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Oxidative Stress and *Ascaris Lumbricoides* Infection in Rural Children

Abeer Abbas Ali[1] Shahad Abbas Ali Al-Attar[2]
1. Health and Medical Technical College, Kirkuk/Northern Technical University
2. College of Veterinary Medicine / University of Kirkuk
abeeralatar@ntu.edu.iq

Abstract
Therefore, the aim of the present work is to detect the role of *A. lumbricoides* in an inducing oxidative stress in young children and their effect on the levels of some antioxidant enzymes. The current work was done among children aged 6 years to 14 years in Al-Hawijacity, Kirkuk, Iraq. 174 children used in current study at March 2019 to December2020. The feces were examined by the direct methodto detect *A. lumbricoides*. The presentworkexhibited that the number of infected children out of 174 is 23 (13.2%) children with *A. lumbricoides*. Otherwise, the outcomesshowed that the levels of Malondialdehyde (MDA), Glutathione (GSH), and superoxide dismutase (SOD)and catalase in an infected children show significant ($P < 0.05$) reduce compared with healthy children. So, the current study show that *A. lumbricoides* induced oxidative stress and causing disorders in antioxidant enzymes levels, which play important against the reactive oxygen species.
Keywords: *Ascaris lumbricoides*; Malondialdehyde; Glutathione.

Introduction

A. lumbricoides is defined as a largest of the most common intestine nematode of human. About1300 millions of persons are infected with *A. lumbricoides* being its morbidity approximately 120- 220 million of the total number of infected persons [1-2]. The Ascaris is transported by eggs ingestion [3-4]. After that, the eggs hatch, and then the larvae penetrate via the wall of intestine and emigrate through the blood vessels to other organs such as liver [5].*A. lumbricoides* block the lumen of small intestine in children and sometimes enter and obstruct the bile and pancreatic ducts [6-7], which lead to vitamin A malabsorption and decrease the digestion of lactose that causing the retardation of growth, disorders in different functions and malnutrition in children [8-10].The ascariasis apperances can be described into acute and chronic symptoms. Human could be experience acute lung inflammation, breathing distress and fever, distension in abdomen with diarrhoea and pain are also feature symptoms of A. lumbricoides infection and chronic ascariasis [11].The reactive oxygen species (ROS) create and produce during various processes in the cells and tissues of body as well as their immoderate formation in oxidative stress state play significant role in generation of different diseases [12-13].Therefore, the aim of the present work is to detect the role of A. lumbricoides in an inducing

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oxidative stress in young children and their effect on the levels of some antioxidant enzymes.

Materials & methods

Infected children

The current work was done among children aged 6 years to 14 years in Al-Hawijacity, Kirkuk, Iraq. 174 children used in current study at March 2019 to December 2020.

Faeces samples

The faeces samples were collected for each child in clean and sterilized cap, the feces were examined by the direct method (smear method). The slides of feces were examined under light microscope (Optica/Italy), to detect *A. lumbricoides*eggs [14].

Blood sample

2ml of blood samples obtained from children with abdominal distension and diarrhea and healthy children and the blood was centrifuged to obtain serum that used to estimate the levels of MDA, GSH, SOD and catalase.

Study measurements

The serum MDA measured according to [21]. The level of GSH measured according to method of [22]. The superoxide dismutase (SOD) and catalase were measured according to method of [23].

Statistical analysis

The data of this work were analyzed by using specific program known as SPSS 18. P≤0.05was considered detecting the significant changes.

Results & Discussion

A. lumbricoides

The presentworkexhibited that the number of infected children out of 174 is 23 (13.2%) children with *A. lumbricoides* as shown in table (1).

Table (1): number of infected children in this work

Groups	Number and percentage
Infected children	23 (13.2%)

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Healthy children	151 (86.8%)
Total	174 (100%)

The current outcomes were agree with [15] who referred that the infection with *A. lumbricoides* which the most common helminths, with a rate of prevalence 9.7%. The current outcomes were disagree with [16] who referred prevalence rate of A. lumbricoides was 9 (4.36%), The cause of difference between this study and previous study may back to unsuitable environment and prevailing socio- cultural agents and factors that effect on *A. lumbricoides* remain and transition methods [17].

Oxidative stress

The levels of MDA in children with *A. lumbricoides*(2.135 ± 0.137) show significant ($P < 0.05$) elevated compared withcontrol children(1.274 ± 0.152) as shown in figure (1).

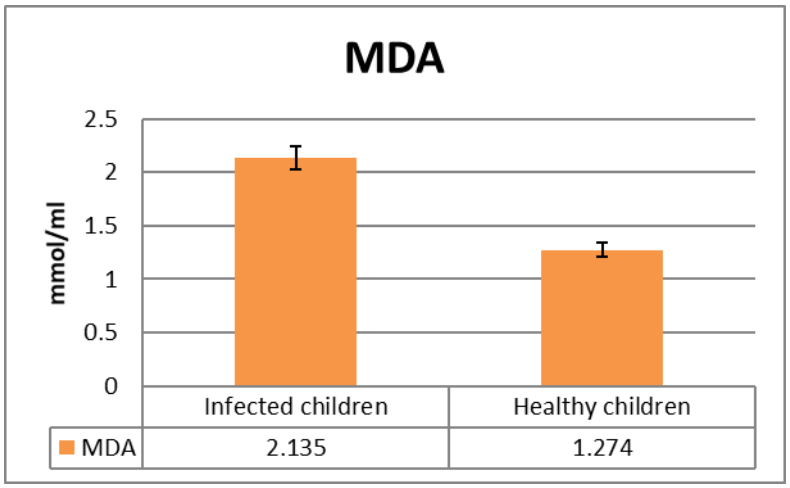

Figure (1): MDA in infected and healthy children.

