

Impact of Toxic Sediment on Hematological Aspects of *Tilapia Mossambica*

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Abstract:- In this study we procured toxic sediment from Amlakhadi water channel in Bhuj where paper, dye and textile industries were dumping their toxic wastes. We took *Tilapia mossambica* to test the toxicity of the sediment in the lab to find the NOEC for its hematological aspects.

I. AIM OF EXPERIMENT

The aim of experiment was to determine the NOEC (No Observation Effect Concentration) of toxic waste for each species of fish i.e. *Tilapia mossambica*.

A. Feeding

Diet, based on the fish protein requirement, was prepared. The fish were fed @ 5-10% of body weight once a day, in the morning. The feeding rate was adjusted as per requirement.

B. Sediment

Organic contents are in terms of organic carbons and organic matters, as well as nutrient load in terms of nitrogen and phosphates and heavy metals of the composite sediment, are presented in Table.

C. Survival of test organisms at toxic sediment

➤ Acute Toxicity

The value of LC50 of sediment to *Tilapia mossambica* was 12.5 gm/l, while the values of LC0 & LC100 were 6.5 & 25.0 gm/l respectively.

➤ Selection of Sub Lethal Doses

The three sub lethal doses for the fish for the fish i.e. *Tilapia mossambica* were taken as different fractions of their LC50 test values i.e. 12.5 gm/l.

The three sub lethal doses selected for *Tilapia mossambica* were 0.8, 0.5 & 0.3 gm/l.

Nutrient & Organic Load	
Organic carbon (%)	2.72
Organic matter (%)	4.7
Total Nitrogen (mg/100 gm)	245
Total Phosphorus (mg/100 gm)	49.5
Heavy Metal Concentration (in mg / 100 gm)	
Cadmium	6.0
Chromium	7.18
Copper	58.27
Lead	6.19
Iron	2763.5
Manganese	47.4
Zinc	109.75

Table 1:- Nutrient, Organic Load and Heavy Metal Concentrations in Composite Sediments from Amlakhadi Water Channel

D. Sampling

Needle was inserted between the two pectoral fins on the ventral side in the heart, and blood was drawn gently. The blood was mixed in a vial with anticoagulant.

Chemical required RBC Diluting fluid, WBC dilute fluid, alcohol, xylene., DPX Procedure Blood was collected from experimental fish to conduct the different studies. The hematological studies were conducted for *Tilapia mossambica* and *Channa punctatus* on 0, 5th, 10th, 20th and 30th days in triplicate.

II. RESULTS

A. Red Blood Corpuscles (RBC)

➤ *Tilapia mossambica*

Fig. 1 shows that there was gradual decrease in mean values of total count of RBC on 5th, 10th, 20th & 30th days, i.e. $12.533 \times 10^6/\text{mm}^3$, $11.5 \times 10^6/\text{mm}^3$, $9.38 \times 10^6/\text{mm}^3$ & $8.40 \times 10^6/\text{mm}^3$ compared to mean value of 0 day, i.e. $18.65 \times 10^6/\text{mm}^3$. Fig. 2 shows that there was initial decrease in mean values of total count of RBC on 5th, day i.e. $14.48 \times 10^6/\text{mm}^3$ and then gradually increased on 10th, 20th & 30th days, i.e. $15.27 \times 10^6/\text{mm}^3$, $16.75 \times 10^6/\text{mm}^3$ & $17.87 \times 10^6/\text{mm}^3$ compared to mean value of 0 day i.e. $18.65 \times 10^6/\text{mm}^3$. Fig. 3 shows that mean values of total count of RBC moved around $18.65 \times 10^6/\text{mm}^3$ on 0 day. Fig. 4

shows that mean values of total count of RBC moved around $18.72 \times 10^6/\text{mm}^3$ on 0 day.

B. White Blood Corpuscles (WBC)

➤ *Tilapia Mossambica*

Fig. 5 shows that there was gradual increase in mean values of total count of WBC on 5th, 10th, 20th & 30th days i.e. $7.59 \times 10^4/\text{mm}^3$, $10.20 \times 10^4/\text{mm}^3$, $11.25 \times 10^4/\text{mm}^3$ & $12.23 \times 10^4/\text{mm}^3$ compared to mean value of 0 day i.e.

$10.24 \times 10^4/\text{mm}^3$. Fig.6 shows that there was decrease in mean values of total count of WBC on 5th day i.e. $8.12 \times 10^4/\text{mm}^3$ & then there was gradual increase on 10th, 20th & 30th days, i.e. $7.59 \times 10^4/\text{mm}^3$, $10.20 \times 10^4/\text{mm}^3$, $11.25 \times 10^4/\text{mm}^3$ & $12.23 \times 10^4/\text{mm}^3$ compared to mean value of 0 day, i.e. $10.24 \times 10^4/\text{mm}^3$. Fig. 7 shows that mean values of total count of WBC moved around $10.29 \times 10^6/\text{mm}^3$ on 0 day. Fig. 8 shows that mean values of total count of WBC moved around $10.13 \times 10^6/\text{mm}^3$ on 0 day.

