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Role of Microstructural White Matter Changes of Somatosensory Cortex in Stress Among Non-Clinical Population: A Diffusion Tensor Imaging Study

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Abstract
INTRODUCTION: Stress is a common response by people to stressors or potential threats, resulting in physical, affective, and cognitive changes. Emotions are associated with interpretations of physiological changes, and the processing of emotions is largely dependent on the somatosensory cortex which includes the postcentral gyrus. The objective of this study was to examine the correlation between stress and alterations in the microstructure of white matter in the somatosensory cortex among healthy non-clincal population. MATERIALSANDMETHODS:A total of 30 participants were recruited. The participants were administered the Depression, Anxiety, and Stress Scale 21 (DASS-21) questionnaire. All subjects underwent Magnetic Resonance Imaging (MRI) brain scanning, with diffusion tensor imaging (DTI) used to assess white matter integrity. The association between stress scores in DASS-21 and DTI parameters was analyzed. RESULTS:A significant negative relationship was observed between stress scores and fractional anisotropy (FA) values in the left postcentral gyrus (r=-0.393, p=0.032), suggesting that stress has an early detrimental effect in this region, while no significant correlation was found in the right postcentral gyrus (r=-0.300, p=0.107). CONCLUSION: The findings of our study indicate that stress may lead to early impairments in the microstructural somatosensory cortex, particularly in the left postcentral gyrus. These alterations were observed using DTI technique. Hence, the alterations in the microstructure of white matter in the brain prior to the onset of the disorder may play a vital role and could serve as a new and promising biomarker for the early identification and treatment of the disease in the non-clinical population.

Author Keywords
DTI; Somatosensory; Stress; White Matter

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36

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