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PARASITOLOGICAL ASPECTS AND BIOCHEMICAL CHANGES OF INFECTED *DASYATIS WALGA* (MULLER & HENLE) FROM WEST COAST OF MAHARASHTRA, INDIA

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Abstract:

This study evaluated the biochemical interactions between the marine stingray Dasyatis walga (Müller & Henle, 1841) and its common intestinal cestode parasites along Maharashtra's West Coast in India. Marine elasmobranchs frequently act as definitive hosts for diverse tapeworm species, which colonize the spiral valve and alimentary canal, subjecting the host to marked physiological stress. To assess the degree of metabolic disruption and nutrient depletion induced by these internal parasites, a comparative quantitative analysis was performed on vital macromolecular constituents—namely total glycogen, protein, and lipid profiles. These biochemical concentrations were quantified and evaluated across three distinct groups: the somatic tissues of adult cestodes, the parasitized intestinal mucosa of infected stingrays, and normal, uninfected host intestinal tissues. The resulting comparative data clarify how parasite burden alters macromolecular storage in marine elasmobranchs, shedding light on nutrient partitioning and energetic drain across the host-parasite dynamic.

Keywords: *Dasyatis walga, Tylocephalum walgai n.sp, Cestode Parasite, Biochemistry, Glycogen, Proteins, Lipids, West Coast of Maharashtra.*

1. Introduction

All diseases are manifestations of abnormalities in cellular biomolecular chemical reactions or processes. Helminth infections, common in almost all vertebrates, are mostly caused by obligatory parasites. Once a parasite enters the host's organ, it generally adapts itself and causes pathological changes, which may include mechanical damage, the effect of toxic substances, and sometimes a decline in growth. The literature reveals that carbohydrates play a more important role in cestodes than in most other parasitic worms, which are characterized by different growth patterns, and carbohydrates are utilized exogenously. Their mechanism of uptake is not

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entirely known. However, the evidence indicating that this takes place via active transport, as in vertebrate cells, is now impressive (1, 2, 3).

Proteins form one of the most important and complex groups of biological materials, as they form the chief nitrogenous constituents of the tissues of the body. A group of substances called enzymes, which are responsible for all the chemical transformations taking place in the body, are also protein in nature. Proteins serve as structural components, biocatalysts, hormones, and repositories for the genetic information characteristic of a species. They are colloidal in nature, non-diffusible, and possess high molecular weights. When a protein is denatured, it loses all its biological properties (4).

There is considerable variation in lipids from species to species and in the degree of lipid content. Variation is also seen in the regions of the worm being experimented on; thus, total lipid tends to be somewhat meaningless unless the degree of maturity is known. The lipid content of the same species grown in different hosts may vary substantially. For example, *Hymenolepis diminuta* from Hamessten contained 9.5% lipid (dry weight) (5), and those from Long Evans rats contained 16.5% (dry weight) (6). In *Hymenolepis diminuta*, the lipids tend to be more abundant in the posterior proglottids (7). Figures for total lipids thus tend to be somewhat meaningless unless the degree of maturity is known.

2. Material and method

The collected cestodes were blotted dry using absorbent filter paper to eliminate surface moisture and placed into a pre-weighed watch glass to determine their initial wet mass on a precision analytical balance. The specimens were subsequently dehydrated in a hot-air oven maintained at 58–60°C for 24 hours until a constant dry weight was achieved. After recording the final dry biomass, the desiccated tissue was homogenized into a fine powder for biochemical profiling. The glycogen estimation was carried out using the method of De Zwaan and Zandee (8). The estimation of protein content in the parasite was carried out using Lowry's method (9), and lipid estimation was performed using the method of Barnes and Blackstock (10).

3. Observation

Biochemical content in the intestine of *Dasyatis walga* (Muller & Henle) and its parasites.

Table 1: Biochemical estimation of *Tylocephalum walgai* n.sp. from *Dasyatis walga* (Muller & Henle)

Sr. No.	Tissue	Glycogen	Protein	Lipid
1	Normal Intestine	78.59 ± 0.42 mg/100mg	37.84 ± 1.2 mg/100mg	10.06 ± 0.46 mg/100mg
2	Infected Intestine	76.51 ± 1.23 mg/100mg	36.078 ± 0.46 mg/100mg	8.09 ± 0.81 mg/100mg
3	*Tylocephalum walgai* n. sp.	69.9 ± 1.01 mg/100mg	33.12 ± 0.47 mg/100mg	4.71 ± 0.47 mg/100mg

4. Result and discussion

Table 1 shows the mean percentage of glycogen in *Tylocephalum walgai* n. sp. (69.9 ± 1.01), which was lower than in the infected (76.51 ± 1.23) and uninfected (78.59 ± 0.42) intestinal tissues of *Dasyatis walga* (Muller & Henle). Table 1 also shows the mean percentage of protein in *Tylocephalum walgai* n. sp. (33.12 ± 0.47), which was lower than in the infected (36.078 ± 0.46) and uninfected (37.84 ± 1.2) intestinal tissues of *Dasyatis walga* (17).

Furthermore, Table 1 shows the mean percentage of lipid in *Tylocephalum walgai* n. sp. (4.71 ± 0.47), which was lower than in the infected (8.09 ± 0.81) and uninfected (10.06 ± 0.46) intestinal tissues of *Dasyatis walga* (17). The present study correlates with the results recorded by Vykhrestiuk *et al.* (11), where they observed that the cestode parasites *Raillietina tetragona* and *Raillietina echinobothrida* infection affects the lipid content of chicken intestines, resulting in a decrease in triglycerides and oleic acid quantities and an increase in the amount of free acids and stearic acids. The lipid content is higher in the parasitic tissue compared to their host. It seems that the parasites take benefit from their host and are thus absorbing most of the lipid content from the host. The parasites are fulfilling their needs from the host and are, in a way, disturbing the development of the host. This high level of lipid content may be because the parasites are often absorbing the lipid store for further processes, and the lipids are exhausted very slowly.

5. Conclusion

The biochemical estimation of glycogen, protein, and lipid from the cestode parasite *Tylocephalum walgai* n. sp., from the host Dasyatis walga, and the infected and uninfected intestinal tissues of the host were carried out. From the results, it can be concluded that the fish species examined could have suffered malnutrition due to the cestode infection. This condition may result in a devaluation of glycogen, protein, and lipid content in the body of the fish. Invariably, protein deficiency impairs normal metabolism, particularly in man. Therefore, the infected fish can transmit disease to man, resulting in poor public health.

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