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Prospective Cohort Study on Oxidative Stress in Acute Ischemic Stroke: Implications for Severity and Disability

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ABSTRACT

Introduction: Numerous studies have explored the serum levels of oxidative stress markers in individuals with acute ischemic stroke (AIS). However, due to factors such as study design, sample size, limited oxidative stress markers, and inadequate consideration of confounding variables, a clear relationship between serum oxidative stress markers and AIS's severity and functional outcomes has not been established. Therefore, we conducted a prospective cohort study to investigate the association between oxidative stress markers and the severity of acute ischemic stroke and functional outcomes.

Search Strategy: This prospective cohort study enrolled 100 AIS patients at Imam Hassan (AS) Bojnord Hospital. The National Institutes of Health Stroke Scale (NIHSS) assessed stroke severity on the first and fourth days post-admission. At the same time, disability levels were evaluated three months after discharge using the Modified Rankin Scale (MRS). A control group of 100 healthy individuals matched for age and gender, devoid of underlying diseases, medications, or supplements, was also included. Oxidative stress markers were measured via colorimetric methods using serum samples collected within 24 hours of admission.

Results: The study investigated the link between oxidative stress markers, AIS severity, and functional outcomes. The average age of participants was 66 years, with 52% female. Statistical analysis revealed no significant differences in NIHSS and MRS scores based on demographic characteristics, except for ethnicity. AIS patients exhibited elevated superoxide dismutase activity, malondialdehyde, and nitric oxide levels, while catalase activity was lower than healthy controls. Nitric oxide and malondialdehyde positively correlated with NIHSS scores, while catalase activity, superoxide dismutase activity, and total antioxidant capacity showed negative correlations. Malondialdehyde showed a positive correlation with the MRS scale.

Conclusion and Discussion: Our study underscores the involvement of oxidative stress in acute ischemic stroke and its connection to stroke severity. Elevated oxidative stress markers were observed in AIS patients compared to healthy controls and correlated with stroke severity. These findings suggest that oxidative stress could contribute to the pathogenesis of acute ischemic stroke, highlighting its potential as a therapeutic target.

Keywords: Cohort studies, Iran, Stroke

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