Tilapia 0.8 gm/l

Days	RBC	Std.Error
0	18.7	
0	18.6	
0	18.65	18.65 0.028868
5	12.5	
5	12.9	
5	12.2	12.53333 0.202759
10	12	
10	11.5	
10	11	11.5 0.288675
20	9.9	
20	9	
20	9.25	9.383333 0.268225
30	8.65	
30	8.55	
30	8	8.4 0.202073

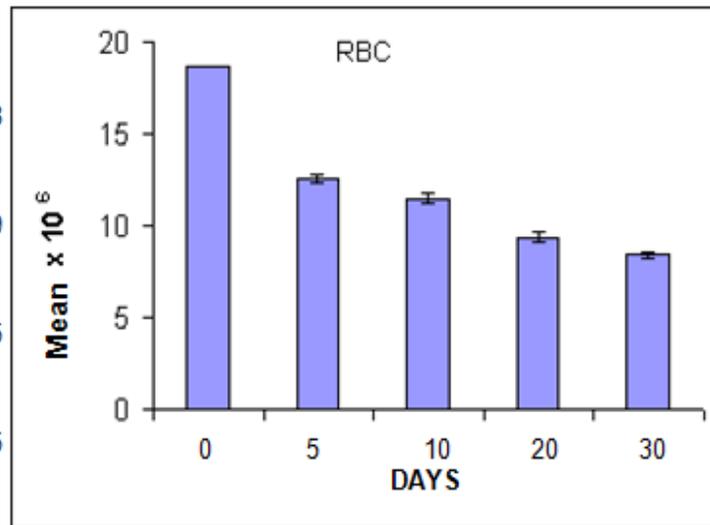


Fig 1:- Hematological Graph of *Tilapia Mossambica*

Tilapia 0.8 gm/l

Days	WBC	Mean	Std.Error
0	10		
0	10.4		
0	10.31	10.23667	0.121152
5	7.9		
5	7.5		
5	7.38	7.593333	0.157198
10	10.1		
10	10		
10	10.5	10.2	0.152753
20	11		
20	11.25		
20	11.51	11.25333	0.147234
30	12		
30	12.2		
30	12.5	12.23333	0.145297

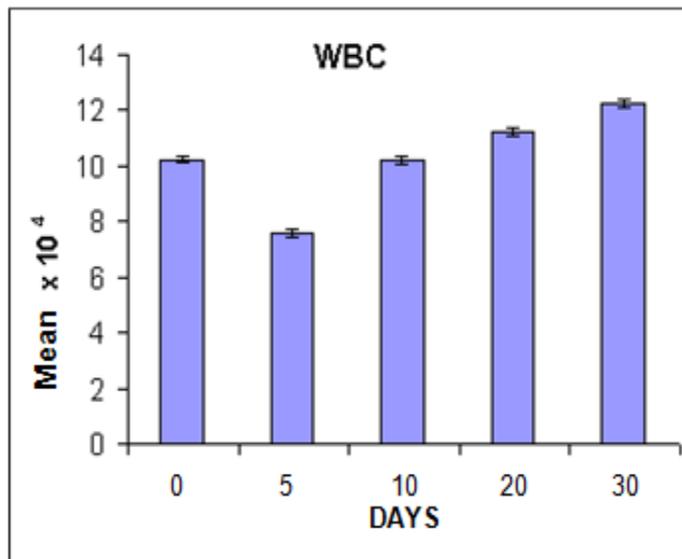


Fig 2:- Hematological Graph of *Tilapia Mossambica*

Tilapia 0.5 gm/l

Days	RBC	Mean	Std.Error
0	18.7	18.72667	0.01453
0	18.75		
0	18.73		
5	14.5	14.48333	0.15899
5	14.75		
5	14.2		
10	15	15.26667	0.145297
10	15.5		
10	15.3		
20	16.75	16.75	0.144338
20	17		
20	16.5		
30	17.5	17.87	0.187705
30	18		
30	18.11		

