INTRODUCTION: Among other effects, oxidative stress also impairs normal brain functions through the inhibition of neurogenesis, altering neuronal transmission, and inducing mitochondrial dysfunction. Human and animals studies demonstrated that oxidative stress is related to anxiety. In an animal model of PTSD, inflammation and oxidative stress were reported to play a critical role in the development and exacerbation of PTSD. There are also studies that did not report a significant difference between patients with PTSD and the control group in terms of oxidative stress. It was reported that oxidative stress could be a critical molecular linkage between the hypothalamic-pituitary-adrenal (HPA) axis dysfunction and mental disorders. It was also reported that the stress-induced increase in cortisol levels accelerates glucose metabolism and production of reactive oxygen species.

The aim of the present study is to evaluate children and adolescents who develop PTSD after experiencing sexual abuse versus those who did not develop PTSD in terms of the level of oxidative stress and DNA damage.

METHOD:
Study Sample: The study was conducted in the Department of Child Psychiatry at Dicle University. The study data were collected between July 2013 and February 2014. A total of 61 children, aged between 5 and 17 years (18 males and 43 females), participated in the study. The patients were divided into two groups, patients with PTSD and patients without PTSD, based on the results of a structured psychiatric interview. Children who achieved an intelligence score below 70 points, those with a significant neurological or medical disorder, those who received oral contraceptives, previous or current cortisol therapy, vitamins, and those with morbid obesity or active infection were excluded from the study in order to prevent interference with the biochemical parameters. The parents provided informed consent in order for their children to participate in the study. Approval was obtained for the study from the Non-interventional Clinical Researches Ethics Committee at Dicle University Faculty of Medicine.

Scales:
Affective Disorders and Schizophrenia for School Age Children-Present and Lifetime Version (K-SADS-PL): The schedule (K-SADS-PL) was originally developed by Kaufman et al. It was adapted to the Turkish language by Gökler et al. in 2004. K-SADS-PL is administered during an interview with the parents and children, and the final evaluation is performed using input from all data sources.

Clinician-Administered Post-Traumatic Stress Disorder Scale for Children and Adolescents (CAPS-CA): CAPS-CA is a semi-structured interview developed to evaluate the frequency and severity of present and past PTSD in children and adolescents according to DSM-III and DSM-IV diagnostic criteria. It was adapted from the Clinician-Administered Post-Traumatic Stress Disorder Scale (CAPS) by Nader et al. in 1996. The scale evaluates 17 symptoms of post-traumatic stress disorder based on DSM-IV and eight items related to PTSD. It was adapted to the Turkish language by Karakaya et al. in 2007.

The Children's Depression Inventory (CDI): The Children's Depression Inventory developed by Kovacs based on the Beck Depression scale was used in the study. However, questions specific to the childhood period such as school success and relationship with friends were added. The scale was adapted to the Turkish language by Öy and contains 27 items, each of which is scored as 0, 1, or 2 points depending on the severity of the symptom.

Biochemical Analysis: The blood samples were obtained in the morning between 10:00 and 12:00 AM. Cortisol, glutathione peroxidase (GPx), superoxide dismutase (SOD), coenzyme Q, 8-Hydroxy-2-Deoxyguanosine (8-OHdG) levels were evaluated using the ELISA method and ready-to-use ELISA kits.

Statistical Analysis: The statistical analysis was performed using SPSS 15.0 software package. A p value < 0.05 was considered statistically significant.

RESULTS: The mean age was 13.3±2.4 years (range: 5-17 years) among the victims of sexual abuse. Our evaluation revealed a diagnosis of PTSD in 51% (n=31) of victims. There was no significant difference between patients with or without PTSD in terms of gender, smoking status, and menstrual cycle, the latter being assessed for adolescent patients. There was also no significant difference between the groups in terms of age, age of the mother/father, and education level of the parents.

Regarding the parameters related to sexual abuse, 48% (n=29) of the victims experienced sexual abuse involving penetration. Of the victims, 46% (n=28) experienced single assault and 54% (n=33) experienced multiple assaults. 21% (n=13) of victims experienced sexual abuse with or without post-traumatic stress disorder.
abuse within the family (incestuous), and 79% (n=48) experienced sexual abuse committed by non-related persons. There was no significant difference between patients with or without PTSD in terms of relationship with the abuse and presence of penetration (p=0.34 and p=0.68, respectively).

There was no significant difference between the groups with or without PTSD in terms of cortisol, GPx, SOD, coenzyme Q, and 8-OHdG levels (Table 1). Likewise, there was no significant difference between the groups with or without depression in terms of cortisol, GPx, SOD, coenzyme Q, and 8-OHdG levels (p=0.43, p=0.46, p=0.38, p=0.53, and p=0.48, respectively). There was no correlation between CAPS scores and GPx, SOD, coenzyme Q, and 8-OHdG levels between patients with or without PTSD.

The mean time that elapsed since the first sexual abuse until the date of examination was 23.9±24.1 months (range: 1-115 months). In the PTSD group, cortisol levels decreased with increasing time after trauma, and there was no significant correlation with the cortisol levels in patients without PTSD (r=-0.46, p=0.01 and r=-0.07, p=0.73, respectively). Similarly, 8-OHdG levels in the PTSD group decreased with increasing time after trauma, and there was no significant correlation with 8-OHdG levels in patients without PTSD (r=-0.42, p=0.03 and r=-0.04, p=0.85, respectively).

**DISCUSSION:** In the present study, there was no significant difference between patients with or without PTSD in terms of oxidative stress and DNA damage. Furthermore, no relationship was found between the severity of the symptoms of PTSD and oxidative stress and DNA damage. In their studies, Tezcan et al. and Čeprnja et al. did not report any association between PTSD and oxidative stress. However, healthy volunteers having no past history of trauma were selected as the control group in their study. In addition, the type of trauma in their study was different compared to the present study. In contrast to our findings, human and animal studies showed an association between oxidative stress and anxiety. In an animal model of PTSD, inflammation and oxidative stress were reported to play a critical role in the development and exacerbation of PTSD.

In the present study, cortisol and 8-OHdG levels decreased with increasing time after trauma in the PTSD group. Although we did not find any difference between the groups in terms of 8-OHdG concentrations, this finding was considered to be a reflection of the relationship between cortisol and DNA damage.

In conclusion, there was no significant difference between children and adolescents with or without PTSD after sexual abuse in terms of the level of oxidative stress and DNA damage. However, cortisol and 8-OHdG levels decreased with increasing time after trauma in the PTSD group. Although we did not find any difference between the groups in terms of 8-OHdG concentrations, this finding was considered to be a reflection of the relationship between cortisol and DNA damage. This is the first study conducted in this age group.

**Keywords:** oxidative stress, PTSD, sexual abuse

**References:**