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Impact of Vitamin D in the improvement of respiratory function in sickle cell disease adult patients

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ABSTRACT

The study aimed to discover the role of vitamin D in improving the respiratory function in sickle cell disease patients. In this prospective study, 188 adults were enrolled, drawn from the out-patients unit of Thalassemia Cente The collected data were categorized into three groups: group 1 included the data of 100 healthy individuals of age range of 18-50 years as control; group 2 included the data of 88 (40 males and 48 females) sickle cell disease patients in steady state before supplementation of vitamin D; group 3 represented the data of the same 88 sickle cell disease patients as measured and recorded after 6 weeks of vitamin D supplementation. Laboratory measurements including pulmonary function tests and hematological parameters, while vitamin D levels were estimated for all groups to compare the data before and after supplementation of vitamin We found significant differences in the pulmonary function tests when comparing groups. Mean value of FEV1 revealed significant differences between group 1 and 2 ($p > 0.05$), while vitamin D supplement created a significant difference between group 2 and 3 ($p > 0.05$). The improvement in FEV1 did not reach to that of healthy (group 1), as referred by the significant variation between group 1 and group 3 ($p > 0.05$). The same findings were indicative within most pulmonary function tests, and the percentages of combined cases (restrictive and obstructive) were also deceased in group 3. Conclusion: supplement of vitamin D in SCD patients could result in relative improvement in lung function.

INTRODUCTION

Sickle cell disease (SCD) is a monogenic autosomal resistant disease that comes about due to homozygosity for a mutation in the beta globin chain at position 6 of hemoglobin A (HbA) resulting in sickle hemoglobin (HbS) [1]. Under deoxygenated conditions and polymerization, HbS become less soluble than normal hemoglobin (HbA), and the erythrocytes become rigid and fragile, while display abnormal sickling instead of being biconcave discs. The reduced erythrocyte deformability leads to hemolysis and vaso-occlusive phenomena, thereby hampering their movements through the circulation. This effect results in a much shorter life span than normal [2]. Chronic lifelong hematological disorder, vaso-occlusive phenomenon and intravascular inflammations impact the entire body with multisystem manifestation and organ damage throughout the patient's life. One of the major organs affected is the lungs [3]. In SCD, pulmonary complications manifest as acute chest syndrome (ACS) and as chronic complications, including pulmonary hypertension, hypoxia and pulmonary fibrosis, that ends with respiratory failure. Pulmonary impairment and complications can be detected and confirmed by pulmonary function tests (PFTs) which visualize important parameters in assessing and tracking patients with respiratory pathology and complications [4]. They are also effective in detecting the abnormalities that may develop in respiratory function due to disease or pathological conditions other than respiratory diseases [5-7].

Sickle cell disease has been identified as a pro-inflammatory status characterized by increased body catabolism and undersupply of nutrients intake. Accordingly, sickle cell patients usually suffer from numerous micro and macro nutritional deficiencies, including deficiency of vitamin D [8]. Lack of sunlight exposure, inactivity and glucocoeticoids intake all contribute to a decline in vitamin D status in sickle cell patients [9]. Vitamin D (25-hydroxyvitamin D) i.e. 25 (OH) D is a seco-steroid hormone, fat soluble, with notable anti-inflammatory effects that may play a significant role in various diseases involving the respiratory system, as reported by prior study [10]. Vitamin D supplementation in

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