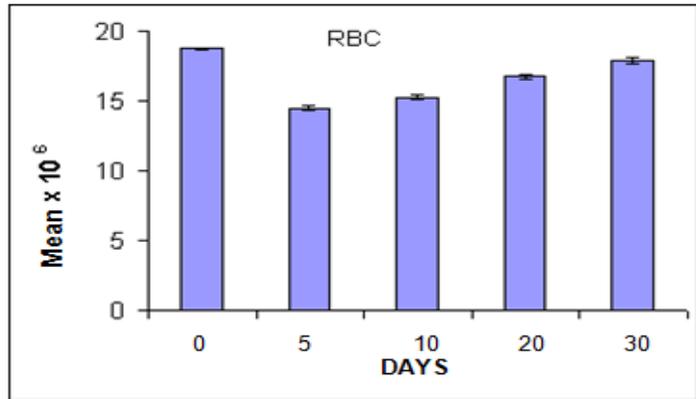


Fig 3:- Hematological Graph of *Tilapia Mossambica*

Tilapia 0.5 gm/l

Days	WBC	Mean	Std.Error
0	10	10.13333	0.088192
0	10.1		
0	10.3		
5	8	8.113333	0.066416
5	8.11		
5	8.23		
10	8.5	8.686667	0.101708
10	8.71		
10	8.85		
20	9.5	9.316667	0.15899
20	9		
20	9.45		
30	9.8	9.9	0.057735
30	9.9		
30	10		

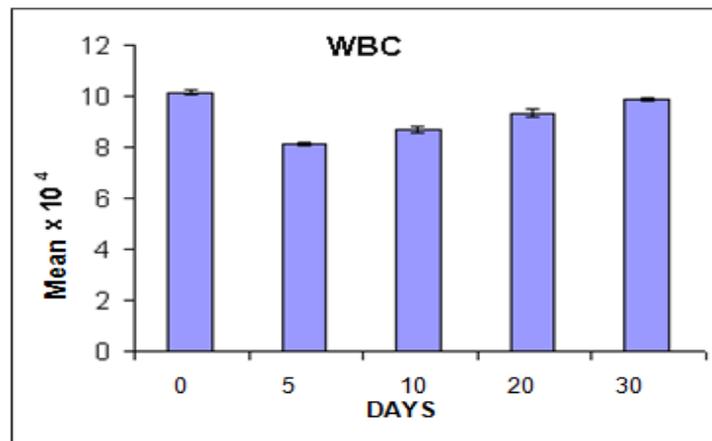


Fig 4:- Hematological Graph of *Tilapia Mossambica*

Tilapia 0.3 gm/l

Days	RBC	Mean	Std.Error
0	18.71	18.65333	0.077531
0	18.75		
0	18.5		
5	18.55	18.56	0.049329
5	18.65		
5	18.48		
10	18.4	18.35	0.028868
10	18.35		
10	18.3		
20	18.25	18.27333	0.012019
20	18.28		
20	18.29		
30	18.3	18.29667	0.031798
30	18.35		
30	18.24		

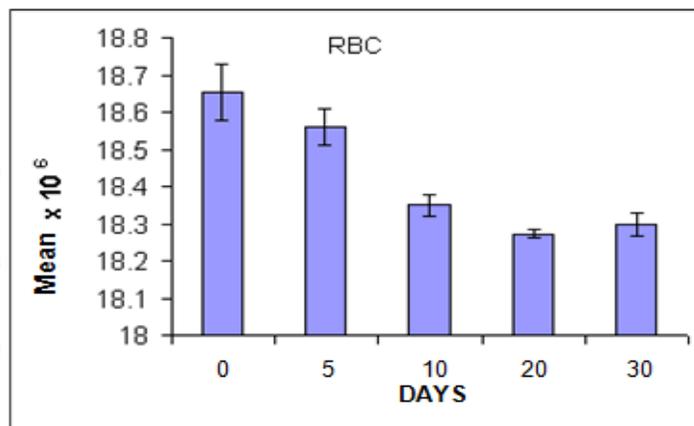


Fig 5:- Hematological Graph of *Tilapia Mossambica*

Tilapia 0.3 gm/l

Days	WBC	Mean	Std.Error
0	10		
0	10.44		
0	10.45		
5	10.25	10.29667	0.148361
5	10.11		
5	10.5		
10	10.65	10.28667	0.114066
10	10.7		
10	10.71		
20	10.75	10.68667	0.018559
20	10.88		
20	10.81		
30	10.95	10.81333	0.037565
30	10.91		
30	10.9		
		10.92	0.015275

