Original Research Article

Serum glycoproteins in patients with severe depression compared with normal subjects

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Abstract

Background: Depressive illness is considered to be a psychoneuro-immunological disorder due to peripheral immune activation through the release of proinflammatory cytokines. Cytokines enhance the hepatic synthesis of glycoproteins. Several studies have shown alpha-1acid glycoprotein levels are elevated in patients with major depressive disorder. **Aim:** To investigate the changes in the level of serum glycoproteins in patients with severe depression and compared with normal subjects. **Material and Methods:** The present study conducted on 100 subjects which were grouped as cases (n=50) and controls (n=50). The patients who were diagnosed as having severe depression by the clinical psychiatrist were included in the cases group. Protein bound hexose (PBH) was estimated by the method of Weimer HE and Moshin JR and Protein bound hexosamine (PBHex) was estimated by the method of Winzler. **Results:** The mean of PBH levels in severe depression cases was 191.05±4.01 mg% and in controls was 102.50±5.81 mg% ($p<0.0001$). Whereas, the mean PBHex level in cases and controls was 97.50±5.06 mg% and 78.50 ± 4.97 mg% ($p<0.0001$). **Conclusion:** The present study shows significantly increased levels of serum glycoproteins in severe depressive patients. As serum glycoproteins are non-specific indicators of severe depression, they cannot be used as a diagnostic marker. At best these levels may be used to study the response to treatment.

Key Words: Severe depression, Normal individuals, Protein bound hexose, Protein bound hexosamine.

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INTRODUCTION

Major depressive disorders are the most common among psychiatric diseases and it may range from a very mild condition, bordering on normality, to severe (psychotic) depression accompanied by hallucinations and delusion. According to Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV), a major depressive disorder is defined as one or more major depressive episodes, without history of manic or mixed episodes.[1] Depressive illness is considered to be a psychoneuro-immunological disorder due to peripheral immune activation through the release of proinflammatory cytokines. These cytokines are responsible for the behavioral, neuroendocrine, neurochemical alterations and modulation of hypothalamic-pituitary-adrenal axis. Cytokines enhance the hepatic synthesis of glycoproteins.[2,3] The glycoproteins as a group have multiple and complex function and are found as enzymes, hormones, blood group substances and as constituents of extracellular membranes. Several studies have shown alpha-1acid glycoprotein levels are elevated in patients with major depressive disorder.[5,6] The present study was undertaken to investigate the changes in the level of serum glycoproteins in patients with severe depression and compared with normal subjects.

MATERIAL AND METHODS

The present study conducted on 100 subjects which were grouped as cases (n=50) and controls (n=50).The patients who were diagnosed as having severe depression by the clinical psychiatrist were included in the cases group. Healthy control subjects were selected from volunteers on the basis of good health as evidenced by the medical history, complete physical examination and routine laboratory tests performed prior to the commencement of the study. The study was carried out after obtaining necessary approval from Institutional Ethical Committee and Informed consent obtained from the healthy control subjects and from the legal guardian of the patients.

Inclusion Criteria

- Patients with Severe Depression based on ICD–10 criteria.
- Patients aged 25-55 years
- Both sex

Exclusion Criteria

- Age <25 years
- Patients with history of cardiovascular disease, Pulmonary tuberculosis, trauma, prolonged bed rest, carcinoma cervix, breast, chronic alcoholism
- Patients with diabetes, hypertension

Estimation of Serum Glycoproteins: Blood samples (3-5ml) were collected from the control subjects and from the patients with severe depression. After collection the blood samples were centrifuged to separate the serum. The biochemical analyses were performed on serum samples for estimation of protein bound hexose and protein bound hexosamine. All the chemicals used were of analytical reagent grade.

Protein Bound Hexose (PBH): Protein bound hexose was estimated by the method of Weimer HE and Moshin JR.[7]In this method, the hexose moiety of glycoprotein conjugates precipitated by ethanol at room temperature. Then determined by orcinol reaction and read at 540nm.

Protein bound hexosamine (PBHex): Protein bound hexosamine was estimated by the method of Winzler.[8] In this method, serum proteins are precipitated by ethanol and hexosamines are liberated from the glycoproteins by acid hydrolysis. Acetylation in alkaline medium cyclizes the hexosamine to pyrrole derivative that couple with paradimethyl amino bezaldehyde forming color complex, which was determined photometrically at 530 nm.

Statistical Analysis: Data were expressed as Mean ± Std. deviation. The data so obtained was analyzed to obtain appropriate conclusions. Student 't' test was employed to find out the statistical significance.

RESULTS

The total number of subjects included for the study were 100. They were grouped as cases (patients with severe Depression) and controls (normal healthy individuals).The patients and controls were grouped into three according to the age as, Group 1=25-35 years; Group 2=36-45 years and Group 3=46-55 years.

