

## RESEARCH ARTICLE

# Determining the Oxidative State in Children with Enterobiasis Infection

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## ABSTRACT

The objective of current study is determining the oxidative state in children with Enterobiasis infection. The current study was done among children aged 3 years to 10 years in Tikrit city, Iraq. 135 children were used in current work at January 2020 to November 2020. The number of males was 57 and female was 78. The cello tape method was to detect infection of *Enterobiasis vermicularis*. The findings demonstrated that the levels of Malondialdehyde (MDA) in an infected children show significant ( $p < 0.05$ ) elevated compared with healthy children. The levels of Glutathione (GSH) and catalase in an infected children show significant ( $p < 0.05$ ) reduce compared with healthy children. Otherwise, the levels of IL-2 in an infected children show significant elevated compared with healthy children. So, the study found that there is a direct relationship between *E. vermicularis* and oxidative status in children with a direct effect on interleukin 2.

**Keywords:** *Enterobius vermicularis*, Interleukin, MDA, Oxidative state.

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## INTRODUCTION

The infection with worm *Enterobius vermicularis*, also called enterobiasis, is mostly effect on children aged between 4–10 years.<sup>1,2</sup> *E. vermicularis* is defined as parasite of intestinal belonging to the nematodes.<sup>3,4</sup> The life cycle of *E. vermicularis* is direct and simple,<sup>5</sup> that takes place in the digestive tract. The Infection happens through oral ingestion of the infective eggs, the larvae found in eggs become infective within 4–6 hours after oviposition.<sup>6</sup> The infection of *Enterobius vermicularis* related with poor hygienic conditions.<sup>7</sup> *E. vermicularis* lives in large intestine.<sup>8</sup> The *Enterobiasis* disease is less spreading in tropical areas because the worm eggs are considerably damaged in hot regions when compared with cool areas.<sup>9</sup> *Enterobiasis* is more occur in children compared with adults and its especially prevalent where some small children sleep together. The infection of *E. vermicularis* is widespread in school children and large families.<sup>10</sup> About 40% of affected individuals are asymptomatic.<sup>11</sup> The most common infection symptom is anal pruritus that happen generally at nighttime that leads to disturb the sleep and childhood enuresis, and in certain cases, childhood developmental defects have been related to *Enterobiasis* disease.<sup>12,13</sup> The oxidative stress defines as physiological disorder between the ROS like H<sub>2</sub>O<sub>2</sub> or O<sub>2</sub>-

and the body capacity to remove them.<sup>14</sup> In human, reactive oxygen species (ROS) and the free radicals are synthesis and produced during the metabolic and the function of immune system.<sup>15,16</sup> Human cells have integrated systems of antioxidant that comprise of enzymatic (such as superoxide dismutase, catalase, glutathione peroxidase, etc.) and nonenzymatic (Vitamin C, Vitamin A, etc.) agents, which are generally effective in blocking injurious effects of ROS.<sup>17-19</sup> So, the aim of current study is determine the oxidative state in children with Enterobiasis infection.

## MATERIALS & METHODS

### Sample

The current study was done among children aged 3 years to 10 years in Tikrit city, Iraq. 135 children were used in current work in January 2020 to November 2020. The number of males was 57 and female was 78.

### Diagnosis of *E. vermicularis* Infection

The method that used to children examined for detect infection of *E. vermicularis* was the cello tape method carried out depending on asking parents and mothers of children to examine their children once in morning by pressing the tape on area of perianal. After that, sticking a tape to slide,

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then the slides transferred to the laboratory for microscopic examination.<sup>20</sup>

**Blood Sample**

Approximately 2 mL of blood samples obtained from infected children and healthy children were utilized for the estimation of serum MDA, GSH, Catalase, IL-1 $\alpha$  and IL-6.

**Study Measurements**

The measurement of serum MDA was done according to colorimetric reaction. The findings were expressed as nmol/ml of MDA.<sup>21</sup> The level of GSH was estimated according to other research.<sup>22</sup> The 5,5 dithiobis-(2- nitrobenzoic acid DTNB) lead to decrease by compounds of sulphhydryl, to produce yellow

react with peroxide, the remaining part of peroxide react with the ammonium molybdate (NH<sub>4</sub>)<sub>2</sub>MoS<sub>4</sub> to form a coloring complex.<sup>23</sup> Interleukin (IL-2) levels were estimated by using ELISA technique. Interleukin (IL-2) Human bio-assay ELISA kit (US biological, USA).

**Statistical Analysis**

The method of descriptive statistical was utilized for analysis of data and the Chi-Square in (p < 0.05) was utilized to detect the significant changes in this study.

**RESULTS AND DISCUSSION**

*E. vermicularis*

The current study showed that the number of infected children out of 135 is 51, and it was divided between 18 males and 33 females

**Biochemical Tests**

The levels of MDA in an infected children (2.063  $\pm$  0.271) show significant (p < 0.05) elevated compared with healthy children (1.572  $\pm$  0.094) as shown in Figure 1. The levels of GSH in an infected children (0.361  $\pm$  0.047) show significant (p < 0.05) reduce compared with healthy children (0.438  $\pm$  0.019) as shown in Figure 2. The levels of catalase in an infected children (0.951  $\pm$  0.035) show significant (p < 0.05) reduce compared with healthy children (1.374  $\pm$  0.162) as shown in Figure 3. Otherwise, the levels of IL-2 in an infected children (59.24  $\pm$  9.135) show significant (p < 0.05) elevated compared with healthy children (6.217  $\pm$  0.495) as shown in Figure 4.