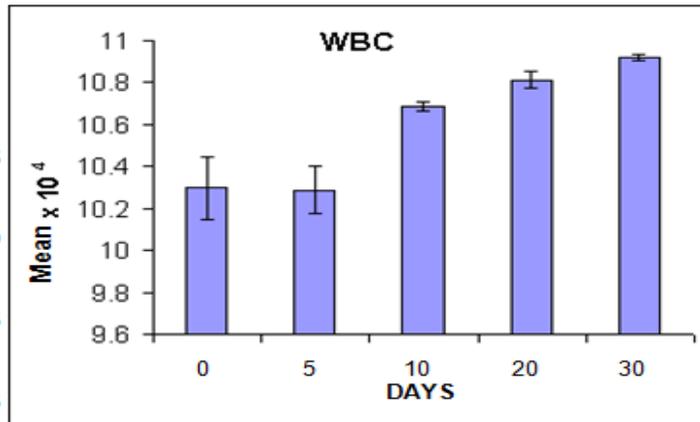


Fig 6:- Hematological Graph of *Tilapia Mossambica*

Tilapia Control

Days	RBC	Mean	Std.Error
0	18.7		
0	18.75		
0	18.73	18.72667	0.01453
5	18.65		
5	18.6		
5	18.61	18.62	0.015275
10	18.55		
10	18.5		
10	18.58	18.54333	0.023333
20	18.48		
20	18.49		
20	18.45	18.47333	0.012019
30	18.47		
30	18.35		
30	18.3	18.37333	0.050442

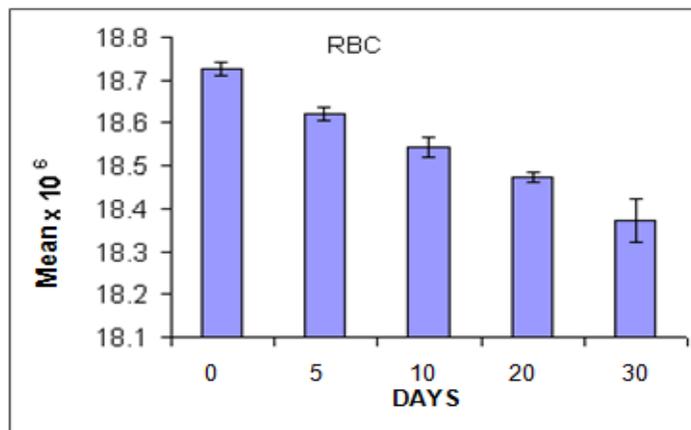


Fig 7:- Hematological Graph of *Tilapia Mossambica*

Tilapia Control

Days	WBC	Mean	Std.Error
0	10		
0	10.1		
0	10.3	10.13333	0.088192
5	10.5		
5	10.8		
5	10.7	10.66667	0.088192
10	10.91		
10	10.81		
10	10.95	10.89	0.041633
20	10.97		
20	10.9		
20	10.92	10.93	0.020817
30	10.95		
30	10.98		
30	10.9	10.94333	0.023333

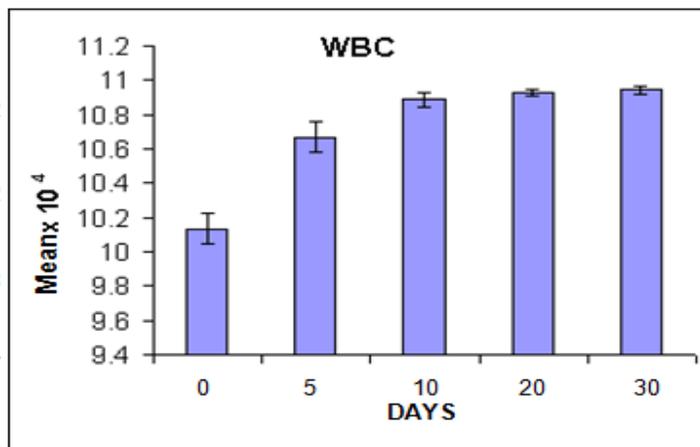


Fig 8:- Hematological Graph of *Tilapia Mossambica*

III. DISCUSSION

➤ *Tilapia Mossambica*

RBC count at 0.8 gm/l sediment showed sharp decrease as the experiment progresses coming around 8.4×10^6 at the end of the 30 day experiment from 0 day value i.e. 18.65×10^6 , while WBC count showed initial decrease on 5th day but increase on 10th, 20th & 30th day, coming to 12.23×10^4 at the end of the 30 day experiment from the 0 day value i.e. 10.24×10^4 .

RBC count at 0.5 gm/l sediment showed initial decrease on 5th day and then gradually increasing on 10th, 20th & 30th day coming around normal count of 0 day i.e. 18.73×10^6 . WBC count showed initial decrease on 5th day but increase on 10th, 20th & 30th day coming around normal count on 0 day i.e. 10.13×10^4 .

RBC count as well as WBC count moves around normal value on 0 day i.e. 18.7×10^6 & 10.13×10^4 respectively throughout the 30 day experiment.

IV. CONCLUSION

Hematological parameters, such as RBC count and WBC count are highly sensitive to physiological condition of the fish. It can be used as an important tool to obtain information about internal disturbance before fish shows any external symptoms.

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