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# Novel therapeutic approach of using high DHA omega-3 fatty acids to prevent vaso occlusive crisis in patients with sickle cell disease

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**Introduction:** Chronic inflammation, increased adherence of blood cells to vascular endothelium, oxidative stress, hemolysis and hypercoagulopathy are known important factors that contribute to pathophysiology of Sickle Cell Disease (SCD). There is evidence that omega-3 fatty acids are effective and safe therapy for patients with the disease. However, the mechanisms through which the effect is mediated have not yet been fully elucidated.

**Aim & Methods:** To demonstrate the effect of omega 3 fatty acid (DHA and EPA) supplementation on inflammatory state, blood cells adhesion, markers of oxidative stress, coagulation and intravascular haemolysis. These biochemical and molecular effects of omega-3 fatty acids on SCD were assessed in a subgroup of homozygous sickle cell patients participated in the Sudan double blinded, placebo controlled, randomized clinical trial.

**Results:** High DHA Omega-3 fatty acid supplementation resulted in a significant ($p<0.05$) reduction in total white blood cells, Lactate Dehydrogenase (LDH), glutathione peroxidase, super oxide dismutase, nuclear factor-kappa B (NF-κB) gene expression in buffy coat, expression of monocyte integrin and D-dimer. Omega-3 fatty acid group had significantly higher plasma vitamin E levels after one year of supplementation. No significant difference between the omega-3 treated and omega-3 untreated groups in hs-CRP and plasma tumour necrosis factor-α ($p>0.05$).

**Conclusion:** This study suggests that the therapeutic effect of omega-3 fatty acid in SCD involves amelioration of chronic inflammatory state, oxidative stress, coagulation and intravascular hemolysis. These findings are in line with the clinical trials that reported improvements in SCD severity and complications after supplementation with omega-3 fatty acids.

## Biography

Ahmed Daak has completed his Medical degree (MBBS) from University of Khartoum, Sudan and got his PhD from London Metropolitan University and Post-doctoral studies from Harvard University School of Public Health. He is the Assistant Professor of Medical Biochemistry, Faculty of Medicine, University of Khartoum. Currently, he is the Director of Clinical Research, Sancilio & Company Inc. He has published several papers in reputed journals and book chapter about the role of omega-3 fatty acids in sickle cell disease.

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