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Role of Serum S100b in Schizophrenia

Sravya Raja*, T V Pavan Kumar

Psychiatry, NRI Medical College/NTRUHS, India

***Corresponding author:** Sravya Raja, Psychiatry, NRI Medical College/NTRUHS, India; Tel: 9441792969; E-mail: sravy.raja@icloud.com

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Abstract

Background: Schizophrenia is a chronic mental illness effecting 1% of the population. Multiple hypotheses were proposed in the development of Schizophrenia including Neurodevelopmental, Neurodegenerative, Glial damage, Dopamine and Glutamate irregularities. S100B is a calcium binding protein found in astroglial and Schwann cells. It has important role in CNS development and recovery after injury. Scientific evidence for elevated S100B concentrations in Schizophrenic patients is consistent. This finding was mainly considered to reflect astroglial or blood brain barrier dysfunction.

Materials and Methods: In this observational study, 30 patients of Schizophrenia belonging to age group of 18-60years admitted in Psychiatry ward were selected randomly and their serum S100B protein levels were measured to determine the significance of it in the development of the disease.

Results: The serum levels of S100B were elevated in 5 patients. There is no elevation in significant number of patients.

Conclusion: Elevated levels of S100B helps in strengthening the astroglial damage hypothesis of Schizophrenia.

Keywords: Schizophrenia; S100B protein; Glial damage.

Introduction

Schizophrenia is a severe mental illness with variety of symptoms that affects cognitive function, perceptual experiences. It has become a severe public health problem and exerts enormous economic and personal costs worldwide. There is sufficient evidence that astrocytes play an important role in the central nervous system (CNS) and are implicated in the pathogenesis of schizophrenia [1]. During the past two decades, the associations between brain tissue damage, or glial cell dysfunction (astrocytes and oligodendrocytes) and schizophrenia have been repeatedly reported. S100 calcium binding protein (S100B) proposed as a marker for glial dysfunction and blood-brain barrier disruption, has been found increased in serum of patients with schizophrenia by numerous previous studies. S100B is a calcium-binding protein that was first described in 1965 and influences many cellular responses along the calcium-signal-transduction pathway. S100B is a monomer that belongs to the S100 protein family [2]. Two of the main monomers of S100 are the S100A1 and the S100B. Both are found mainly as dimers, either homo- (BB) or heterodimers (A1B). With regard to schizophrenia, there is sufficient evidence that its pathogenesis is related to both neurodevelopmental and neurodegenerative processes. It is important to measure the functionality of astrocytes in patients with schizophrenia through astrocytic markers that can be detected in both CSF and serum. The S100B protein concentrations can be considered as a potential marker of astrocytic response in schizophrenia [3].

Material And Methods

This observational study was carried out on patients of Department of Psychiatry, at NRI Medical College and General Hospital, Chinnakakani, Mangalagiri, Guntur, Andhra Pradesh from January 2019 to June 2019. A total 30 adult subjects (both male and females) of aged ≥ 18, years were for in this study [4].

Study Design: Observational study.

Study Location: This was a tertiary care teaching hospital based study done in Department of Psychiatry, at NRI Medical College and General Hospital, Chinnakakani, Mangalagiri, Guntur, Andhra Pradesh [5].

Study Duration: from January 2019 to June 2019.

Sample size: 30 patients.

Subjects and selection method: The study population was drawn from patients who presented to NRI Medical College and General Hospital with symptoms of Schizophrenia from January 2019 to June 2019. Patients were diagnosed based on ICD10 criteria [6].

Inclusion criteria:

Schizophrenic patients

Either sex

Aged ≥ 18 years,

Exclusion criteria:

Patients who didn't give consent for the study.

Patients who denied the investigation (Serum S100B)

Procedure methodology

After written informed consent was obtained, a well-designed questionnaire was used to collect the data of the recruited patients retrospectively. The questionnaire included socio-demographic characteristics such as age, gender, nationality, height, weight, and consanguineous marriage, physical activity and lifestyle habits like smoking and alcohol and the nature and duration of the symptoms. The Serum S100B levels were quantified on samples collected in the fasting state. The quantization was determined by quantitative immunoassay **Figure 1**.

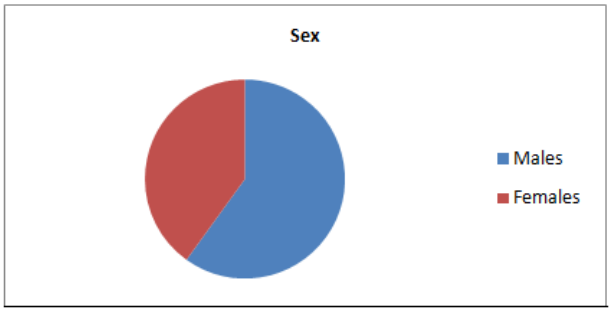

Figure 1: Shows Sex wise distribution.

Result

The normal levels of S100B is < 0.105µg/L. elevated levels were seen in 5 patients i.e., 16.60% out of 30 patients selected for the study **Table 1**. Of this four were males and one female. Of the 5 cases, 3 were newly diagnosed and 2 were on treatment for a long time **Table 2**.

Age Group	Number
16 - 30	14
31 - 45	12
46 - 60	4

Table 1: Shows Age wise distribution of the population.

Age	Sex	S100B
22	M	0.255
23	M	0.150
34	M	0.113
43	F	0.182
58	M	0.153

Table 2: Elevated S100B values of the population.

Discussion

Increased serum levels of S100B have been related to a passive release due to astrocyte destruction or an active release by secretion. Thus, increase of peripheral levels of S100B is a sign of astrocytic injury and/or astrocytic response to neuronal injury [7]. Astrocyte activation indicated by increased S100B is considered a potential pathogenic factor for Schizophrenia. Several lines of research indicate that astrocyte destruction can be directly responsible for neuronal malfunction mainly via Glutamate induced Calcium modulation. Hanson and Gottesman hypothesize disruptions in astroglial mediated coupling of CBF to neuronal metabolic needs to cause a neurointegrative defect, which leads to psychotic psychopathology as the vascular-glial-neuron triad is progressively damaged over time by repeated in inflammatory episodes [8]. Persistently high levels repeatedly been associated with negative or deficit symptoms and slower psychopathological improvement upon treatment [9]. It appears that persistently increased S100B concentrations indicate or are involved in an ongoing pathological process resulting in chronic course of the disease with cognitive impairment [10]. Result of high level of plasma S100B in Schizophrenic patients reinforces the glial dysfunction and brain damage hypothesis in the pathogenesis of Schizophrenia. It is important to measure the degree of glial damage in Schizophrenic patients by peripheral markers that can reflect level of CNS. The present study aimed to build on this hypothesis of glial damage in the pathogenesis of Schizophrenia. This study was an observational study done in Department of Psychiatry, at NRI Medical College and General Hospital, Chinnakakani, Mangalagiri, Guntur, Andhra Pradesh from January 2019 to June 2019. The study, shows that there is no elevation in significant level of the population [11].

Conclusion

Elevated levels of S100B helps in strengthening the astroglial damage hypothesis of Schizophrenia. The limitations of the study are small size of sample and the effect of drugs on the concentration of serum S100B levels is not taken into consideration.

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