Table 1: Age Group-wise comparison of Serum Glycoproteins levels in two groups

Group	Age (yr)	Cases			Control		
		No.	PBH Mean±SD (mg%)	PBHex Mean±SD (mg%)	No.	PBH Mean±SD(mg%)	PBHex Mean±SD(mg%)
1	25-35	25	191.26 ± 4.78	98.87±5.55	26	102.90 ± 6.33	78.46±5.74
2	36-45	16	190.15 ± 3.01	95.93±4.12	18	101. 58 ±4.96	78.50±3.95
3	46–55	9	192.07 ± 3.03	96.43±4.45	6	103.42 ± 6.23	78.66±4.84

The mean levels of protein bound hexose and protein bound hexosamine were compared within the different age group taken for the study. No significance was found between the age groups for the protein bound hexose and protein bound hexosamine levels in serum either in the study group or in controls.

Table 2: Sex-wise comparison of Serum Glycoproteins levels in two groups

Sex	Severe Depression			Control		
	No.	PBH Mean ± SD (mg%)	PBHex Mean ± SD (mg%)	No.	PBH Mean±SD (mg%)	PBHex Mean ± SD (mg%)
Males	25	191.97±4.00	96.87 ± 5.12	24	101.72±5.87	77.95 ± 4.45
Females	25	190.13±3.85	98.11 ± 5.01	26	103.19±5.73	79.00 ± 5.44

The mean values are significantly higher in both the sex in patients with severe depression compared to controls. The comparison of Protein bound hexose and protein bound hexosamine within males and females do not show any significance. This infers that age and sex do not influence the parameters.

Table 3: Comparison of Serum Glycoproteins levels in both groups

Variables	Severe depression Mean±SD (mg%)	Controls Mean±SD (mg%)	p value
PBH	191.05 ± 4.01	102.50 ± 5.81	< 0.0001
PBHex	97.50 ± 5.06	78.50 ± 4.97	< 0.0001

Mean levels of Protein bound Hexose and Protein bound Hexosamine in severe depression was significantly higher than controls. ($p<0.0001$).

DISCUSSION

The study shows a statistically significant difference in the mean concentration of Protein bound Hexose and Protein bound Hexosamine between the controls and patients with severe depression. This study also demonstrates an elevated level of serum glycoproteins as Protein bound Hexose and Protein bound Hexosamine in severe depressed patients compared to the control group. The mean value of both the parameters in all 3-age groups was significantly higher in patients with severe depression than controls. The same was observed in both males and females of study subjects than controls. The mean values of parameters studied when compared among the age group and between males and females do not show any significance. This infers that the age and sex do not influence the levels of serum glycoproteins. Nandave M *et al* reported changes in levels of serum glycoproteins in major depressive disorder. They have concluded that raised levels of glycoproteins may serve as an indicator of major depressive disorder.[9] Elevated serum Glycoprotein levels represent a systemic response to non-specific stress. The levels are effected by pituitary adrenal axis. The change in the hypothalamic pituitary adrenal axis is caused by cytokines, which are the signaling molecules of the immune system. Seidel A *et al* have reported significantly high levels of cytokines and serum proteins in patients with depression. The elevated cytokine levels indicate that depression is associated with exaggerated immune activity.[10]The cytokines enhance the hepatic synthesis of acute phase proteins like alpha 1–acid Glycoprotein and other glycoproteins in patients with depression. Sluzeswka *et al* observed high level of serum alpha 1-acid Glycoprotein and C-reactive protein in patients with Major depressive disorder.[4] The present study has found an increase in the levels of serum Protein bound Hexose and Protein bound Hexosamine in patients with severe depression. This is due to enhanced hepatic biosynthesis of glycoproteins mediated by cytokines. Cytokines have been found to be involved in many other disorders and has been reported by various authors. Seymour GJ *et al* reported that TNF-beta, an inflammatory cytokine is an important mediator in Type 1 Diabetes mellitus.[11]Miller LC and Dinarello CA observed the raised level of cytokines in Rheumatic heart disease.[12] Libiau RS *et al* reported that Th-1 cytokines play a major role in organ specific autoimmune diseases.[13] As there are many reports of increased Glycoproteins in disorders of varied pathology,[14] using the raised levels as a specific marker for depression is probably not useful to diagnose the condition. Glycoprotein increase due to raised cytokines is found in many unrelated disorders. Although the present study has observed significantly raised levels of serum glycoprotein, they cannot be used as a diagnostic marker for severe depressive patients as the increase seems to be not specific for depression alone.

CONCLUSION

The present study shows significantly increased levels of serum glycoproteins in severe depressive patients. As serum glycoproteins are non-specific indicators of severe depression, they cannot be used as a diagnostic marker. At best these levels may be used to study the response to treatment.

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