

Glutathione and malondialdehyde levels in patients with hydatid cyst

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ABSTRACT

الأهداف: عصيات جرامولوسيس المتحجبة توفر الدهون الضرورية لتقنات على الجسم الضحية. تعطي مالونديالدهيد (أم دي آيه) ارتفاع لعبور ربط و تبلور محتويات الغشاء. جلوتاثيون (جي اس اتش) الذي يتفاعل مع الخلايا خالية الجذور وفوق الأكسيد يحمي الخلايا من الإصابة المؤكسدة. الهدف من هذه الدراسة من أجل هو التحقق من مستويات جلوتاثيون (جي اس اتش) ومالونديالدهيد (أم دي آيه) في المرضى الذين شخضت حالتهم بالكيس العداري.

الطريقة: شملت الدراسة ٤٦ مريضاً مصاباً بالكيس العداري وأجري لهم اختبار الجلتنة الدموية غير المباشرة (أي اتش آيه) واختبار المستضد فلوريسانس غير المباشر (أي اف آيه تي) في مجموعة الدراسة في عام ٢٠٠٧م. شكل مجموعة التحكم ٤٠ شخصاً سليماً كانت نتيجة فحصهم سالبة من الإصابة بالكيس العداري بواسطة طريقة (أي اتش آيه) وطريقة (أي إف آيه) ولا يعانون من أي إصابة بجانب الموقع مع فحص البراز. تم تحليل مستويات (إم دي آيه) في المصل بواسطة طريقة أوتشياما وميهارا. تم قياس نشاط (جي اس اتش) بواسطة طريقة إلمان.

النتائج: تبين أن مستوى (جي اس اتش) 11.31 ± 3.80 ميكرومليمول/لتر ومستوى (أم دي آيه) 67.94 ± 106.70 ميكورمليمول/لتر في مجموعة الدراسة بينما تبين أنها 24.95 ± 6.55 ميكورمليمول/لتر و 26.52 ± 19.42 ميكورمليمول/لتر في مجموعة التحكم.

خاتمة: تمت ملاحظة الزيادة في مستويات (أم دي آيه) والانخفاض في نشاط (جي اس اتش) لدى المرضى المصابين بالكيس العداري.

Objective: To investigate the levels of glutathione (GSH), and malondialdehyde (MDA) in the sera of patients diagnosed with cyst hydatid.

Methods: Forty-six hydatid cyst patients who were indirect hemagglutination (IHA) and indirect fluorescence antibody (IFA) test positive constituted our

study group in 2007. Patients diagnosed with hydatid cyst in the Inonu University School of Medicine, Department of Parasitology were re-called for the study. Forty healthy subjects who were negative for hydatid cyst by IHA and IFA methods, and who did not have any parasites on stool inspection formed the control group. The MDA level was analyzed in the sera by Uchiyama and Mihara method. The GSH activity was measured by the Ellman method.

Results: The GSH level was 11.31 ± 3.80 $\mu\text{mol/L}$ and the MDA level was 67.94 ± 106.70 $\mu\text{mol/L}$ in the study group, while they were 24.95 ± 6.55 $\mu\text{mol/L}$ and 26.52 ± 19.42 $\mu\text{mol/L}$ in the control group.

Conclusion: An increase in MDA levels and a decrease in GSH activity in patients with hydatid cyst was observed.

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The host immune system is defended by cells against parasites (mature or larval form). In this mechanism, various cytotoxic agents produced by activated phagocyte cells, reactive oxygen and nitrogen by-products play a role. These products are oxidant molecules in the nature of free radicals, which have an adverse impact on the viability of parasites. Glutathione

(GSH), which is a non-enzymatic antioxidant, is a tripeptide, which is synthesized in the liver without any need for genetic information. Glutamic acid is composed of cysteine and glycine amino acids. The GSH, which reacts with free radicals and peroxides, protects the cells from oxidative injury. In addition, it maintains the sulphur-hydrogen groups in a reduced state, protecting them from oxidation. Hence, it prevents the inactivation of functional proteins and enzymes.^{1,2} Like other cestodes, species of echinococcus, cannot synthesize the lipid, which plays an important part in enzyme regulation, recognition of cell surface, cell interaction, glycoprotein synthesis, and the release of surface antigenic determinants in membrane transport and supplies the necessary lipid from host.³ However, MDA which results from lipid peroxidation, causes the cross linking and polymerization of membrane components. Consequently, intrinsic membrane characteristics such as deformation, ion transport, enzyme activity, and aggregation of cell surface components are altered. This accounts for the mutagenic, genotoxic, and carcinogenic effects of MDA.² The aim of the present study is to investigate the GSH and MDA levels in the serum of patients with the definite diagnosis of hydatid cyst.

