

Serum Plasma Thiol Evaluation in Chronic Telogen Effluvium Patients

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Abstract

Background: Oxidative stress has been linked to chronic telogen effluvium (CTE). In a physiological sense, free radicals are eliminated by thiols, which are powerful and stable antioxidants. When oxidative stress is present, thiols are the body's go-to antioxidant. The purpose of this study is to compare serum total thiol, thiol-disulphide, and disulphide levels in female CTE patients to those of healthy controls. Topics and Approaches: Sixty people with CTE and twenty age- and sex-matched healthy volunteers served as the case and control groups, respectively, in this case-control research. From May 2020 to December 2021, they were scouted from the outpatient clinic of the Dermatology, Venereology, and Andrology Department at Benha University Hospitals. Results: There was no statistically significant difference in age or body mass index between the patients and the controls. In patients, total thiol levels were considerably lower than in controls. Patients had considerably lower levels of thiol-disulphide compared to healthy controls. Patients had considerably lower levels of disulphide compared to controls. The pathophysiology of TE is intimately linked to oxidative stress, we conclude. The development and prevention of oxidative stress are both influenced by the thiol-disulfide equilibrium. TE upsets this delicate equilibrium.

Key Words: Serum, Plasma Thiol Evaluation in Chronic Telogen, Effluvium

1. Introduction

The most prevalent kind of hair loss is telogen effluvium (TE). An increase in the rate of synchronous telogen hair loss results from a disturbance in the hair development cycle. The primary or idiopathic widespread shedding of telogen hairs from the scalp for more than 6 months without any obvious reason is known as chronic telogen effluvium (CTE). 2.

In a physiological sense, free radicals are eliminated by thiols, which are powerful and stable antioxidants. Thiols protect keratinocytes from the effects of oxidative alterations in the stratum corneum and control intracellular redox metabolism, making them an indication of antioxidant status 3. 4. Under situations of oxidative stress, thiols are the first antioxidants to be used 5.

This research set out to compare the levels of thiol-disulphide, disulphide, and total thiol in the blood of female CTE patients with those of healthy controls.

2. Subjects And Methods

In this case-control study, sixty females diagnosed with CTE were compared to twenty healthy female volunteers of the same age and sex. They were culled from the Dermatology, Venereology, and Andrology Department's outpatient clinic at Benha University Hospitals between May 2020 and December 2021.

Radiation therapy, chemotherapy, or the use of thiol-containing medicines like N-acetylcysteine or captopril; the presence of androgenic alopecia, alopecia areata, cicatricial

alopecia, or lupus erythematosus; or the presence of an associated chronic condition disqualified patients from participation.

Everyone was subjected to a complete physical and mental examination. All patients had their CTE severity evaluated using a hair-pull test. Each temporal lobe and the frontal lobe were checked, as well as the occipital lobe.

Over the course of two weeks, hair that had fallen out of all of the patients had to be gathered. Daily samples of the hairfall were collected at the same time, usually in the morning, and placed in envelopes labelled with the days they were collected. Microscopical examination of hairs supported the findings (telogen hair).

Cloud Clone Corporation provided a commercially accessible, test-specific kit for measuring total thiol and disulfide levels in serum using the enzyme-linked immunosorbent assay (ELISA) technique. Both patients and controls had 5 ml of venous blood drawn.

3. Statistical Analysis

SPSS version 25 was used for data administration and statistical analysis. (IBM; Armonk, New York; USA). The Kolmogorov-Smirnov test (for cases) and the Shapiro-Wilk test (for controls) as well as direct data visualisation techniques were used to check the normality of the quantitative data (for both). Means and standard deviations were calculated based on the normality of the data.

Quantitative and percentage summaries of the categorised data were generated. The independent t-test was used to compare quantitative data from each research group. The Chi-square test was used for the comparison of categorical data. For the markers under investigation, ROC assessments were performed. For each marker, we determined its area under the curve (AUC) and 95% confidence interval (CI), optimal cut-off point, and diagnostic indices. Pearson's correlation was used for the analysis of

relationships. The independent t-test was used to compare the markers of interest based on whether or not the subjects had received therapy in the past. A 95% confidence interval and odds ratio were determined. There were no one-sided statistical analyses. Significant results were reported for P values lower than 0.05.

4. Results

The patients and control groups showed a non-significant difference as regards age and body mass index (BMI) (Table 1).

Table (1) General characteristics in patients and control groups

		Patients (n = 60)	Controls (n = 20)	P
Age(years)	Mean \pm SD	27 \pm 3	26 \pm 3	0.44
	Females n	60		
Gender	(%)	(100%)	20 (100%)	-
Body Mass Index	Mean \pm SD	24.2 \pm 3	23.9 \pm 2.3	0.66

***Independent t-test was used for age and BMI. Chi-square test was used for gender**

The mean age of CTE onset was 25 years, with a standard deviation of 3 years. The mean CTE duration was two years, with a standard deviation of one year. About three-quarters of the patients received previous treatment.

