

Impact of Toxic Sediment on Hematological Aspects of *Channa Punctatus*

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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 *Channa punctatus* 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. *Channa punctatus*.

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 matter, 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

LC50 value of *Channa punctatus* was 25.5 gm/l, while values of LC0 & LC100 were 50.0 & 12 gm/l respectively.

➤ Selection of Sub Lethal Doses

The three sub lethal doses for *Channa punctatus* were taken as different fractions of their LC50 test values i.e. 25.5 gm/l. The three sub lethal doses selected for *Channa punctatus* were 1.2, 0.8 & 0.5 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

The fishes were caught gently and stress was avoided during the time of handling. Fishes were held horizontally by hand and absolute alcohol was swabbed, where the needle was inserted. Hypodermic needle of 24 gauge and 1-inch length 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 *Channa punctatus* on 0, 5th, 10th, 20th and 30th days in triplicate.

II. RESULTS

➤ Red Blood Corpuscles (RBC)

Fig. 1 shows that there was gradual decrease in mean values of total count of RBC on 5th, 10th, 20th & 30th days i.e. $16.83 \times 10^6/\text{mm}^3$, $8.88 \times 10^6/\text{mm}^3$, $6.56 \times 10^6/\text{mm}^3$ & $5.92 \times 10^6/\text{mm}^3$ compared to mean value of 0 day i.e. $40.42 \times 10^6/\text{mm}^3$. Fig. 2 shows that there was initial decrease in mean values of total count of RBC on 5th, day i.e. $27.5 \times 10^6/\text{mm}^3$ and then gradually increased on 10th, 20th & 30th days i.e. $32.33 \times 10^6/\text{mm}^3$, $40.0 \times 10^6/\text{mm}^3$ & $43.3 \times 10^6/\text{mm}^3$ compared to mean value of 0 day, i.e. $44.67 \times 10^6/\text{mm}^3$. Fig. 3 shows that mean values of total count of RBC decreased slightly to $31.68 \times 10^6/\text{mm}^3$ on 30th day as compared to $44.67 \times 10^6/\text{mm}^3$ on 0 day. Fig. 4 shows that mean values of total count of RBC decreased slightly to

31.23x10⁶/mm³ on 30th day as compared to 44.25x10⁶/mm³ on 0 day.

➤ *White Blood Corpuscles (WBC)*

Fig. 5 shows that there was gradual increase in mean values of total count of WBC on 5th, 10th, 20th & 30th days i.e. 21.13x10⁴/mm³, 34.23x10⁴/mm³, 40.2x10⁴/mm³ & 40.78x10⁴/mm³ compared to mean value of 0 day i.e.

33.5x10⁴/mm³. Fig. 6 shows that there was decrease in mean values of total count of WBC on 5th day i.e. 27.33x10⁴/mm³ & then there was gradual increase on 10th, 20th & 30th days i.e. 30.73x10⁴/mm³, 32.43x10⁴/mm³ & 33.72x10⁴/mm³ compared to mean value of 0 day i.e. 34.23x10⁴/mm³. Fig. 7 shows that mean values of total count of WBC moved around 33.77x10⁶/mm³ on 0 day. Fig. 8 shows that mean values of total count of WBC moved around 33.57x10⁶/mm³ on 0 day.

Channa 1.2 gm/l

Days	RBC	Mean	Std.Error
0	40.52		
0	40.5		
0	40.25	40.42333	0.086859
5	15		
5	17		
5	18.5	16.83333	1.013794
10	8.9		
10	8.5		
10	9	8.8	0.152753
20	6.4		
20	6.5		
20	6.8	6.566667	0.120185
30	5.96		
30	6		
30	5.8	5.92	0.061101

