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Abbreviations

AC = Adult cestode

AR = Artery

AT = Aporal Test of adult

BD = Bile Duct

CA = Cirrus of Adult

CR = Crypts of intestine

CV = Central Vein of liver

DP = Dilatation of Portal vein branches

EA = Eggs of Adult

EI = Edematous Infiltration (edema)

FC = Fatty Changes of liver

FF = Fine Fragmentation

FCT = Fiberous Connective Tissue layer of cyst wall

GP = Genital Pores of adult

H = Hamorhage

HA = Head of Adult

HC = Hepatocytes

HI = Hepatic Inflammatory reaction

HL = Head of Larva

HoL = Hooks of Larva

HP = Hyperplasia of intestine (epithelial hyperplasia)

IC = Inflammatory Cell layer cyst wall

ICI = Inflammatory cells infiltration

IO = Intestine Organ of rodent

IS = Inner Shell of eggs

KC = Kuppfer Cell of liver

La = Larva

LC = larval cyst

LO = Liver Organ of rodents

LT = Larval Tegument

MI = Mitotic figures of Intestine epithelium

ML = Middle part of Larva

MS = Micro-vesicular Steatses

MT = Thickened of muscularis

NA = Neck of Adult

NP = Nematode Parasites

NW = Net Work reticulation of intestine epithelium

OA = Ovary of Adult

OS = Outer Shell of eggs

PI = Pigments

PL = Posterior end of Larval

PT = Poral Testes of adult

PV = Portal Vein of liver

RA = Rostellum of Adult

SA = Scolex of Adult

SI = Stroma of Intestine

SR = Seminal Receptical of adult

SS = Sheet of Submucosa

SUA = Sukers of Adult

SUL = Sukers of Larval

SW = Sinusoid Widening

TM = Thickened muscles

UA = Uterus of Adult

VA = Vagina of Adult

VG = Vitelline Gland of adult

VI = Villi of Intestine

Summary

Rodents are important in many ecosystems because they reproduce rapidly, and can function as food source for predators, mechanisms for seed dispersal and as diseases vectors. Rodents may act as reservoir hosts for important human parasitic diseases. Rodents play a significant role in public health, Chiefly due to their role as carriers or reservoirs of microbes and parasites of zoonotic importance.

The present study was focused on histopathological changes of rodent liver and small intestine infected with a larval and adult cestodes recorded at two locations situated at Sohag, Egypt. This study reported infection rate of 56% and 32% for rodents at the two locations, respectively. The study also showed that the incidence in females is higher than in males in the second location compared with that of the first location .

The study revealed that The infection percentages of the present rodent with the adult tapeworm *Hymenolepis diminuta* were (12% females) and (16%

males) and (12% females) and (8% males) in first and second sites, respectively.

Analysis of variance for the present results was shown significant seasonal fluctuations in rodent body weight ($F= 9.292$, $P<0.001$) and rodent length 9.292 ($F= 7.477$, $P<0.001$). Also, male and female rodent were shown significant differences in body weight ($F= 11.256$, $P=0.003$), and no significant differences in rodent length. The two investigated sites almost similar in the studied parameters no significant differences were recorded.

The high infections of rodent individuals with helminthes were recorded in summer and autumn. This observation may be related to food resources and/or invertebrate intermediate host availability in the case of helminth species with indirect life cycles. The present data of the prevalence and abundance of helminthes (larva in liver and adult in small intestine) in rodents showed high peaks in summer and autumn.

Monthly numbers of general infection, larva in liver, adult in small intestine and the total collected

parasites and their relative abundance in rodents were showed higher prevalence of larva in liver (50%) and (36.36%) of adult in small intestine.

There is a significant difference between the means of rodent body weight between that infected by larva and adult parasites (t= -2.747, df= 19, p=0.013). Similar result is recorded to rodent length (t= -2.091, df= 19, p=0.049), while the number of parasite don't shows a significant differences between larval and adult infections (t= 0.190, df= 19, p=0.851). Also, there is a very strong effect of rodent body weight on parasite infection ($F_{1, 35} = 15.146$, $p < 0.001$) and body length ($F_{1, 35} = 5.146$, $p = 0.03$).

Presently, there is strong Correlation Coefficients between total number of parasites with body weight and length of the infected rodent ($P<0.001$).

Microscope examinations of the liver tissue sections revealed a wall cyst of larval cestode, *Cysticercus fasciolaris* in parenchyma consists of two compressed layers of highly proliferative fibrous connective tissue and inflammatory cells mainly

lymphocytes. Inflammatory reaction was seen in the hepatic parenchyma around the cyst. Also, there are dilatation and congestion in the central and portal veins and infiltration of the liver parenchyma with inflammatory cells. The hepatocytes in the central and portal areas showed fatty degenerative changes. While, in the portal area the histological tissue of the liver showed microvesicular steatosis and edematous infiltration. Signs of inflammation including sinusoid widening and prominent kupffer cells were noted

The main objective of the present study was to make a histopathological study on the small intestine of rodents infected with an adult tapeworm, *Hymenolepis diminuta* and nematode parasites collected from two sites at Sohag, Egypt.

Histopathologically, the lumina of the present rodent intestine contained tapeworm. Presence of the tapeworm in lumina of the infected rodent intestine lead to excessive mucin secretion in luminal debris. Some intestinal villi appeared blunt and reduced in height. The intestinal muscularis layers were thickened. Moreover,

inflammatory cells infiltration in the connective tissue core of the villi and crypts were observed. Erosion and adhesion of the tip of villi were observed in the intestine. The proliferating activity of the enterocytes was evidently increased and mitotic figures were observed not only in the intestinal crypts but also in the epithelium covering the middle third of the villi. Crypts and villi hyperplasia of intestine were observed.

Histopatholgical examinations of intestinal sections of the present rodent showed nematode parasites within the mucosa. It was observed that, some layers of the small intestine were damaged seriously by nematodes such as expansion of the mucosa (villi and crypts), submucosal sheet and thickening of muscle layers. The damage of mucosal villi and crypts summarized as follows: epithelial hyperplasia (crowdening of the cells lining villi and crypts), dense plasma cell rich inflammatory infiltrate of villi and crypts, rich plasma cell infiltrate, dense infiltration of the villi by plasma cells and occasional lymphocytes, fragmentation of the villi, , severe inflammation with

liberated pigments (may be haemolysed RBCS), regenerative atypia of villi and crypts (prominent nucleoli) of villi and crypts, and multiple mitotic figures. Finally, there are epithelial and interstitial edema, active inflammatory reaction around the worm, connective tissue edema and sheets of round inflammatory cells of intestinal mucosa.

Blood smears of infected rodents showed two groups of abnormalities in blood cells. The first group includes four cases in erythrocytes and two cases in leukocytes). The first cases of the first group includes three types (Microcytic and hypochromic cells, Macrocytic cells, and Target cells). The second case includes three types (Teardrop cells, Burr cells and Stomatocytes). The third case includes a single type (Howell-jolly bodies). While, the fourth case includes two types (Rouleaux cells and Red cell agglutination).

The first case of the second group includes two types: Hypersegmented neutrophils and Pelger-Huet anomaly. The second case includes a single type is atypical lymphocytes.