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Evaluation of C-reactive protein and fibrinogen among Sickle cell disease patients

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ABSTRACT

AIM: This study was done to determine the levels of C – reactive protein and fibrinogen in sickle cell disease patients. Material and method: 100 sickle cell patients in steady state ages 5 to 30 years attending General Hospital Owerri were used in the study while 100 normal subjects(HbAA) and 100 HbAS were used as control. Results: The results obtained showed that the level of C-reactive protein and fibrinogen levels were significantly elevated in sickle cell disease when compared with the controls at $P < 0.05$. Conclusion: The elevation in c-reactive protein and fibrinogen in sickle cell disease could probably linked to a response to inflammatory condition. Hence people with sickle disease should be monitored closely of their C-reactive protein to avoid crisis. This observation probably imply that C-reactive protein and fibrinogen could be used as a marker for sickle cell disease.

Keywords: *C-reactive protein, fibrinogen, sickle cell disease.*

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INTRODUCTION

-reactive protein(CRP) is an important acute phase protein which increases in various inflammatory and neoplastic conditions. It is an abnormal specific glycoprotein produced by the liver and excreted into the blood stream during the acute phase inflammation(Dehghan et al., 2008). CRP was initially discovered in the sera of patients with pneumococcal pneumonia where it was shown to react with the C-mucopolysaccharide of the bacterial capsule. The main role of CRP is its interactions with the complement system. The determination of CRP is clinically useful for screening for organic disease, assessment of the activity of inflammatory disease, detection of intercurrent infections in systemic lupus erythromatosus and management of neonatal septicemia and meningitis when specimen collection for bacteriological investigation may be difficult (Danesh et al 2004). In the same vein, fibrinogen is an acute phase protein. It is simply a substance or coagulation factor present in blood plasma and it is acted upon by the enzyme thrombin to produce the insoluble protein fibrin in the last stage of blood coagulation. Fibrinogen also referred as factor 1 is converted to fibrin by thrombin during clotting(Dacie and Lewis, 1995). In disease inflammatory conditions, particularly sickle cell disease, C-reactive protein and fibrinogen are affected as a result of oxidative stress.

Sickle cell disease (SCD) is a hereditary disorder caused by the substitution of valine for glutamic acid at the sixth position of the amino acid β -chain of the haem molecule (Nnodim, 2013). It is characterized by having sickle cell haemoglobin (Uwakwe *et al*, 2002). According to Mmeremiukwu, (2005), sickle cell haemoglobin (Hbs) is referred as a form of abnormal haemoglobin occurring in the red cells of sickle cell disease patients.

Sickle cell disease is a common disease among black individuals and could result to morbidity and mortality (Ibe *et al.*, 2009). The prevalence of SCD is very high in central Africa, Mediterranean region, Eastern countries and in certain part of India(Kato et al,2006). Life expectancy is decreased with studies reporting an average life expectancy of 42 and 48years for male and female respectively (Dunlop *et al.*, 2006).

Although sickle cell disease is present from birth, symptoms are rare before the age of 3 to 6 months since a large percentage of the erythrocyte haemoglobin is of the fetal type (HbF). As more Hbs replaces HbF in the subject, the main symptoms: episode of anaemia ,pains and infections as well as associated crisis become manifested due to irreversible sickling of the red cells when HbS molecule polymerizes invariably leading to vasoocclusion in the small capillary (Bernard *et al*, 2006). In this study,the level of C-reactive protein and fibrinogen are evaluated in sickle cell disease in Owerri Imo State Nigeria.

MATERIALS AND METHODS

Subjects: 100 subjects confirmed of HbSS by haemoglobin electrophoresis were used in this study. 100 normal HbAA and 100 HbAS were used as controls. The number of females and males in each class was made as equal as possible to minimize bias due to known sex-related biochemical differences. All the subjects were not subjected to dietary restriction. Their consent was obtained as well as ethical approval from the ethical committee of the hospital.

BLOOD COLLECTION

In all subjects, 5ml of fasting veinous blood was collected into plain and EDTA bottles. The serum was separated by centrifuging the whole blood in a Westerfuge (Model 684) centrifuge at 5000g for 5minutes

ESTIMATION OF BIOCHEMICAL ASSAY

Fibrinogen was measured using Randox Kit while C- reactive protein was assayed by ELISA method using commercial kit.

STATISTICAL ANALYSIS

The results were expressed as mean \pm standard deviation and student t – test was used to calculate the level of significance at P<0.05.

RESULTS AND DISCUSSION

Results

Table 1. C-reactive protein and fibrinogen levels in sickle cell anaemia(HbSS), HbAA, and HbAS

Parameters	C-reactive protein(ug/ml)	Fibrinogen(mg/dl)
HbAA	0.98 \pm 0.07	286 \pm 30.15
HbAS	1.01 \pm 0.11	288 \pm 30.18*
HbSS	1.51 \pm 0.06	294 \pm 25.68*

*Significantly different from control at P<0.05

The level of C-reactive protein and fibrinogen in table1 were significantly increased in sickle cell anaemia(HbSS) patients when compared with HbAA,and HbAS at P<0.05.

Discussion

Oxidative stress occurs in sickle cell disease. It is linked with increased utilisaiton of antioxidants as antioxidants neutralize toxin and volatile free radicals(Nnodim *et al.*, 2012). Free radicals are constantly being generated in the body as a result of normal metabolic processes. However, sickle cell disease tend to increase the rate of free radical production causing impairment of cell function(Jovanovic and Simic, 2000).

In this study, the level of c-reactive protein was significantly increased in sickle cell anaemia when compared with the HbAA and HbAS. This is consistent with the work of Dehghan *et al.*, (2008). CRP is a substance present in the sera of acutely ill individuals that is able to bind the C-polysaccharide on the cell wall of Streptococcus pneumonia. It is one of the acute phase protein to become elevated in inflammatory disease(Zacho *et al.*, 2008). CRP has long been recognized as one of the most sensitive acute phase protein(Mantovani *et al.*, 2008). This increase could be probably associated with a response to inflammatory condition. This inflammatory situation is probably responsible for the release of interleukin-6 and other cytokines that enhance production of C-reactive protein by the hepatic tissue. C-reactive protein belong to class of acute phase reactants as the level rises immediately during inflammatory processes taking place in the body (Pradhan *et al.*, 2001).This increase is mainly due to a rise in the serum concentration of IL-6 which is produced mainly by macrophages and adipocytes. This in line with the work of Dehghan *et al.*, (2008)

Furthermore, It was observed that fibrinogen was significantly increased in sickle cell disease when compared with HbAA and HbAS. Fibrinogen is a large dimeric protein, each half consisting of three polypeptides. Therefore, C-reactive protein and fibrinogen could be used as a marker in sickle cell disease.

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