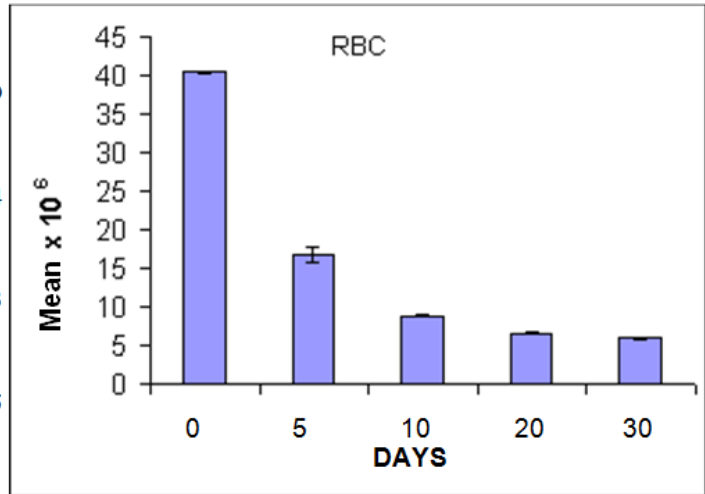


Fig. 1:- Hematological Graph of *Channa Punctatus*

Channa 1.2 gm/l

Days	WBC	Mean	Std.Error
0	34		
0	33		
0	33.5	33.5	0.288675
5	20		
5	21.5		
5	21.9	21.13333	0.578312
10	34.5		
10	34		
10	34.2	34.23333	0.145297
20	40.1		
20	40.5		
20	40	40.2	0.152753
30	40.6		
30	40.9		
30	40.85	40.78333	0.092796

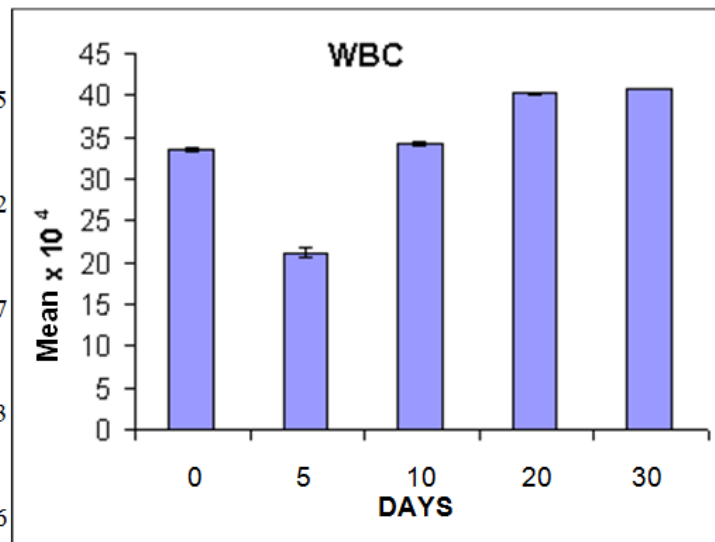


Fig. 2:- Hematological Graph of *Channa Punctatus*

Channa 0.8 gm/l

Days	RBC	Mean	Std.Error
0	45.2		
0	45		
0	43.8	44.66667	0.437163
5	25		
5	28		
5	29.5	27.5	1.322876
10	30		
10	32		
10	35	32.33333	1.452966
20	40		
20	41		
20	39	40	0.57735
30	42.1		
30	43.8		
30	44	43.3	0.602771

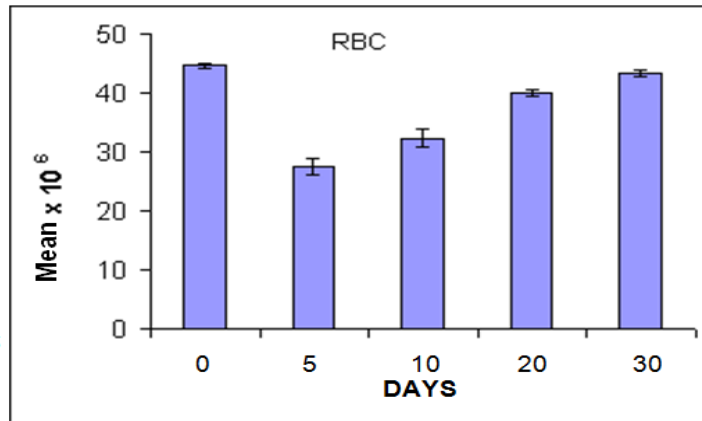


Fig. 3:- Hematological Graph of *Channa Punctatus*

Channa 0.8 gm/l

Days	WBC	Mean	Std.Error
0	34		
0	34.2		
0	34.5	34.23333	0.145297
5	25		
5	28		
5	29	27.33333	1.20185
10	30.5		
10	30.8		
10	30.9	30.73333	0.120185
20	32		
20	32.5		
20	32.8	32.43333	0.233333
30	33.75		
30	33.5		
30	33.91	33.72	0.119304

