Int. J. Curr. Res. Med. Sci. (2022). 8(9): 1-4

International Journal of Current Research in Medical Sciences

ISSN: 2454-5716

(A Peer Reviewed, Indexed and Open Access Journal)

www.ijcrims.com

Original Research Article

Volume 8, Issue 9 -2022

DOI: http://dx.doi.org/10.22192/ijcrms.2022.08.09.001

Fibrin Degradation Products (FDPS) level is decreased in steady-state patients with Sickle Cell Anaemia in Ibadan, Nigeria

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Abstract

Complex perturbations of haemostasis occurs in sickle cell anaemia. The protein manifestations of sickle cell anaemia, especially, microvessel involvement in the vasoocclusive process is ascribed to the phenomenon of erythrocyte sickling and enhanced red cell-endothelial adherence. We investigated the end products of the cellular and plasmatic phases of haemostasis. 71 patients and 60 controls were invested for levels of fibrin degradation products (FDPs) by standard methods. The controls had FDPs level of 1.14 ± 0.78 as against 0.60 ± 0.70 (mcg/ml) by the SCA patients. The difference in results was statistically significant, $P < 0.05$. This suggests decreased fibrinolysis in the patients. Patients with sickle cell anaemia in steady-state were therefore considered to be responding well to clinical care.

Keywords: FDPS, sickle cell anaemia, fibrinolysis, vasoocclusive process.

Introduction

Sickle cell anaemia remains a global public health burden, particularly in children (1). The condition is a hypercoagulable state in which patients exhibit increased platelet activation, high plasma levels of markers of thrombin generation, depletion of natural anticoagulant proteins, abnormalactivation of the fibrinelytic system and increased tissue factor (TF) expression, even in the non-crisis steady-state (2). Sickle cell anaemia is characterized by a variety of thrombotic complications, including ischaemic stroke (3).

In SCA, chronic activation of coagulation is commonly observed in patients at steady-state compared to healthy controls as evidenced by increased plasma levels of in-vivo markers of thrombin, and fibrin generation, including D-dlimers, thrombin-antithrombin complexes (TAT), plasmin-antiplasmin complexes (PAP), prothrombin fragments etc. (4,5).

In the study, we estimated the levels of fibrin degradation products to reflect the degree of fibrinolysis in the condition.

Materials and Methods

We enlisted seventy-one (71) patients with sickle cell anaemia in steady-state, diagnosed by standard methods (6) at the University College Hospital, Ibadan, Nigeria. Ethical approval was obtained from the local Ministry of Health. After informed consent was obtained from the patients, and informed consent, 5ml of various was obtained by venipuncture.

All laboratory procedures and tests were done by standard methods (6) and Elisa method. Statistical evaluations of X^2 and student's t-test were performed on the data using a software (SPSS 23.0) $P < 0.05$ was inferred to be statistically significant.

Results

Table 1. Shows the age distribution of the patients and controls studied. There were 71 patients and 60 age-matched controls.

Table 1: Age distribution of the patients with steady-state sickle cell anaemia (SCA) and the apparently age-matched healthy controls

Age groups	SCA patients no. (%)	Controls no.(%)
20 – 24	6 (8.5)	14 (23)
25 – 30	10 (14.1)	12 (20)
31 – 34	16 (22.5)	19 (32)
35 – 40	31 (43.7)	10 (17)
41 – 45	8 (11.3)	5 (83)
Total	**71**	**60**

Table 2. Shows comparisons between the fibrin degradation products (FDPs) results of the patients and controls. The patients had FDPs result of 0.60 ± 0.70 mcg/ml whereas the age-matched controls had 1.14 ± 0.78 mcg/ml. The difference in the results between two groups is statistically significant, $P < 0.05$.

Table 2: FDPs results of the patients and controls

Parameter	Controls (n = 60)	SCA (n = 71)	p Value
FDPs (mcg/ml)	1.14 ± 0.78	0.60 ± 0.70	1 < 0.05

Discussion

In the study, the steady-state patients who had homozygous sickle cell anaemia in steady-state had grossly lowered levels of fibrin degradation products. Fibrin and fibrin degradation products are the end products of fibrinogenolysis (cleavage of fibrinogen and non-cross links fibrin) or secondary lysis of cross-linked fibrin clots (7). Elevated FDP concentration indicate either fibrinogenolysis or fibrin lysis. High FDP level is associated with uncontrollable bleeding in trauma. Hence, fibrin degredation products and D-dimer levels were positively correlated with Injury Severity Score (ISS) (8,9).

The implication of our result is that the current clinical management methods for patients with sickle cell anaemia is achieving its objectives since the expected haemostatic alteration in SCA earlier described (10) may be absent as reflected by low FDPs levels in our study.

Regular medical laboratory monitoring of patients with homozygous sickle cell anaemia is recommended for early detection of deviations in their status.

Acknowledgements

The authors thank all the doctors, medical laboratory scientists and other staff who assisted during the study.

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How to cite this article:
Aghatise, E.K, Ugbomoiko D, Agu-CS, Nto-Ezimah UA, Ibekailo, S, Ezimah, ACU. (2022). Fibrin Degradation Products (FDPS) level is decreased in steady-state patients with Sickle Cell Anaemia in Ibadan, Nigeria. Int. J. Curr. Res. Med. Sci. 8(9): 1-4.
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