A PRELIMINARY MRI STUDY OF HIPPOCAMPAL VOLUME IN CHRONIC POSTTRAUMATIC STRESS DISORDER

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Since a long time, PTSD symptoms have been attributed to certain areas of the brain, the most important of which includes hippocampus. Considerable evidence points out a relation between stress and damage to hippocampus. To examine this theory a controlled study was conducted in Government Psychiatric Disease Hospital in Srinagar in collaboration with the Department of Radio Diagnosis, on seven patients diagnosed with PTSD using DSM-IV guidelines. Of the seven patients, five were males and two females. The patients were in the age range of 22-68 years, with an average duration of PTSD of 21 months. Using appropriate MRI techniques and evaluation protocols, the hippocampal volumes were measured in both cases and controls. The preliminary results revealed smaller sizes of both hippocampi in PTSD samples as compared to controls. The results of longitudinal study using MRI and spectroscopic methods are, however, been evaluated for a final report in near future.


Keywords: PTSD, hippocampus, MRI, spectroscopy.

That traumatic events can cause psychological disorders in those who experience them is a well known fact. One disorder that has received considerable attention over the past two decades is post traumatic stress disorder (PTSD).

PTSD is a constellation of disabling behavioural and emotional symptoms that occur in some individuals who are exposed to severe psychological trauma in the form of combat, sexual abuse or natural disaster. The lifetime prevalence of PTSD has been found to be different in various epidemiological studies with newer studies reporting a prevalence range of 7.8% - 12.3% , whereas some have not. We, therefore, conducted a controlled study to look at the hippocampal structure(measured with MRI) in persons suffering from chronic posttraumatic stress disorder.

Methods
The study was conducted in department of Psychiatry, Government Medical college Srinagar in collaboration with the Department of Radiodiagnosis. The patient group consisted of 7 PTSD patients who met the DSM-IV criteria for PTSD.

Subjects with history of head injury or physical injury necessitating admission to hospital were excluded from the study. In addition subjects with history of life-time neurological disorder, psychiatric disorder, bipolar disorder and substance abuse were not included. The subjects were given a comprehensive account of the study and informed consent was taken from them. The sample was matched according to the age, education, etc. with the control subjects.

MRI Methods:
All the patients were subjected to MRI of the brain, which was, performed with a 1.5 Tesla (Siemen’s symphony) and a standard head coil. Symmetric head positioning was verified by performing a short scout sequence and then the following sequence was performed.

The first sequence was T-1 weighted image
(T1W) performed in sagittal plane followed by T-2 weighted axial images (T2W) to rule out any brain abnormality. Then oblique coronal inversion recovery (IR) sequence was performed, after locating the plane of Sylvain fissure in T1W sagittal sequence. The sections were thus perpendicular to long axes of hippocampal formation. Hippocampal volumes were measured in these oblique coronal images by manual tracing method. Finally orthogonal coronal T-2 weighted images (T2W) were obtained to detect any change in signal intensity of hippocampus.

Results

The study groups did not differ with respect to socio-demographic variables. The study group comprised of two females and five males. Age ranging from 22-68 years with a mean age of 56.4 years. The average symptom duration of PTSD was 29 months (range 18-43 months). The CAPS scores for PTSD ranged from very high to low scores (91-78). The control subjects matched adequately with the study group comprised of 3 females and 4 males. The results of the preliminary investigation revealed the similar size of both hippocampi in PTSD patients as compared to the programmes.

Discussion

More severe chronic unremitting forms of PTSD, which majority of our subjects were suffering from have been reported to have an increased possibility of being associated with small hippocampal size. Some studies have specifically correlated with small hippocampal size with PTSD, while as others indicate that PTSD is not a necessary outcome of it. In some reports cortico steroid induced damage to hippocampus resulting in its atrophy has been suggested to play an important role in the pathogenesis of PTSD, but other recent observations do not support corticosteroid mediated hippocampus neurotoxity as the main causal mechanism of the neuro psychiatric disorders. Psychological trauma damaging areas of brain as evidenced by neuro imaging needs to be researched further as a challenge to the conventional therapeutic approaches. Although majority of the studies so far had involved mostly the subjects with PTSD for a number of years, a recent hippocampal volume study on recent onset PTSD subjects has also replicated previous findings of smaller hippocamal volumes in PTSD patients, which as the authors also point out suggest, “that either smaller hippocampal volume is a predisposing factor in the development of PTSD or that damage occurs within months of trauma rather than a number of years.” More recently spectroscopic assessment of the brain structures as a better indicator of the underlying pathology than volume losses in conditions like PTSD has been suggested. We have also been carrying out the spectroscopic measurements of our PTSD subjects and the results will be reported separately. The limitation of the present study will be addressed in the final report of this longitudinal MRI study when the final results are reported in near future.

In conclusion, the present preliminary study revealed small hippocampal size in trauma survivors than those without PTSD, so future research should focus on developing strategies to prevent and reverse structural changes in brain after exposure to traumatic experiences.