The current work showed direct effect of *E. vermicularis* on oxidative status in children. The current findings are consistent with study carried out by other researchers<sup>24</sup> who referred that the serum MDA levels were higher in patients with *E. vermicularis* (p < 0.005) compared to healthy persons. Also, indicated that the highest level of GSH was showed in the healthy persons compared to patients. Also, it has been<sup>25</sup> found that the levels of GSH demonstrated a significant decrease in patients serums infected with *Giardia intestinalis* compared to healthy persons. The decrease in activity of GSH in the infected children group might be resulted from oxidative stress by lipid peroxidation and lack of antioxidant GSH activity and concentration. The free radicals that formed resulting

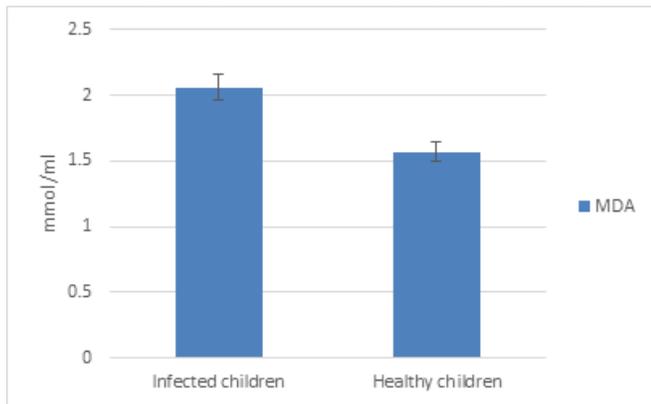


Figure 1: Levels of MDA studied groups.

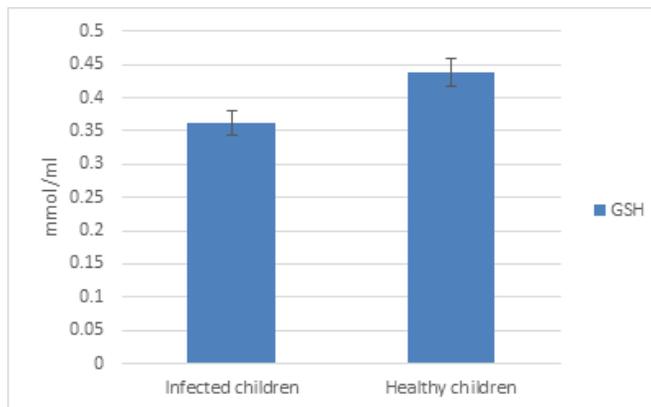


Figure 2: Levels of GSH studied groups.

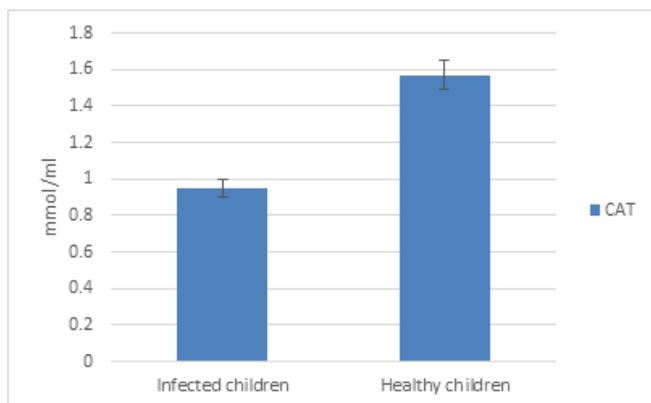


Figure 3: Levels of catalase studied groups.

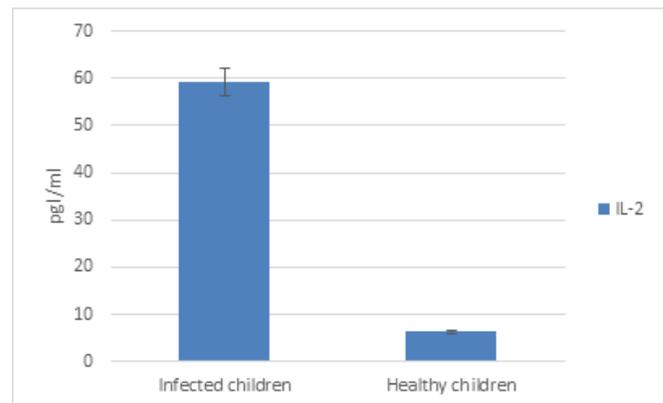


Figure 4: Levels of IL-2 studied groups.

from infection can be attack the polyunsaturated fatty acids, starting the reaction of lipid peroxidation chain that leads to disordering the function and structure of cell. It is obvious that the lipid peroxidation can causes several degradation products inclusive MDA.<sup>24,26</sup> On the other hand, the current work showed elevated the levels of IL-2 in the infected children. The chronic infection of helminth lead to the activations of T helper type 2 cells that transport the macrophage activation of adipose tissue from the classical activation into the alternative activation. The alternatively activated macrophages lead to secrete various cytokines like IL-10, IL-2, IL-4 and IL-5.<sup>27,28</sup> Also, asymptomatic children with helminthiasis infections have good profile of immunological with a very high antiinflammatory cytokines.<sup>29</sup>

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