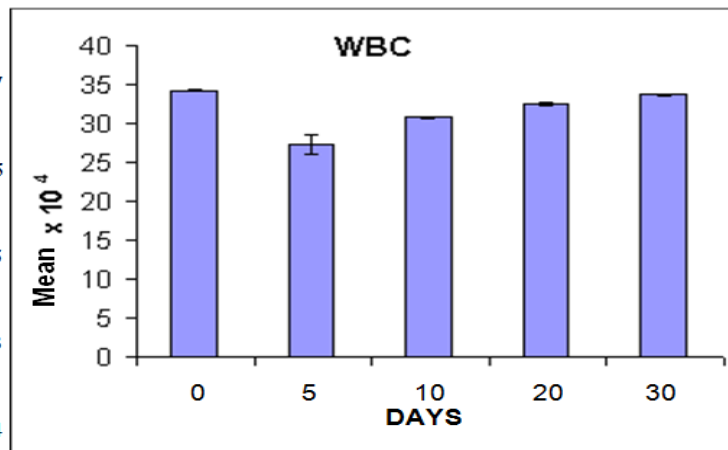


Fig. 4:- Hematological Graph of *Channa Punctatus*

Channa 0.5 gm/l

Days	RBC	Mean	Std.Error
0	45		
0	45.2		
0	43.8	44.66667	0.437163
5	34.1		
5	38		
5	37	36.36667	1.16952
10	35		
10	35		
10	37	35.66667	0.666667
20	34		
20	30		
20	31	31.66667	1.20185
30	33		
30	32		
30	30	31.66667	0.881917

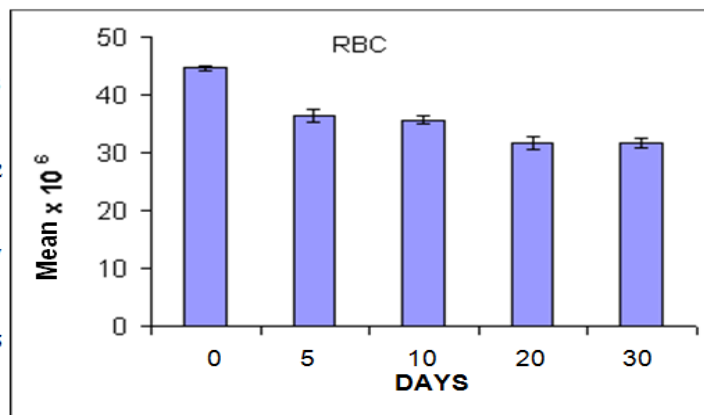


Fig 5:- Hematological Graph of *Channa Punctatus*

Channa 0.5 gm/l

Days	WBC	Mean	Std.Error
0	34		
0	33.8		
0	33.5	33.76667	0.145297
5	34.4		
5	33.7		
5	33.1	33.73333	0.375648
10	34		
10	33.9		
10	34.1	34	0.057735
20	34		
20	34.2		
20	34.3	34.16667	0.088192
30	34.3		
30	34		
30	34.2	34.16667	0.088192

