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Studies on Some Serum Immunoglobulin Levels in Heart Failure Subjects in Owerri Imo State

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Abstract

Studies on some serum immunoglobulin levels in heart failure subjects in Owerri, Imo state was carried out. Heart failure has a high risk of mortality and morbidity in Nigeria, there is need to study, if there are alterations in antibody response. A total of 60 subjects within the age 25-65 years were recruited for this study. The study comprised of 30 subjects who were diagnosed of heart failure consisting of 15 males and 15 females, 30 were apparently healthy individuals who served as controls subjects. Immunoglobulin M, G and E was analysed using ELISA technique. Data was assessed using SPSS version 20, the mean value with P< 0.05 was considered statistically significant. The serum level of immunoglobulin M in heart failure subjects (0.22±0.14µg/ml) was statistically significantly lower (P=0.001) when compared with control subjects (1.50±1.95). The serum level of immunoglobulin G and E of heart failure subjects (5.17±1.10mg/ml and 0.24±0.12µg/ml) was statistically significantly lower (P=0.000) than that of the control (9.27±1.67mg/ml and 0.74±0.16 µg/ml).The mean value of Immunoglobulin M of female heart failure subjects (0.25±0.14 µg/ml) was not statistically significantly higher (P=0.121) than the male heart failure subjects (0.18±0.14 µg/ml).The mean value of Immunoglobulin G in female heart failure subjects (5.09±1.43mg/ml) was not statistically significantly lower (P=0.666) when compared with male heart failure subjects (5.24±0.68mg/ml). The mean value of Immunoglobulin E in female heart failure subjects (0.26±0.11µg/ml) was higher which is not statistically significant (P=0.373) when compared with male heart failure subjects (0.22±0.13 µg/ml). In conclusion, reduced serum level of IgM, IgG and IgE in heart failure subjects may be due to some humoral immunodeficiency which occurs as a result of insufficient number of circulatory B cells to differentiate into antibodies.

Keywords: Immunoglobulins; Heart failure; Owerri.

1. Introduction

Heart failure (HF) is a risky condition of many cardiovascular diseases, including myocardial infarction (MI), valvular heart disease, and various cardiomyopathies. It is an important cardiovascular disease with increasing prevalence and mortality rate [1]. HF is associated with a diverse range of complications, such as hospitalization, lethal arrhythmia, and death during the disease progression. Due to these unique characteristics, various pharmacological and non-pharmacological treatments have been developed, not only to improve underlying cardiac disease but also to prevent hospitalization and death [2].

Immunoglobulins (Ig) are glycoproteins that are produced by plasma cells and are involved in the body's immune system [3].

There are five immunoglobulin classes of antibody molecules found in serum and this includes IgG,IgM,IgA,IgE and IgD. Immunoglobulin M (IgM) antibodies are provided as a body first response to a new infection or to a new non self antigen providing short term protection [4].

Human heart failure is a disease with multifactorial causes, considerable morbidity and high mortality. Reports from other research showed that circulating anti heart autoantibodies may precede disease manifestations and are independent predictators of disease development. Management of heart failure mainly involves treatment at each stage of heart failure [5]. This treatment may result to some undesirable effects, which may include alteration of biochemical constituents of the body. subjects that go on to suffer from coronary heart disease (CHD, including myocardial infarction, death from coronary heart disease and coronary revascularization were associated with

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traditional risk factors such as smoking, hypertension and hypercholesterolemia but also by lower levels of total IgG and to some extent lower levels of IgM [6]. Remarkably, those with IgG in the highest tertile had an almost 60% lower risk of CHD than those in the lowest IgG tertile. Also,studies have shown that analyses of total plasma Ig can be used clinically as a biomarker to improve prediction and diagnosis of cardiovascular disorders. High doses of polyclonal IgG reduces atherosclerosis in mice [7] but it is questionable if IgG at this concentrations normally found in humans can have this effect. Despite these, there is still scarce reports on immunoglobulins level in heart failure in Nigeria. Therefore, this study is designed to evaluate immunoglobulin level in subjects with heart failure, so as to help in better understanding and treatment progression of heart failure in Nigeria.

2. Materials and Methods

2.1. Research Design

A case control study design was conducted in General Hospital Owerri from January, 2017 to October, 2017.

Subjects: A total of sixty (60) subjects between the ages twenty five and sixty five were recruited for this study. Thirty (30) were heart failure subjects who had been attending cardiology clinic for not less than three months diagnosed of heart failure consisting of 15 males and 15 females. Thirty (30) were apparently healthy individuals who served as controls subjects of the same age limits and sex who had no record of any other ailment.

