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Studies on glycogen profile of cestodes of *Capra hircus*

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Abstract

The present investigation deals with the content of glycogen in different regions of cestode parasites of *Capra hircus*. The present study indicates that the amount of glycogen is lower in the immature proglottids of both the tapeworms than mature and gravid proglottids. The amount of glycogen present in all cestode parasites are some variable due to its size and habitat.

Keywords: Cestodes, *Capra hircus*, Glycogen Profile

INTRODUCTION

Carbohydrates are the chief energy source in parasitic cestodes. Glucose is very important energy source for many helminthes inhabiting the gut of vertebrates. It is generally belived that helminthes absorb glucose against a concentration gradient and use their endogenous carbohydrates as an energy source only when it is unobtainable from outside. Similarly, glycogen in most of the cestodes provides a significant reserve store of energy, particularly in forms which are parasitic in animals and which exist in environments of low oxygen tension. The cestode parasites utilize the food from the intestinal gut of host. The metabolism depends on the feeding habits and the rich nourishment available in the gut of the host. The parasites use this nourishment for their normal development and growth. A major part of energy source utilized by the parasite is from Carbohydrates, the percentage and location of Carbohydrates in the host, where the environment is rich for nourishment normal development and reproduction of the parasite is accounted in the host diet. The host carbohydrate also has an effect of growth; worms grow better in a host, feed on protein free diet containing carbohydrates.

Some workers have been previously experimented on the Carbohydrate metabolism of *Oochoristica, Moniezia expansa, Moniezia benedini, Taenia saginata, H. nana, H. utelii, H. diminuta Phylobothrium folliatum, Echinococcus, Diphylidium caninum, Taenia pisiformis, Taenia crossiceps* and *Bothriocephalus gowkongensis*. The quantative values found in previous and of many the recent literature viz. Woodland (1923) Read et al. (1956,1958,1967), Von Brand (1950,1960, 1966)and others have been obtained by rather unspecific chemical method, there often given higher values than those obtained by means of an enzymatic procedure (Glucose oxidize); Daughtry and Taylor (1956) studied regional distribution of glycogen in cestode of rat, Goodchild (1961) studied carbohydrate content of cestode *H. diminuta* from rat, Cheng and Dyckman (1964) described glycogen deposition in *H. diminuta*, Chopra (1981) studied glycogen contents and its distribution in cyclophyllidean cestode of sheep, Singh et al. (1987) described total carbohydrates and glycogen in Cestodes, Hiware and Jadhav (1994) studied quantitative studies of glycogen in some Cestodes, Pappas Barly and Werdropsm (1999) studied glucose and glycogen gradient in *H. diminuta* and Ramalingam et al. (2004) studied Carbohydrate profile in relation to growth and differentiaationn of proglottids in *Avitellina lahorea.*

MATERIAL AND METHODS

Some intestine of *Capra hircus* was brought and these intestines were dissected for the collection of parasites. The tapeworms were collected washed thoroughly in distilled water, few of them fixed in 4% formalin for identification. The taxonomc observation turns them to a species of the genus *Moniezia sp. and Stilesia sp.* The glycogen content of these worms was determined by the method of San Seifter (1950).

RESULTS

In the present investigation the glycogen content was studied on the regional distribution along the strobila (i) Scolex and immature proglottids, (ii) mature proglottids and (iii) gravid proglottids. Fully matured tapeworms of the same size are used in assaying glycogen content in the different regions of the worm.

The glycogen content in different region of both the worms are presented in Table-1 and Graph-1.