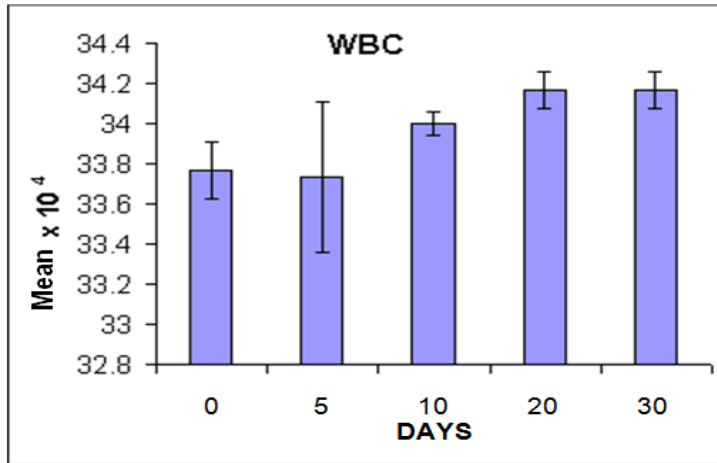


Fig 6:- Hematological Graph of *Channa Punctatus*

Channa Control

Days	RBC	Mean	Std.Error
0	45.25		
0	40		
0	47.5	44.25	2.222049
5	40		
5	37.5		
5	39	38.83333	0.726483
10	35		
10	37.1		
10	36.9	36.33333	0.669162
20	32		
20	35		
20	33.8	33.6	0.87178
30	30		
30	31		
30	32.7	31.23333	0.788106

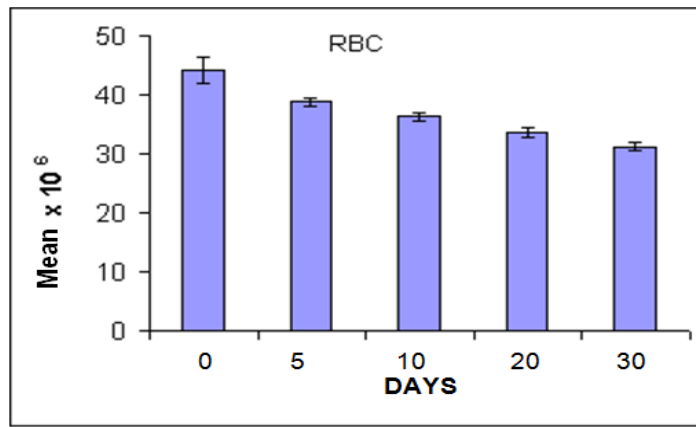


Fig 7:- Hematological Graph of *Channa Punctatus*

Channa Control

Days	WBC	Mean	Std.Error
0	34		
0	33		
0	33.7	33.56667	0.296273
5	32		
5	32.15		
5	32.55	32.23333	0.164148
10	33.8		
10	33.5		
10	33	33.43333	0.233333
20	34		
20	34.2		
20	34.5	34.23333	0.145297
30	34.5		
30	34.4		
30	34.7	34.53333	0.088192

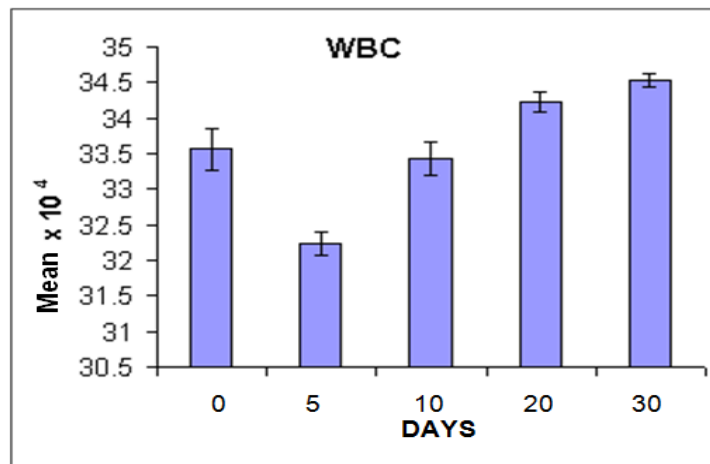


Fig 8:- Hematological Graph of *Channa Punctatus*

III. DISCUSSION

➤ *Channa Punctatus*

RBC count at 1.2 gm/l sediment showed sharp decrease coming to 5.92×10^6 on 30th day from 0 day count i.e. 40.42×10^6 , while WBC count showed initial decrease on 5th day but gradual increase on 10th, 20th & 30th day coming to 40.78×10^4 at the end of the experiment.

RBC count at 0.8 gm/l sediment showed initial decrease on 5th day and then gradual increase on 10th, 20th & 30th day coming around normal count of 44.67×10^6 . WBC count showed initial decrease on 5th day but increase on 10th, 20th & 30th day coming around normal count of 34.23×10^4 .

RBC count at 0.5 gm/l sediment slightly decreasing from 44.67×10^6 of 0 day value to 31.67×10^6 at the end of the 30 day experiment while WBC count moved around normal value on 0 day i.e. 33.77.

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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