

# Study of certain Antioxidant Enzyme Levels in Albino Male Rats Infected with *Hymenolepis nana*

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## ABSTRACT

Current work aims to study the levels of certain antioxidant enzymes in male rats with *Hymenolepis nana*. 40 albino male rats were used in current work. Thirty male rats infected with *H. nana* and 10 male rats as control group. The direct examination of feces by using microscope was done to diagnosis the adult worms, tapeworm segments and larvae. The findings of present work demonstrated that the levels of superoxide dismutase (SOD), glutathione peroxidase (GPx), glutathione (GSH) and catalase in an infected rat's show significant ( $p < 0.05$ ) reduce compared with control rats. So, the study found a direct relationship between *H. nana* and antioxidant enzymes where the levels of antioxidant enzymes significantly ( $p < 0.05$ ) reduced in infected rats.

**Keywords:** *Hymenolepis nana*; antioxidant enzymes; Glutathione Peroxidase.

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**Conflict of interest:** None

## INTRODUCTION

The dwarf tapeworm (also known as *H. nana* and other scientific names) is located everywhere in the world and it's the most common kinds of Cestodes parasites of the phylum Platy helminthe, which infects a various animals and humans, especially children. The infection of *H. nana* can lead to weakness and diarrhea. *H. nana* is a zoonotic parasite, and definitive hosts are rodents.<sup>1-3</sup> The infection of *H. nana* is usually around the regions with bad conditions of hygienic where the eggs of parasite passed through the fecal matter in environment from host with infection to the uninfected host. The length of *H. nana* is 15 to 40 mm and its lifespan more than 3 months in small intestine of human. The eggs are described as a round or oval at approximately 40–60 mm length and contain about 4–8 filaments located between inner and outer membranes,<sup>4</sup> hatch in small intestine villi and convert to cysticercoids, then developed to adult tape worms.<sup>5-7</sup> The evidence of molecular is unclear that suggests there could be two strains of *H. nana*, which are preserved in zoonotic and non-zoonotic cycles but this manner stills to be determined.<sup>8-11</sup> Therefore, current work aims to study the levels of certain antioxidant enzymes in children with *H. nana*.

## Materials and Methods

### Animal Model

40 albino male rats, (3–6 mon. and 150–180 gm weight) were housed in special cages, and then the rats were maintained

under optimum conditions; temperature ( $25 \pm 2$ ) and light (12 hours light and 12 hours dark).

### Diagnosis of *H. nana*

The feces sample were collected from children aged 5–15 years in Kirkiuk city at the first visit from March 2021 to May 2021, and then the sample was examined by using microscopic diagnosis methods for the presence to detect eggs of *H. nana* and other stages of parasite.<sup>12</sup> Also, the fecal samples were examined by zinc sulphate floatation method.<sup>13,14</sup>

### Induce the Infection

The proglottids obtain from an infected children and ground with a mortar to obtain eggs. The suspension of egg was shaken vigorously and 0.1-mL were taken; and placed on hemocytometer slide for counted the number of eggs. The suspension of egg was administrated to rats. The infected rats were killed after 13 to 15 days.

### Blood Sample

About 3mL of blood samples were obtained from the infected rats and the control rats were utilized to estimate the serum GPx, GSH, SOD and catalase.

### Study Measurements

The level of GPx and GSH was estimated.<sup>15</sup> The 5,5 dithiobis-(2-nitrobenzoic acid DTNB) lead to reduce to produce the yellow complex and absorbance measured at 412 nm. Catalase react with SOD were estimated.<sup>16</sup>

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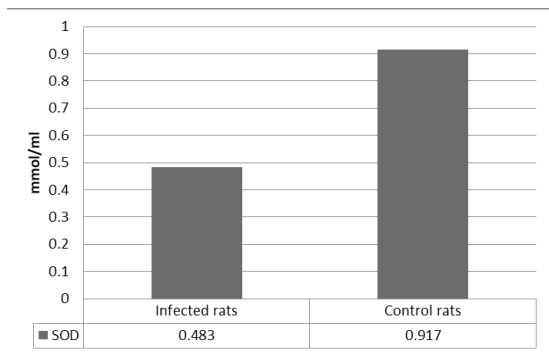
**Statistical Analysis**