Methods. In this study, approval was obtained from the Ethical Committee of Inonu University, Faculty of Medicine, Malatya, Turkey, and the related information was given to the patients and their consent was taken. Patients diagnosed with hydatid cyst between 2002 and 2006 in the İnönü University School of Medicine, Department of Parasitology were re-called and the indirect hemagglutination (IHA) and indirect fluorescence antibody (IFA) test were repeated, and the blood samples of 46 positive patients were gathered. The mean age was 33 years, with 23 males and 23 females. In addition, 40 non-smokers, who had not taken hormone treatment constituted the control group. They were negative for hydatid cyst by IHA and IFA methods, and did not have any parasites on stool inspection. The gathered serum samples were preserved at -80°C until they were used. The mean age of the control group was 40.25 ± 5.25 years, and it included only male subjects. The MDA level was analyzed in the sera of both groups by the Uchiyama and Mihara method.⁴ This method is based on the formation of a pink colored compound, which emits maximum absorbance at 535 nm upon the reaction of thiobarbituric acid with MDA:GSH. The GSH was determined by the spectrophotometric method using Ellman's reagent.⁵

Data obtained from the study was given as mean ± standard deviation. Normality test was carried out with Shapiro-Wilk test. On statistical analysis, independent sample t test and Mann Whitney U test were used depending on the statistical assumptions. $P < 0.05$ was

Table 1 - Descriptive statistics of MDA and GSH.

Parameter	Patient group (n=46)	Control group (n=40)	P-value
MDA	67.94 ± 16.70	26.52 ± 19.42	0.001
GSH	11.31 ± 3.80	24.95 ± 6.55	0.001

Data are expressed as mean ± standard deviation.
MDA - Malondialdehyde, GSH - Glutathione

considered statistically significant, and SPSS 10.0 software was used.

Results. Descriptive statistics for MDA level and GSH activity are given in Table 1. In the present study, MDA and GSH were found to be significantly different in the study group and in the control group ($p=0.001$).

Discussion. Echinococcus granulosus, which is prevalent in a large area over the world, occurs in all continents. Its prevalence is highest in Euroasia, Africa, Australia, and some regions of South America. In our country, hydatid cyst infection occurs frequently.⁶ The disease may not exhibit any symptoms until the cyst reaches the diameter of 5 cm. Symptoms arise due to pressure on the adjacent tissues, and complications, or reactions against the toxic effects of the parasite.⁷ Malondialdehyde (MDA), which is formed as a result of lipid peroxidation, causes deformation in cells and alters the intrinsic membrane characteristics.² It has been established that MDA levels increase in parasite diseases.⁸⁻¹¹ In sources, MDA has been reported to be mutagenic, genotoxic, and carcinogenic.^{2,9} However, as far as we know, there has been no study investigating the relation between cancer and the increase in MDA levels in hydatid cyst disease. In the present study, the MDA level was found to be significantly high compared to the control group ($p=0.001$). Glutathione reacts with free radicals and peroxide and protects the cells from oxidative injury.^{1,2} The increase in MDA levels in hydatid cyst disease have also been reported by Koltas et al.¹² Yet, to our knowledge, there has been no study investigating GSH activity in the literature. In the present study, GSH activity was observed to decrease in hydatid cyst patients ($p=0.001$), emphasizing the importance of GSH and MDA levels in these cases, and demonstrating that they could be important parameters in the treatment process. In addition, the relation between IHA positivity and the differences in GSH and MDA levels can be investigated. If a significant relation is found, GSH and MDA may be measured to monitor the course of the disease.

In conclusion, the increase in MDA levels and the decrease in GSH activity in patients with hydatid cyst

were observed, which may cause a severe clinical picture. Therefore, it is suggested that antioxidant vitamins (E and C), which increase the activity of GSH, one of the factors protecting cells from the deleterious effects of MDA, will be beneficial in the treatment of hydatid cyst disease. The relation between the changes in the levels of MDA and GSH and the treatment and the course of hydatid cyst disease should be investigated in further studies.

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