Antioxidant enzymes

The levels of GSH in children with *A. lumbricoides*(0.327 ± 0.029) show significant ($P < 0.05$) reduce compared with control children(0.451± 0.042)as shown in figure (2).The levels of SOD in children with *A. lumbricoides*(0.582 ± 0.184) show significant ($P < 0.05$) reduce compared with control children(0.942± 0.072)as shown in figure (3). The levels of catalase in children with *A. lumbricoides*(0.841 ± 0.019) show significant ($P < 0.05$) reduce compared with control children(1.538± 0.096)as shown in figure (4).

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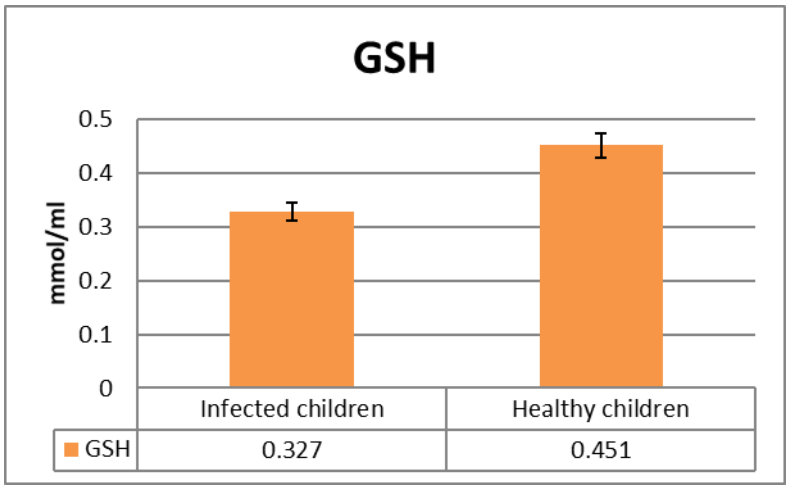

Figure (2): GSH in infected and healthy children.

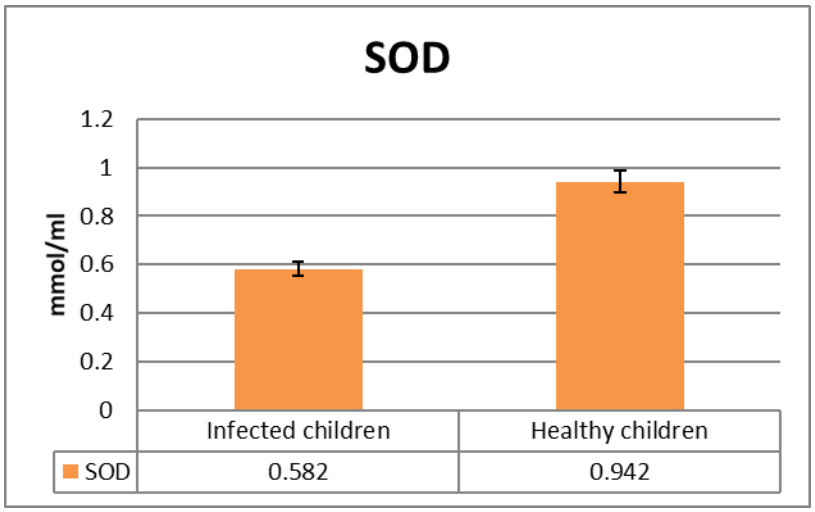

Figure (3): SODin infected and healthy children.

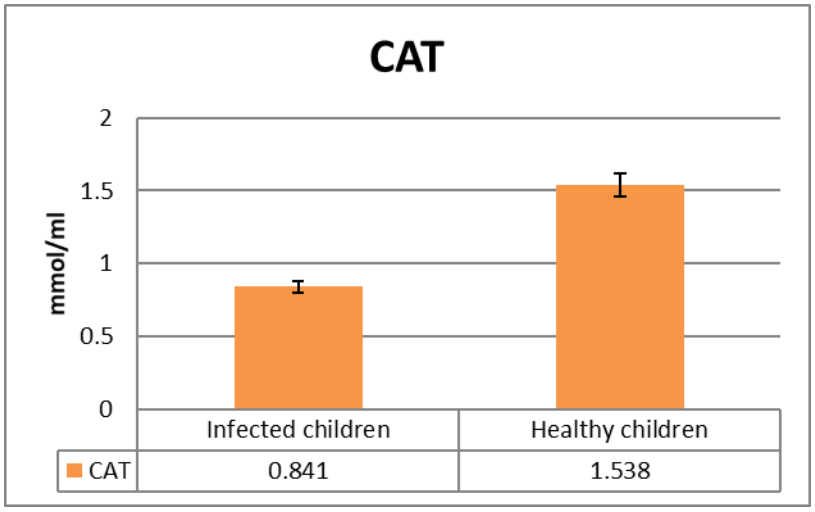

Figure (4): catalase in infected and healthy children.

The current outcomes showed direct effectof*A. lumbricoides*on oxidative stress and antioxidant enzymes in children. The outcomes were agreed with study carried out by [18] who referred that the infection of schistosome has been direct effecton the levels of antioxidant enzymes (catalase, glutathione peroxidase and SOD) in the liver. On the other hand, the results of the current study agree with a study of [19] that indicated that *Enterobius vermicularis* caused a decrease in glutathione levels in infected children.The reason may be due to a decrease in the raw materials needed to synthesis glutathione during oxidative stress, including NADPH, which is produced by the 5-phosphate glucose pathway, which is the catalyst for the enzyme Glutathione reductase, which act to convert the active form of glutathione from the inactive form [20,21].

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