The methods of statistic were utilized to analyze the data of current study. The inferential statistics that used to analyze the statistical hypotheses, that involved Chi-Square ( $\chi^2$ ),  $p > 0.05$  level of significance was considered non-significant changes.<sup>17</sup>

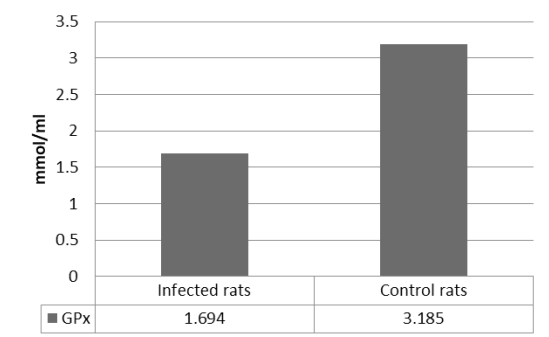
**Results and Discussion**

SOD levels show significant ( $p < 0.05$ ) reduce in infected rats with *H. nana* ( $0.483 \pm 0.186$ ) compared with control rats ( $0.917 \pm 0.205$ ) as shown in Figure 1. The levels of GPx show significant ( $p < 0.05$ ) reduction in infected rats with *H. nana* ( $1.694 \pm 0.454$ ) compared with control rats ( $3.185 \pm 0.729$ ), as shown in Figure 2. The levels of GSH show significant ( $p < 0.05$ ) reduction in infected rats with *H. nana* ( $0.261 \pm 0.048$ ) compared with control rats ( $0.518 \pm 0.136$ ), as shown in Figure 3. Otherwise, the levels of catalase show significant ( $p < 0.05$ ) reduced in infected rats *H. nana* ( $1.625 \pm 0.352$ ) compared with control rats ( $0.741 \pm 0.058$ ) as shown in Figure 4.

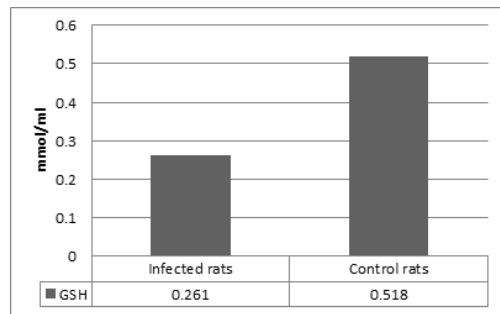
The intestinal parasitosis disease is considered a significant public health trouble in worldwide.<sup>18</sup> The epidemiology information on the prevalence of different infections of intestinal parasite in various regions is necessary to develop suitable control strategies.<sup>19</sup> The findings of present work demonstrated that the levels of superoxide dismutase (SOD), glutathione peroxidase (GPx), glutathione (GSH) and catalase in infected rats show significant ( $p < 0.05$ ) reduction compared with control rats lipid peroxidation in mice small intestine, as measured by estimated the level of malondialdehyde in serum, was elevated during the infection of *H. nana*. The continuous administration of an inhibitor of NADPH oxidase to mice interfered with the larvae degeneration.<sup>20</sup>



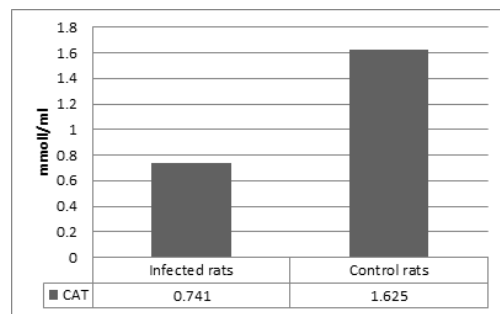
**Figure 1:** levels of SOD infected and control groups.



**Figure 2:** levels of GPx infected and control groups.



**Figure 3:** levels of GSH infected and control groups.



**Figure 4:** levels of catalase infected and control groups.

**CONCLUSION**

The infection of endo-parasite was observed led to oxidative stress. Whereas, the lipid peroxidation was observed, and the concentrations and levels of antioxidant enzymes were reduced in the tissues of cattle infected with endo-parasite,<sup>21</sup> that explain the current results. Several studies referred that the decrease in the activities of antioxidant enzyme and the concentrations of trace mineral various hosts infected with external parasites that suggested that external parasites in various hosts is related with inhibition in antioxidant defense, and oxidative stress play significant role in external parasites pathogenesis,<sup>22,23</sup> that is agreement with results of current work.

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