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Profiling of Serum Immunoglobulins in Bangladeshi Major Depressive Disorder Patients

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Abstract

Background: Major Depressive Disorder (MDD) is a mental disorder characterized by a pervasive and persistent low mood which is accompanied by low self-esteem and loss of interest or pleasure in day to day activities that adversely affects a person's family, work, and personal life. There is no sufficient laboratory test for the diagnosis of MDD and it is expected that this investigation may be helpful for better diagnosis and management of MDD. We aimed to measure serum immunoglobulin levels in MDD patients and control subjects to meet the above demand. **Methods:** For this purpose, we recruited 88 MDD patients from the department of psychiatry, Bangabandhu Sheikh Mujib Medical University, Dhaka and 89 healthy volunteers from Dhaka city matched with age, sex and socioeconomic status to the patient group. Turbidimetry method was applied to measure serum levels of immunoglobulin A, G, and M where immunoglobulin kit was utilized. **Results:** The current study revealed that mean serum concentrations of immunoglobulin A, G, and M in patients were found to be 209.07 ± 104.93, 791.50 ± 235.67 and 107.92 ± 47.53 mg/dL while those were 195.34 ± 92.16, 763.81 ± 175.89 and 99.17 ± 48.78 mg/dL in control subjects, respectively. **Conclusion:** Our result indicates that serum concentrations of immunoglobulin A, G and M were not significant between the groups and further studies are required to establish these findings.

Keywords

Serum Immunoglobulins, Major Depressive Disorder, MDD, Bangladesh

1. Introduction

In Bangladesh, 16.05% of the adult population suffer from psychiatric illness.

The prevalence of MDD is 4.6%. Among all psychiatric patients, 28.7% suffer from MDD. Both mild to moderate and severe depression are more common in females and among singles [1]. The most common time of onset is the third decade of life, with a later peak in the forth decade and there is a second, smaller peak of incidence in the sixth decade [2].

A depressed mood with sadness or irritability accompanied by several psychophysiological changes like disturbances in sleep, appetite, or sexual desire, constipation, loss of the ability to experience pleasure in personal and family life, crying, suicidal thoughts or plans, and slowing of speech and actions are the diagnostic criteria of MDD [3]. Patient's work and family life hampered considerably by these changes that last at least 2 weeks. Lifetime prevalence of depression in the USA is more than 12% in men and 20% in women [4]. Sometimes, severe depression is termed as melancholia or vital depression in a much narrower way [5]. Manic Episode consisting of hyperactivity, euphoria and increased pleasure-seeking may appear in some MDD patients. There is an overlap of some pathogenetic mechanisms between major depression and manic episode. A distinct illness termed as bipolar disorder sometimes may be a history of mania [6] [7]. So depression is a mixed disorder with a highly irregular course with an inconsistent response to treatment and has no well-known mechanism. The central nervous system and the immune system are closely correlated. The psychiatric disorder is usually linked to a deregulation of the immune responses. There is a significant positive relationship between the stress-induced alterations of serum immunoglobulin A (IgA), immunoglobulin G (IgG) and immunoglobulin M (IgM) [8].

Patient's self-reported experiences, the behavior described by families or friends and a mental status examination based on DSM criteria of the American association of psychiatry are still used as the diagnostic tools for MDD. There is no laboratory test for this, though physicians usually demand tests for physical situations that may cause comparable symptoms. Some hypothesis indicates that such parameters may play an important role in some neuropsychiatric disorders, such as depression [9] [10]. The aim of this research is to measure the serum levels of immunoglobulins in patients with major depression and healthy control subjects. It is expected that this investigation will be helpful for the management of MDD and it will highlight on the regulatory effect of immunoglobulins on MDD, which will be also considered to be very important for the design of new drug molecules to treat this psychiatric disease.

2. Materials and Methods

2.1. Study Design

We presumed that the alpha risk and exposed controls will be 5% and 20% for this study. A 1:1 matched case-control study was planned to identify an odds ratio of 3 with power 90%. For this assumption, the probable sample size was supposed to be 166 (83 cases and 83 controls). Based on the above calculation,

88 MDD patients and 89 healthy controls matched by age, sex and socio-economic status to the patient group with no previous history of any psychiatric disorders or any medical disease that may affect the serum level of immunoglobulins were included in this study. The age range of study population was from 18 to 60 years. Cases were randomly recruited from the outpatient and inpatient department of psychiatry, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh. The specialist psychiatrist trained in the use of DSM-5 of Psychiatric Disorders (5th edition), conducted the diagnosis and interview of the patients [11]. The controls were recruited from different parts of Dhaka city.

All patients were evaluated clinically by taking history and clinical examination, searching for other symptoms which are very much correlated to MDD that may mislead the research. Laboratory investigations were performed to exclude the patients having other comorbid illness [12]. Some common complaint of depression e.g. headaches, back pain, muscle aches and joint pain, chest pain, digestive problems, exhaustion and fatigue, sleeping problems, change in appetite or weight, dizziness or lightheadedness may be due to other pathological conditions which must need to exclude by differential diagnosis. Mentally retarded patients and who suffered from comorbid psychiatric disorders were also excluded from this study. The study subjects were briefed about the purpose of the study and written consent was taken from each of them. Socio-demographic data were taken by using a structured questionnaire. The investigator filled in the forms for them who had no formal educational background. The study protocol and volunteer consent form were approved by the ethical review committee of the department of psychiatry, BSMMU, Dhaka, Bangladesh.

