

# Serum Lipid Peroxidation Level in Patients with *Taeniasis saginata*

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**SUMMARY:** The aim of the study was to investigate the oxidative stress hypothesis in patients infected with *Taenia saginata*. The serum malondialdehyde concentration activity was measured in 50 patients who were found to be infected with *Taenia saginata*. Scores were obtained for the positive patients and their age-and sex-matched 60 *Taenia saginata* negative healthy controls. For comparison of the two groups for continuous variables, the independent samples t-test was used. There was no significant difference in the malondialdehyde levels of patients with *Taenia saginata* and the control group in either females ( $p>0.05$ ) or males ( $p>0.05$ ). In addition, in both the patient and control groups, no correlation was found between age and malondialdehyde levels in either females or males. In conclusion, no change was observed in malondialdehyde levels in the patients with *Taenia saginata* as compared to controls.

**Key words:** *Taenia saginata*, antioxidant, malondialdehyde

## **Taeniasis saginata'lı Hastalarda Serum Lipid Peroksidasyon Seviyesi**

**ÖZET:** Çalışmamızdaki amaç, *Taenia saginata* ile enfekte hastalarda serum malondialdehid düzeyindeki değişiklikleri, diğer bir deyişle oksidatif stres hipotezini incelemektir. Bu amaçla, 50 *Taenia saginata* ile enfekte hastada ve 60 sağlıklı kontrolde serum malondialdehid konsantrasyon aktivitesi araştırılarak sonuçlar yaş ve cinsiyete göre karşılaştırılmıştır. Cinsiyete bağımlı olarak kontrol ve hasta grubundaki malondialdehid seviyelerinde bir değişiklik gözlenmemiştir. Aynı zamanda kontrol grubu ve hasta grubu arasındaki malondialdehid seviyelerinin kadın ve erkeklerde yaşla bir bağlantısı gözlenmedi. Sonuç olarak *Taenia saginata* ile enfekte hastalarda malondialdehid seviyelerinde kontrol grubuna göre bir değişiklik gözlenmemiştir.

**Anahtar kelimeler:** *Taenia saginata*, Antioksidant, Malondialdehid

## **GİRİŞ**

There are several species of *Taenia* that humans are likely to encounter. *Taenia saginata* (*T. saginata*) and *Taenia solium* (*T. solium*) are the two common *Taenia* spp. *T. saginata* is also known as the beef tapeworm. Humans are the definitive hosts for both parasites; cattle and swine are the intermediate hosts (3-6).

All species of *Taenia* have similar life cycles. Adult worms occur in the small intestine of humans, and gravid proglottids are passed with feces. These proglottids are ingested by cattle or swine. The hexacanth larvae (ie, cysticerci) inside the eggs hatch once the egg reaches the small intestine. Larvae penetrate the mucosa and go on to develop into cysticerci in the animals' muscles. Infections with *Taenia* are diagnosed by recovering eggs or proglottids in the feces of an infected host (2-6).

As adults in the definitive host's small intestine, tapeworms rarely cause problems; in exceptional cases the tapeworms

might physically block the intestinal tract, due to their large size, or proglottids might become lodged in the appendix and result in appendicitis. The proglottids of *Taenia* are large and muscular. Occasionally single proglottids or long chains of proglottids might crawl out of the anus of an infected human (2, 5, 6).

Gravid proglottids are found in the feces of infected humans. *Taenia* adults may be speciated by examining a squashed proglottid microscopically. *T. saginata* has twelve or more uterine branches. The cysticercus in cattle is usually found in meat at necropsy (2, 5, 6).

Infected humans have nausea, weakness, loss of appetite, increased appetite, headache, constipation, dizziness, diarrhea, pruritus ani, hyperexcitability, epigastric fullness, vomiting and appendicitis (1, 2, 4-6).

Lipid peroxidation is a well-established mechanism of cellular injury in human, and is used as an indicator of oxidative stress in cells and tissues. Lipid peroxides, derived from polyunsaturated fatty acids, are unstable and decompose to form a complex series of compounds. These include reactive carbonyl compounds, which is the most abundant

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malondialdehyde (MDA). Therefore, measurement of malondialdehyde is widely used as an indicator of lipid peroxidation. Increased levels of lipid peroxidation products have been associated with a variety of diseases in both humans and model systems (7, 9, 10).

The aim of the study was to investigate and to test the hypothesis of decreased activity of defense system protecting tissues from free radical damage in patients with taeniasis saginata by measuring the level of MDA (an end-product of lipid peroxidation), in serum samples.

