Serum malondialdehyde level in patients infected with Ascaris lumbricoides

Eser Kilic, Süleyman Yazar, Recep Saraymen, Hatıce Özbilge

INTRODUCTION

Ascaris lumbricoides (A. lumbricoides) is one of the largest nematode (roundworm) parasitizing the human intestine.[1-3,5]. It is estimated that 25% of the world’s population is infected with this nematode.[4]. The adult worms live in the small intestine and eggs are passed in the feces. A single female can produce up to 200,000 eggs each day. After about two weeks, the eggs contain a infective larval or juvenile stage, and eventually are passed in the feces. A single female can produce up to 200,000 eggs each day. About two weeks after passage in the feces, the eggs contain an infective larval or juvenile stage, and eventually are passed in the feces. A single female can produce up to 200,000 eggs each day.

CONCLUSION: Malondialdehyde levels clearly increase in patients infected with Ascaris lumbricoides.


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and had any known pathologies and taking steroids or medications such as iron for anemia at the time of sampling. Serum samples for control group were obtained from healthy people who came to the different departments of Medical Faculty Erciyes University, for regular check-up and students or employees of the University. All subjects were fasted after midnight before blood collection the next morning. 43 patients and 60 controls were examined in this study. The mean age of the patient group, which consisted of 21 men and 22 women were 25±13 years and 27±13 years, respectively. The mean age of the control group, which included 27 men and 33 women were 30±14 years and 29±12 years respectively. Wet mount preparations in 0.9 % NaCl, diluted Lugol’s iodine and flotation technique in saturated saline solution were used for the detection of intestinal parasites.

Assay
All venous blood samples taken between 8 and 9 a.m. after 8 h of fasting were collected in polystyrene tubes and vacutainers containing heparin. The tubes were centrifuged at 5000g for 15 min. Sera were then removed and stored at -20°C until analysis. Serum MDA levels were measured by the double heating method\(^\text{(11,12)}\). The principle of the method was based on the spectrophotometric measurement of the color occurred during the reaction to thiobarbituric acid with MDA. Concentration of thiobarbituric acid reactive substances (TBARS) was calculated by the absorbance coefficient of malondialdehyde-thiobarbituric acid complex and expressed in nmol/ml.

Statistical analysis
Statistical analysis was performed with SPSS software package (Version 11.0 for Windows). The data were expressed as mean ± standard deviation (SD). For comparison of two groups of continuous variables, independent sample t-test was used. A probability value of \(P<0.05\) indicated a statistically significant difference.

RESULTS
Malondialdehyde scores are given in Table 1.

Table 1 MDA levels of patients infected with \textit{A. lumbricoides} and control group

<table>
<thead>
<tr>
<th>Patients</th>
<th>Age(year)</th>
<th>MDA levels (nmol/ ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female (22)</td>
<td>27±13</td>
<td>0.67±0.16</td>
</tr>
<tr>
<td>Male (21)</td>
<td>25±13</td>
<td>0.62±0.11</td>
</tr>
<tr>
<td>Controls</td>
<td>Age(year)</td>
<td>MDA levels (nmol/ ml)</td>
</tr>
<tr>
<td>Female (33)</td>
<td>29±12</td>
<td>0.21±0.15</td>
</tr>
<tr>
<td>Male (27)</td>
<td>30±14</td>
<td>0.22±0.14</td>
</tr>
</tbody>
</table>

The difference between MDA levels of patients and control group was statistically significant both for females (\(P<0.05\)) and males (\(P<0.05\)), (Table 1). In the patient and control groups, no correlation was found between age and MDA levels (\(P>0.05\)) both in females and in males. In addition, no significant correlation could be found between MDA levels of both females and males for patients and control group (\(P>0.05\)).

DISCUSSION
This present study was aimed to evaluate and characterize the relationship between intestinal parasite infection of \textit{ascarisasis}, which can cause pathology and oxidative stress mechanism as a mediator of tissue damage concurrent with \textit{ascarisasis} infection. \textit{Ascariasis} is the most common human worm infection. Human can become infected after touching mouth with hands containg with eggs from soil or other contaminated surfaces. Infection has occurred worldwide and has been most common in tropical and subtropical areas where sanitation and hygiene were poor\(^\text{(1-3,5,7)}\). Children are infected more often than adults. Estimates suggest that 1 in 4 of the world’s population, or more than 1 billion people, are infected with the intestinal roundworm \textit{A. lumbricoides}. In Europe, infection was common, but the most common in rural areas of the southeast\(^\text{(3-5)}\).

Although \textit{Ascaris lumbricoides} has only a single host and it is found in the small intestine, its life cycle is far from simple. It has been suggested that from an evolutionary perspective that \textit{Ascaris lumbricoides} originally had two hosts and has secondarily lost its intermediate host\(^\text{(1-3,5,7)}\). Although most people have no symptoms, symptoms can be broken down into 2 categories: early (larval migration, 4-16 days after egg ingestion) fever, cough and wheezing and late (mechanical effects, 6-8 weeks after ingestion). All symptoms resulted from mechanical irritation include; vague abdominal complaints (i.e. cramping, nausea, vomiting), small bowel obstruction (mostly in children), pancreatitis (secondary to worm migration), cholecystitis (secondary to worm migration), appendicitis (less common, secondary to worm migration). Secondary complications could arise with \textit{Ascaris lumbricoides} infections because sometimes when the worms were undergoing this migration they appeared to get lost and started wandering through other organs such as the brain, bile duct, pancreas or appendix\(^\text{(3,5,7)}\).

\textit{Ascaris lumbricoides} proteins are very immunogenic and people can become very sensitive to the worm and have strong allergic reactions. The parasite could be treated very easily with drugs such as mebendazole or pyrantel pamoate\(^\text{(1-3,5,13,14)}\). However, reinfections frequently occur if other control measures are not taken. This is a particular problem where night soil is used as a fertilizer.

Oxidative stress as a mediator of tissue damage concurrent with \textit{A. lumbricoides} infection was investigated. This was the first study to characterize the relationship between \textit{A. lumbricoides}, (may cause no symptoms however, some complains of cramping, nausea, vomiting, small bowel obstruction, pancreatitis, cholecystitis, appendicitis can be seen) and MDA (lipid peroxidation), which is a well-established mechanism of cellular injury in human, and is used as an indicator of oxidative stress in cells and tissues.

Levels of MDA were significantly increased in patients infected with \textit{A. lumbricoides} The results of our study strongly suggested that one of the main reasons for high MDA levels in patients infected with \textit{A. lumbricoides} could be decreased activity of defense system protecting tissues from free radical damage. However, in the patients and control groups, no correlation was found between age and MDA levels both in females and in males. In addition, no significant correlation could be found between MDA levels of both females and males for \textit{A. lumbricoides} infected and control groups. These results for patients infected with \textit{A. lumbricoides} could possibly be explained as that with high MDA activity in all ages.

As it is known that lipid peroxidation is a free radical-related process that in biologic systems may occur under enzymatic control, e.g., for the generation of lipid-derived inflammatory mediators, or nonenzymatically. This latter form was associated mostly with cellular damage as a result of oxidative stress, which also involved cellular antioxidants in this process\(^\text(10)\). The high infection/control ratio of MDA concentration and the significant correlation strongly indicate the occurrence of oxidative stress and lipid peroxidation as a mechanism of tissue damage in cases of \textit{A.lumbricoides} infection.

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