DISCUSSION

The result obtained in the present study indicates that the glycogen content shows differential values in immature, mature and gravid regions of parasites. The immature region contain low glycogen as compared to mature and gravid region. The endoparasites living in anaerobic habitats like alimentary canal characterized by the presence of large quantities of reserve polysaccharides mostly in the form of glycogen. Carbohydrates are the major source of energy for parasitic helminths (Barrett,1976). The glucogen is unevenly distributed in the length of strobilae. The values of glycogen in cestodes of *Capra hircus* L. are compairable with those of 1.1-9.8% fresh weight in *H. diminuta* (Fairbairn et al. 1961, Goodchild, 1961; Read, 1967), 3.4-9.8% fresh weight in *H. citelli* (Read and Rothman,1957 b, Read,1957), 2.7-5.2% freshweight in *Moniezia expansa*, 2.5-5.6% in *T. taeniaeformis* (Von Brand et al.,1968).

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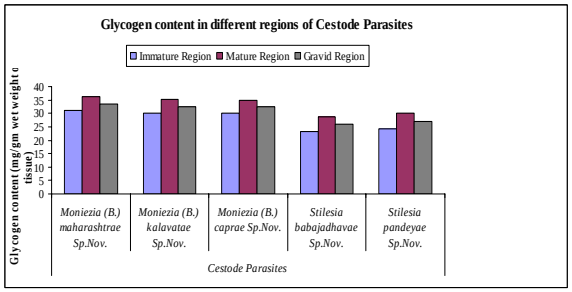
Table 1. The glycogen content in different region of Cestode Parasites.

Tissue	Cestode Parasites				
	Moniezia (B.) maharashtrae Sp.Nov.	*Moniezia (B.) kalavatae* Sp.Nov.	*Moniezia (B.) caprae* Sp.Nov.	*Stilesia babajadhavae* Sp.Nov.	*Stilesia pandeyae* Sp.Nov.
Immature Region	31.079±0.105	29.925±0.117	30.244±0.160	23.355±0.146	24.134±0.120
Mature Region	36.272±0.172	35.235±0.163	34.856±0.107	28.683±0.161	29.994±0.120
Gravid Region	33.670±0.115	32.574±0.117	32.545±0.142	26.021±0.142	27.064±0.0277



Graph 1. The glycogen content in different region of Cestode Parasites.

From the data in Table No.1, it is evident that there exists a variation in the levels of glycogen in the immature, mature and gravid regions of the parasites. Highest glycogen is found in mature region followed by gravid and immature regions. Mature regions are having more microtriches than the other regions, which are involved in the absorption of nutrients. The variations in the glycogen content along the strobilae of tapeworms may be reflection of differential rates of metabolism along the strobilae related to the regional differences in anatomy and permeability in tapeworms (Daughetry and Taylor, 1956), especially with reference to the maturation of reproductive organs and development of eggs and embryo. Dendiger and Roberts (1977) reported that there was a correlation between the rate of glycogen deposition and level of glycogen synthesis activity. They found the glycogen synthesis activity in *H. diminuta* was higher in mature proglottids than in immature and gravid proglottids. These finding may support the results of the present investigation regarding regional distribution. Parasitic worm store more glycogen as reserve food

Jadhav et al. (2008) reported variation in glycogen content in cestode *Davainea shindei* is lower (15.17 mg/100ml) where as in host intestine it contains high amount (17.56 mg/100 ml). There on Odlang (1955) determined the amount of glycogen in trematode and cestode. This result indicates that lung flukes *Haematoloechus complexus* and H. *medioplexus* have significantly smaller amount of glycogen than frog tapeworm, *Crepidobothrium saphena* Axmonn (1947) explained size of the parasite was on factor and that large flukes such as *Fasciola*, Fascioloides and *Alassostoma* stored greater quantites of glycogen then smaller worms, Habitat also very important factors which play important role in amount of glycogen present in parasites body. Nanware et al. (2010) reported remarkable variation in glycogen content of parasite and its host tissue. He reported lower glycogen level in parasite than infected and normal intestine of its host.

CONCLUSION

The present study indicates that the glycogen content shows differential values in immature, mature and gravid regions of parasites. The immature region contains low glycogen as compared to mature and gravid region.

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