemoglobin in gms per 100 ml of blood.

4. RESULTS AND DISCUSSION

Notopterus notopterus

4.1 Red Blood Corpuscles (RBC)

During the present observation the decrease in RBC count was observed in the polluted water fishes. The mean value of RBC count was 2.06 million/cumm in fresh water specimen of N*otopterus notopterus* and the mean of RBC count was 1.99 Million/cumm in polluted water fishes which were corroborates with the findings of earlier workers like Sachdeva (1994), Singh (1995), Yoshinaga (2001) Joseph John (2007). According to these workers this could be due to haemolysis and haemorrhage and due to invading worms and disturbance in erythropoisis water pollution infection produces macrocytic anemia with decrease RBC Number.

4.2. Eryhrocyte Sedimentation Rate (ESR)

During the present investigation the ESR level increase in the polluted water fishes. The men value of ESR in fresh water fishes was 12.1mm/hr in fresh water fishes and the mean value of ESR in polluted water fishes was 22.4 mm/hr. These findings were also corroborates with the findings of Singh (1986) Saxena and Chauhan (1993), Joshi, *et al.* (2002), this could be due to the stress condition.

4.3. Hameoglobin (HB)

During the present investigation depletion of Hb concentration in polluted water fishes has been noticed throughout the experiments. The mean value of Hb concentration in fresh water fishes was 8.9gm% and the mean value of Hb concentration in polluted water fishes was 9.1gm%. It corroborates with the earlier findings of. Verdege *et al.* (1997) Shalaby (2001), Joseph John (2007). According to these workers decreased haemoglobin is due to as acid stress causes increase in erythropoisis, which might have not been followed by haemoglobin synthesis.

Heteropneustes fossilis

4.4. Red Blood Corpuscles (RBC)

During the present investigation, decrease in erythrocyte count was observed in polluted water fishes. The mean of RBC count in fresh water fishes was 1.95million/cumm and the

mean of RBC count in polluted water fishes was 2.02 million/cumm which corroborates with the findings of earlier workers like. Singh (1986) Murad and Mustafa (1988) Saxena and Seth (2002) and Shalaby (2001). According to these workers this is due to haemolysis and haemorrhage due to invading worms in polluted water.

4.5. Erythrocyte Sedimentation Rate (ESR)

During the present investigation increased in the ESR level was reported. The mean value of ESR in fresh water fishes was 10.9mm/hr and mean value was 55.8 mm/hr in the polluted water fishes. This could be due to the infection produced by the pollutants in the polluted water as discussed by the earlier workers like Joseph John (2007).

4.6. Hameoglobin (HB)

During the present investigation the regular decrease in haemoglobin was observed throughout the experiments. The mean value of Hb% in fresh water fish was 11.9gm% and 9.2 gm% in polluted water fishes. The decrease in Hb% is due to haemolysis or RBC and subsequent catabolism of Hb as observed by the earlier workers like Tor *et al.* (1987).

5. COCLUSION:

The haematological studies have been analyzed the effect of pollutants on blood parameters of two edible fishes. The blood parameters can be considered as a potential bio-indicators in assessing the physiological status of fish and the contained in this regard might also provides substantial on the quality of the water body as such. The review of the literature on haematological studies in fishes indicated that the data obtained from various fish species by various workers around the globe is not uniform. Since the fish are the most sensitive fauna any little change that occurs in their living media might have immediately influenced on their physiology. The result of present study indicates that entry of pollutants in the blood stream of fish promotes their ill effects on various blood parameters the reduction in RBCs and PCV and HB percentage indicates the occurrence of acute anemia such anemia in fishes is known to induced by various toxicant Agarwal *et al.* (1982). The polluted water fishes suggest the destruction of RBC which results in reduced oxygen carrying capacity of fish and ultimately death of fish. The gills and the body of the polluted fishes become pale whitish and colour less in contrast to the normal individuals in which the gills were dark red. Due to the toxic effect of pollutants present in water. The increased erythrocyte sedimentation rate (ESR) and decreased packed cell volume (PCV) account for the degradation of blood proteins in fish as observed by Bhatt (1985). The increase in TLC count can be correlated with a increase in antibody production which help in survival and recovery of the fishes exposed to the toxicants. Increase number of TLC and DLC values may be associated with the defense mechanism and immunological responses against infection caused by water pollution.

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