Blood collection: Venous blood samples (5ml) were collected asceptically by venipunture from each of the subjects using a 5ml sterile disposable syringe and needle. The whole blood samples were dispensed into a pre - labeled plain dry specimen container and allowed to clot. The clotted samples were centrifuged at 3000rpm for 5minues to separate and obtain the serum for analysis. Informed consent of the participants was obtained and was conducted in line with the ethical approval of the Hospital

Biochemical assay: The Serum Human Immunoglobulin M (IgM), Immunoglobulin G (IgG) and Immunoglobulin E (IgE) were determined by Enzyme Linked Immunosorbent Assay Technique [8]

2.2. Statistical Analysis

The results were expressed as mean ± standard deviation. The statistical evaluation of data was performed by using independent students.

3. Results

Table-1. Mean ±SD Values of Serum Immunoglobulins IgM, IgG and IgE in Heart failure Subjects of the Study Population

Parameters	Heart Failure Subjects (n-30)	Controls Subjects (n=30)	t-value	p-value (0.05)
IgM (µg/ml)	0.22±0.14*	1.50±1.95	-3.661	0.001
IgE(µg/ml)	0.24±0.12*	0.74±0.16	-11.207	0.0001
IgG(mg/ml)	5.17±1.10*	9.27±1.67	-11.197	0.0001

*statistically; significant compared with control (P<0.05)

Table-2. Mean±SD values of Serum IgM, IgE and IgG in Male and Female Heart Failure Subjects

Parameters	Female-Heart Failure Subjects (n-15)	Male-Heart Failure Subjects (n=15)	t-value	p-value (0.05)
IgM (µg/ml)	0.25±0.14	0.18±0.14	1.653	0.121
1gE(µg/ml)	0.26±0.11	0.22±0.13	0.921	0.373
IgG(mg/ml	5.09±1.43	5.24±0.68	-0.441	0.666

4. Discussion

The result from this study showed that the serum IgM in heart failure subjects was statistically significantly lower when compared with the controls. This reduction observed showed that the decrease of serum level of Immunoglobulin M can be attributed to some humoral immunodeficiencies. This is in agreement with the study of [9] that reported that humoral (antibody) immunodeficiency may occur as apparent congenital or acquired abnormalities, which lead to deficiencies in all or in only some classes of immunoglobulins.

The level of serum IgE in heart failure subjects was statistically significantly lower when compared with the controls subjects. Evidence has shown that the serum level of Immunoglobulin E (IgE) steadily decrease after an acute episode of myocardial ischemia and infarction, which is consistent with their kinetics. This means that degradation occur between 5 and 12hours and with the development of a temporary and self-limited immunological event. This is in consistent with Achatz, *et al.* [10], Gruber, *et al.* [11] which stated that IgE-mediated antigenic stimulation is a mechanism that results in the stimulation of mast cells in coronary atheromas may trigger local degradation of extracellular matrix, as stimulated mast cells secrete neutral proteases capable of activating matrix metalloproteinases secreted locally by other cells.

The level of Immunoglobin IgM was not significantly higher in female heart failure subjects compared to male heart failure subjects. This finding is in agreement with with several studies of Gonzalex-Quintela, *et al.* [12], Bouman , *et al.* [13] and It has been suggested that serum Immunoglobulin M (IgM) levels are higher in females than in males. Higher IgM levels in females have been attributed to the stimulatory action of oestrogens on B lymphocytes [14]. However, levels of sex hormone such as testosterone and oestrogen were not measured in this

study. Considering the higher levels of IgM , it is reasonable to postulate that in females, many body tissues are more tolerant to the action of IgM [15].

In this study there was a non significantly higher serum level of Immunoglobulin IgG in male heart failure subjects compared to female heart failure subjects. This is in accordance with the reports of Biondi [16], Binder and Witztum [17] which stated the response of immune system against cardiac proteins upon heart failure is very likely to confound a full regenerative outcome in heart failure, thereby suggesting the potential role of an autoimmune response.

Some epidermiological studies showed that IgE levels were higher in subjects with cardiovascular disease and this is in agreement [18, 19]. It occurs commonly in those experiencing unstable angina and acute coronary events [20, 21].

5. Conclusion

In conclusion, reduced serum level of IgM, IgE and IgG in heart failure subjects may be due to some humoral immunodeficies which occurs as a result of insufficient number or function of B cells to differentiate into antibodies, occurrence of degradation which leads to the development of a temporary and self limited immunologic event. Hence, the inclusion of immunoglobulins assay is highly recommended as potential biomarkers of antibody response in early diagnosis, treatment and monitoring of heart failure conditions.

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