## MATERIALS AND METHODS

**Patients:** We assayed MDA activities of 110 subjects in human serum aged between 12-44 years (58 males and 52 females). None of them were smokers, had any known pathologies and taking steroids or medications such as iron for anaemia at the time of sampling. Serum samples for control group were obtained from healthy people who have come to the different departments of Erciyes University, Medical Faculty for regular check-up and students or employees of the University. All subjects fasted after midnight before blood collection the next morning. 50 patients and 60 controls were examined in this study. The mean age of the patient group, which consisted of 25 men and 25 women were 23±11 and 26±12 years, respectively. The mean age of the control group, which included 27 men and 33 women were 30±14 and 29±12 years respectively. Wet mount preparations in 0,9 % NaCl, diluted Lugol's iodine, flotation technique in saturated saline solution and cellophane tape method were used in order to 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 500xg for 15 min. Sera were then removed and stored at -20 °C until analysis.

Serum MDA levels were measured by the double heating method (7). The principle of the method was based on the spectrophotometric (Shimadzu 1601 UV-Vis spectrophotometer) 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. As a standard MDA bis (dimetil asetal)-TBA (thiobarbituric acid) complex was used.

**Statistical Analysis :**Statistical analysis was performed with SPSS software package (Version 11.0 for Windows). Data were expressed as mean±standard deviation (SD). For comparison of two groups of continuous variables, independent samples t-test was used. A probability value of  $p < 0.05$  indicated a statistically significant difference.

## RESULTS

No statistically difference between MDA levels of patients and control group was found both for females ( $p > 0.05$ ) and males ( $p > 0.05$ ) (Table 1). In addition, in the patient and control group, no correlation was found between age and MDA levels both in females and males. Moreover no significant correlation could be found between MDA levels of both females and males for patients and control groups. MDA, scores are given in Table 1.

**Table 1.** MDA levels of patients with taeniasis saginata and control group

Patients	Age	MDA levels (nmol/ml)
<b>Female (n: 25)</b>	26±12	0,33±0,12
<b>Male (n: 25)</b>	23±11	0,39±0,14
<b>Controls</b>		
<b>Female (33)</b>	29±12	0,21±0,15
<b>Male (27)</b>	30±14	0,22±0,14

## DISCUSSION

This work was aimed to evaluate and characterize the relationship between taeniasis saginata and oxidative stress mechanism as a mediator of tissue damage concurrent with taeniasis saginata infection. This is the first study to characterize the relationship between taeniasis infection 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.

*T.saginata* is medically important recognized species of *Taenia*. Cysticercosis caused by *T.saginata* is rare. *T.saginata* infection is endemic in Southeast Asia, Africa, Europe, and Central and South America. Infection in children usually goes unrecognized. Humans develop a tapeworm infection by eating raw or undercooked beef. The cysticercus becomes activated, attaches to the wall of the small intestine by the scolex, and becomes a mature tapeworm. Approximately 50 million people worldwide are infected by *T.saginata*. *T.saginata* is common in cattle-breeding regions (2,3,4,5,6).

Most intestinal taeniid infections are asymptomatic. When symptoms occur, they usually are mild and involve abdominal pain, anorexia, weight loss, or malaise. The most common serious complication of adult tapeworm infection is appendicitis (1-6). Humans may be treated with niclosamide or praziquantel (1,5,8).

Levels of MDA were seemed to be numerically but statistically increased in patients with taeniasis. The results of our study possibly suggest that one of the main reasons for this numerically (but as indicated above not statistically) high MDA levels in patients with taeniasis saginata could be

decreased activity of defense system protecting tissues from free radical damage. However, in the patients and control group, no correlation was found between age and MDA levels both in females and males. In addition, no significant correlation could be found between MDA levels of both females and males for taeniasis infection and control groups.

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 non-enzymatically. This latter form is associated mostly with cellular damage as a result of oxidative stress, which also involves cellular antioxidants in this process (7).

Taeniasis is strictly anaerobic, normally requires bacteria for growth, and is capable of ingesting bacteria and other debris. It is usually seen in the human stool specimen. Thus, infection/control ratio of MDA concentration and the un-significant but numerically increased correlation weakly but possibly indicate the occurrence of oxidative stress and lipid peroxidation somehow as a mechanism of tissue damage in cases of taeniasis saginata.

In conclusion, the results of our study possibly suggest that one of the main reasons for this numerically high MDA levels in patients with taeniasis could be decreased activity of defense system protecting tissues from free radical damage.

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