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## Seasonal variation in the blood coagulation time of *Heteropneustes fossilis*

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**Abstract-** The current study examined seasonal variations in the blood coagulation time of *Heteropneustes fossilis* in both sexes from January to December 2022. Notable were the greatest and minimum coagulation times in the months of December and June, as well as the non-significant variation in coagulation times between the sexes. It was also observed that the clotting time increased gradually from January to June and then steadily decreased from July to December. The fish's blood clotting time may gradually increase and drop due to a series of increases in ambient temperature from January to June and a gradual decrease in temperature from July to December.

**Key words:** Coagulation, *Heteropneustes fossilis*, Temperature, Seasonal Variation, Blood.

### INTRODUCTION

Bihar is the state of variable seasons. Different seasons influence the environment and consequently changes in the physio-biochemical properties of poikilothermic vertebrates are also inevitable. However, little is known about the physiological adjustments which have evolved among these poikilothermic fishes in response to the stresses of their environment. Few reports regarding the effect of temperature on the blood coagulation time of fishes are available.<sup>1,2</sup> But no study has been made in the past as to the influence of different seasons on the clotting time of blood of the fish. The present paper deals with the responses of the blood clotting time to the fish to different seasons of a year.

### MATERIALS & METHODS

Specimen of both the sexes of *Heteropneustes fossilis* were collected with the help of fishermen from local Dighi tank and Keoti Darbhanga at regular intervals of six days in each month. Each year was divided into four seasons – Monsoon (June – August), Post – monsoon (September – November), Winter (December – February) and Summer (March – May). Only healthy and adult fishes of more or less equal weight (the range of variation not exceeding 10 gm). Investigations were made on five specimens of each sex in every month of the year. Clotting time of blood was determined by “Capillary-glass-tube method”. Statistical analysis of the recorded data was made by ‘t’ test, simple analysis of variation and bar notations.

### RESULTS

Non-significant difference in the clotting time of blood between the two sexes of *Heteropneustes fossilis*

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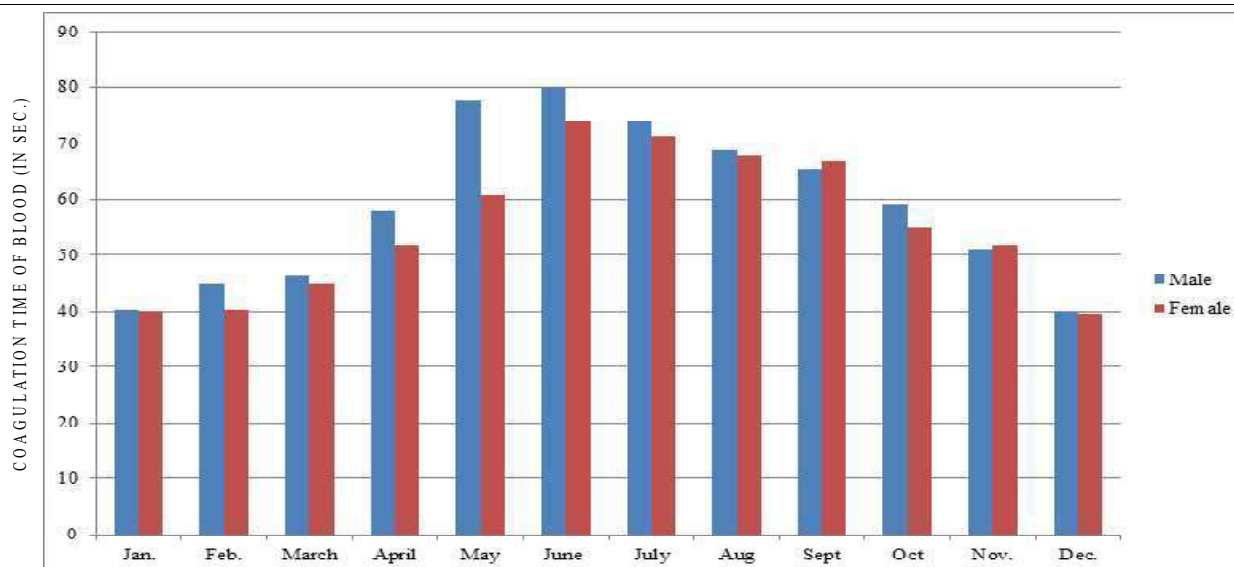
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was noticed (T value = 1.3915 at 1%). In both the sexes the minimum and the maximum values of clotting time were recorded in the month of December and June respectively. It was further marked that there was a gradual increase in its time from January to June followed by a steady fall from July to December (Fig. 1). The analysis of variation showed highly significant variability in the clotting time of blood in male and female fish in different months of the year. The 'F' ratio was highly significant (F 188.59 in male and 127.75 in female with DF 59) at 0.01 level of P. From the bar notation of the recorded data it was evident that in male *Heteropneustes fossilis* the increase in the clotting time from January to February and

between March and May were statistically significant (P 0.01). However, it was non-significant between February and March and May and June. Again the fall in the clotting time from June to August and September to December were statically highly significant though it was non-significant between August and September (Table – 1). In the case of female, the increase in the clotting time from February to June was statistically significant but it was non-significant between January and February. Again, the fall in the clotting time between June and July, July and August, August and September was well as between October and November were statically non-significant. However, it was significant between September and October as well as November and December.

**Table 1- Showing bar nations of the mean values of clotting time of blood of male and female *Heteropneustes fossilis* in different months of a year (P<0.01)**

MALE												
Months of Observation	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Clotting time in seconds (mean value)	40.2	44.8	46.2	57.8	77.4	79.8	73.8	68.8	65.4	59.2	51.0	40.0
		S.E.± 1.05,			C.D. at 1% = 3.99							
FEMALE												
Clotting time in seconds (mean value)	40.0	40.2	44.8	51.8	60.8	73.8	71.4	67.8	67.0	55.0	51.8	39.6
		S.E.± 1.12,			C.D. at 1% = 4.25							



**Fig. 1- Showing seasonal variation in the coagulation time of blood of male and female *Heteropneustes fossilis***

## DISCUSSION

Banerjee and Banerjee (1988)<sup>3</sup> observed no definite increasing and decreasing trends in the clotting time of any sex of *Heteropneustes fossilis* and *Rita rita* during summer, rainy and winter seasons. They also noticed non-significant difference in the clotting time of both the sexes in two fishes. Direct relation of temperature with the clotting time of blood of fish has been reported by a few investigators. Akela (1983)<sup>2</sup> suggested that the increase in the clotting time at high temperature was due to fall in the Plasma Protein level of the fish causing deficiency in the Thromboplastin, Prothrombin and Fibrinogen. Poonam (1987)<sup>4</sup> opined that the fall in the clotting time of fish at low temperature was due to activation of factor V by enhanced production of epinephrine. Recent studies with the teleosts *D. rerio*<sup>5,6</sup> and *F. rubripes*<sup>7</sup> reported the presence of the gene for vit.-K dependent factor, such as factor VII, IX, X & prothrombin.

## CONCLUSION

The present investigation on both sexes of *Heteropneustes fossilis* was made from January 2022 to December 2022 to explore seasonal variation in its blood coagulation time. A non-significant difference in the coagulation time in the two sexes and its maximum and minimum values in the months of December and June were noteworthy. A gradual increase in the clotting time from January to June followed by a steady decrease in its time from July to December was also recorded. Successive rise in environmental temperature from January to June and gradual fall in temperature from July to December might be responsible for gradual increase and decrease in the clotting time of blood of the fish.

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