2.2. Blood Sample Collection

In total, 5 mL of venous blood was taken from each of the MDD patients and the healthy control subjects by plastic syringe built-in with a stainless steel needle. Then the blood sample was collected into a metal-free plastic tube. No glass material was used to prevent Al and Si contaminations. To eliminate metal contamination all the precautions were taken throughout the period of blood collection and storage as per the national committee for clinical laboratory standards criteria [13] [14].

2.3. Quantification of Serum Immunoglobulin Levels

The serum IgA, IgG, and IgM levels in both patients and controls were determined by turbidimetry method using immunoglobulin kit (Chronolab, Switzerland). In this method, anti-human antibodies were mixed with samples containing IgA, IgG and IgM that formed insoluble antigen-antibody complexes. An absorbance change depending upon the immunoglobulin levels that was measured by a calibrator. Absorbances were taken at 550 nm for IgA and IgG, and at 405 nm for IgM.

2.4. Statistical Analysis

SPSS statistical software, version 23.0 (IBM Corp., Armonk, NY) was used to perform necessary statistical analyses. Descriptive statistics for normally dispersed variables, the mean and standard deviation (SD) were used. The P value of less than 0.05 was considered to be statistically significant. Comparison between cases and controls of investigated parameters were shown by independent sample t-tests.

3. Results

3.1. Characteristics of Subjects

All the patients and control subjects were categorized based on socioeconomic conditions, biophysical characteristics and smoking habit. It was found that most of the patients were literate (87%) and nonsmoker (73%). It was observed that the mean age of the patients and controls was 33.03 ± 10.87 and 33.55 ± 9.56 years, respectively, whereas the mean BMI at diagnosis was 22.82 ± 2.53 and 23.15 ± 3.01 kg/m^2, respectively. Eighty-four percent of patients had BMI in the normal range and for control, the percentage is 78%. Average monthly family income for the patient group was found 19.28 ± 14.10 KBDT. Among all MDD patients, 38% were very poor and 79% have family income within 25 KBDT per month. Only 7% of patients have monthly family income above 40 KBDT. Among all MDD patients, 15% were jobless which may correlate with their depression. Sometimes during and after student life, people may have mild depression but this may develop major depression when they remain jobless for a long period [15]. Statistical analysis of these parameters showed that the differences of age, education, occupation, BMI, income and smoking habit were not significant between the groups (p > 0.05).

3.2. Serum Immunoglobulin Levels

The mean serum immunoglobulin concentrations of IgA, IgG, and IgM of MDD patients and control subjects are presented in Table 1. From the statistical analysis, it was observed that there were no significant differences of serum IgA, IgG and IgM levels between MDD patients and control subjects.

4. Discussion

From this finding, it reveals that there is a positive tendency to increase serum

Table 1. Serum immunoglobulin levels in patients and controls subjects.

Groups	Immunoglobulin A (mg/dL)	Immunoglobulin G (mg/dL)	Immunoglobulin M (mg/dL)
MDD (*n* = 88)	209.07 ± 104.93	791.50 ± 235.67	107.92 ± 47.53
Control (*n* = 89)	195.34 ± 92.16	763.81 ± 175.89	99.17 ± 48.78
p value	0.404	0.407	0.293

immunoglobulins in MDD patients compared to healthy control. There were no significant alterations occurred for the measured parameters. Some earlier study results support this finding and some other not. Research results propose that psychological stress is associated with the changed secretion of serum immunoglobulins, some acute phase proteins and complement factors [16]. In another study serum levels of IgA, IgG and IgM were measured in psychiatric patients including bipolar depression, unipolar depression and schizophrenia and the comparative findings with healthy subjects reveal that a significantly high level of IgM concentration was found in all patient groups compared with the controls whereas IgM levels were more elevated in female patients than in male patients for the bipolar and unipolar depression. There were no significant differences for IgA and IgG among the groups studied [17]. Depressed patients had significantly higher percentages of circulating neutrophils, significantly lower percentages of circulating lymphocytes and significantly lower in vitro lymphocyte responses to mutagenic stimulation than normal controls [18]. Serum immunoglobulin levels, as well as socio-demographic features, may also be influenced by some other psychiatric illness [19]. IgG levels in PD patients were found significantly lower than that of the controls but the change in the concentration of IgA and IgM were not significant. This finding may be considered as an important parameter for the diagnosis and treatment of the panic disorder (PD) patients [20]. Serum concentration of IgA and IgM are significantly higher in obsessive conversion disorder (OCD) patients compare to healthy control but the change of IgG is not significant [21]. Serum IgM levels of GAD patients was found significantly higher than that of the controls whereas IgA and IgG levels were insignificant [22]. All the above findings where immunoglobulin levels were altered can be considered as risk factors for the diagnosis and treatment of psychiatric illness. The limitations of this study are the single measurement of immunoglobulins, lack of food intake data, and the small number of the study population.

5. Conclusion

There is a significant positive relationship between the stress-induced alterations of serum IgA, IgG, and IgM which is supported by many studies. The present study indicates that there was no significant difference of serum IgA, IgG and IgM levels between MDD patients and control subjects but a positive tendency to increase serum immunoglobulins in patient group compared to healthy control was observed. Thus, we recommend further research to explain the exact role of immunoglobulins in the pathogenesis of MDD.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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