5. Discussion

Constant exposure to endogenous and exogenous pro-oxidant agents is hypothesised to cause reactive oxygen species to be formed as a result of damage to cellular components like nucleic acids, proteins, and lipids in the cell membrane of the scalp skin, potentially leading to a decline in the antioxidant/oxidant balance. 6.

Hair follicles' internal biological clock may be affected by oxidative stress, leading to an unusually high number of follicles entering the telogen phase all at once⁷.

The present investigation found no significant relationship between total thiol and patient age. This finding was consistent with ⁸, who demonstrated a connection between total thiol and patient age that was not statistically significant.

Total thiols levels tend to drop as people become older. This lends credence to the link between oxidative stress and becoming older. Hair thinning and hair loss are also associated with oxidative stress as we age¹¹.

Although previous research has linked total thiol levels and patient age, the present study's findings contradict those of Akbas et al. (2019)⁹. Total thiols levels tend to drop as people become older. The discrepancy between the two investigations, as shown in Akbas et

al.(2019)⁹.'s research of TE patients and controls of advanced age.

Although total thiol was measured differently in the two groups, the present study's findings showed patients had considerably lower levels compared to controls are similar with those of Savci et al. (2019). In addition, both male and female TE patients were included in the research by Savci et al. (2019).

Disulfide levels were found to be considerably lower in the study's participants compared to the study's controls. This result corroborated the findings of Savci et al., (2019)⁸, who discovered a statistically significant decrease in disulphide levels between patients and controls (P 0.001).

In line with the findings of Akbas et al. (2019)⁹, the present investigation found that the disulphide level was considerably lower in patients compared to controls (P 0.115).

The present investigation found no statistically significant correlation between patient age and disulphide concentrations. Savci et al. (2019)⁸ also discovered no statistically significant correlation between disulphide and patient age, therefore these findings were consistent with theirs. Consistent with the findings of Akbas et al. (2019)⁹, the present analysis demonstrated no statistically significant correlation between patient age and disulfide.

There was no statistically significant link between disulphide and patient age in this analysis. Savci et al. (2019)⁸ also discovered a non-significant association between disulphide and patient age, therefore this finding is consistent with theirs. The present study's finding that no statistically significant

relationship existed between patient age and disulfide agreed with that of Akbas et al. (2019)9.

In contrast to Akbas et al. (2019)9 and Savci et al. (2019)8, thiol-disulphide was measured in the present investigation and found to be considerably lower in patients than controls.

One-fourth to two-thirds of COVID-19 patients report TE, according to a recent research; however, the study did not prove that COVID-19 produced or caused the alterations in thiol-disulphide hemostasis.

The thiol/disulfide homeostasis was studied, and it was revealed that in many illnesses, including obesity, pneumonia, bronchiolitis, and diabetes

mellitus, the balance of oxidative stress is disrupted compared to healthy populations. However, the scales tipped more toward the thiol side in illnesses such renal cancer, colon cancer, urinary bladder cancer, and multiple myeloma 13.

Serum thiol levels in psoriasis patients were shown to be considerably lower compared to a healthy group by Yazici et al., (2016)14. Serum thiol/disulfide levels were found to be comparable across patient and control groups, suggesting that vitiligo did not influence thiol/disulfide balance (Akbas et al., 2013)15).

Patients with acute urticaria showed no differences in thiol/disulfide levels when compared to a healthy control group, however those with chronic spontaneous urticaria did show substantial differences.

There was no significant difference between androgenic alopecia patients and controls 17 in terms of disulfide, total thiol, or disulfide/total thiol ratios. Serum thiol levels in acne sufferers were shown to be considerably higher compared to a healthy group by Mikheal et al., (2021)18.

Another research found no difference in thiol/disulfide levels between patients with alopecia areata and a healthy control group (Kilinc et al., 2017)19).

Patients with rosacea had a considerably higher mean disulfide level compared to the control group of 20. Total thiols were observed to be considerably greater in the seborrheic dermatitis patient group compared to the control group. The levels of disulfide in the sick group were found to be marginally lower than those in the control group (P .05).

The current research has a few flaws. To begin, there was an insufficient sample size of patients. Second, this research only involved individuals who reported symptoms of CTE; those who reported acute TE were excluded.

Third, this research only included female patients with CTE and excluded male patients.

Despite these limitations, the present investigation revealed a hitherto unrecognized function of thiol in CTE patients. More research is needed to validate oxidative stress's causal involvement in CTE.

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