

Studies on blood volume in a teleostean fish, *Mystus bleekeri* in relation to body weight in summer and winter seasons

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ABSTRACT

The total blood volume, relative (%) blood volume and haematocrit value of *Mystus bleekeri* of six different weight groups ranging from 24 to 76 grams were studied in winter and summer months at water temperatures of 18°C and 28°C. The total blood volume at both temperatures increased from lower to higher weight groups. The correlation coefficient between total blood volume and body weight were 0.8587 at 18°C and 0.9946 at 28°C. Total blood volume in all weight groups was greater at the higher temperatures and most results were statistically significant. The relative blood volume and haematocrit decreased from lower to higher groups at both temperatures.

Figures : 03

References : 18

Tables : 03

KEY WORDS : Blood volume, *Mystus bleekeri*, Summer, Winter months

Introduction

The direct method for blood volume determination was first employed¹⁸ in 1858 but it is only recently that improved techniques have been devised to study the blood volume of fishes⁸. Effects of sex and maturity on blood volume in *Chimaera colliei*, *Squalus sucklii* and *Raja* species² were investigated. The blood volume of wild and pond carps and the blood volume of Salmonids^{4,7} were measured.

Workers¹⁰ considered wider parameters and compared the blood volume in animals with open and closed circulatory systems. Another worker¹⁷ while studying the body fluids in Osteichthyes discussed their phylogenetic and ecological implications in aquatic vertebrates and measured the fluid compartments in sea lamprey and marine Chondrichthyes. The effects of environmental temperature and thermal acclimatization on the body fluid and blood volume of fishes have received relatively little attention from fish biologists. The works⁶ on environmental temperature and the body fluid systems of freshwater teleosts and on the effect of exercise on the distribution of blood to various organs of rainbow trout are of special interest.

In aquatic animals like fishes, gaseous exchange takes place between blood and water through the gills and body surfaces. In some tropical freshwater fishes special structures have evolved in response to exceptional environmental conditions. The accessory respiratory

organs enable the fish to tolerate oxygen depletion in water or to live out of water for short periods. The blood of terrestrial animals and fishes function as carrier of respiratory gases mainly bound to haemoglobin in erythrocytes and also dissolved in blood plasma¹ Therefore, not only the haemoglobin concentration per unit volume of blood, but also the determination of total blood volume of a particular animal is important. It is of much interest for respiratory physiologists to know if there is any relationship between total blood volume and respiratory surface area of fishes.

The present investigation on *Mystus bleekeri* was undertaken to study the effect of seasonal temperature on the absolute and relative blood volume and its relationship with the body weight.

Material and Methods

Fishes of different size and weight were collected from the ponds of Hazaribag but mostly through the local fish dealers. They were transported to laboratory and kept in glass aquarium. The animals were kept under intensive care and were fed on chopped goat liver. Weights of each group were maintained almost constant in the laboratory.

Quantitative measurements of blood volume were made during November when the average water temperature of aquaria was 18°C, and in April when the average water temperature rose to 28°C. Fishes of different sizes were divided into six weight groups viz., 24-25 g, 30-