

## Determination of Vitamin D Concentration in Thalassemia Patients in Tikrit City-Iraq

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### Abstract

**Introduction:** The thalassemia's considered as a group of inherited blood diseases that carry similar hemoglobin abnormality especially in the synthesis of hemoglobin caused by absolute or relative defect in major components of alpha ( $\alpha$ ) or beta ( $\beta$ ) proteins of adult haemoglobin (HbA). It is mostly complicated by reduction in the hemoglobin formation with higher rate of red blood cells destruction. Previous study, found that, there was predictive increment in liver enzymes level and addition to increase in the measurements of serum ferritin, Total serum bilirubin and IL-10.

**Aim of the Study:** The aim of the study is to determine the concentration of vitamin D in male thalassemia patients in Tikrit city.

**Patients and Methods:** This study was conducted in Tikrit city the first of March 2019 till the end of June 2019, at the outpatient unit in especial private hospital at Tikrit city - Iraq. Seventy subjects were participated in present study. The subjects were divided into 2 groups.

- Group 1 = Thalassemic male patients age less than 18 years (40 patients)
- Group 2 = Normal healthy male subjects less than 18 years (30 participants).

Full history was taken from all participants and all of them undertake full physical examination. All blood samples had been collected at afternoon after overnight fasting. Serum vitamin D was measured by immune assay methods by Abbot equipment and by vidas equipment.

**Results:** The results showed that there was a highly significant elevation ( $p \leq 0.01$ ) in the concentration of serum ferritin in thalassemic male patients as compare to normal control male subjects. In the present study, there was significant ( $p \leq 0.01$ ) elevation in the serum activities of AST, ALT and ALP in male patients in comparison to control groups. Also, in the present study, there is significant reduction in the ( $P < 0.01$ ) concentration of vitamin-D3 concentration in patients with thalassemia.

**Keywords:** *Thalassemia; Ferritin; Vitamin D; Liver Enzymes*

### Introduction

Thalassemia is universe illness in inhabitation, particularly Mediterranean zone, far-eastern and south East Asian nations [1]. Beta thalassemia is an inherited autosomal recessive blood illness. Genetic mutation or deletion in hemoglobin products in patients with beta

thalassemia and other hemoglobinopathies leads to reduction in the rate of hemoglobin synthesis which, might occur with or without one of the globin chains that association in beta thalassemia and hemoglobinopathies, the occurrence of mutations or deletion products in reduced average of synthesis or no combination of one of the globin chains that produce hemoglobin could be considered as hereditary disorders [2].

Iron overload considered as an important complication in patients with thalassemia, which could be resulted from Thalassemia itself or as a consequence of repeated blood transfusion. Cardiac and hepatic damage might occur due to deposition of huge amounts of iron an addition to destruction of many endocrine glands for the same reason. Accumulation of large amounts iron without chelating agents in patients with B-thalassemia might lead to excessive tissue damage and complicated by potentially fatal outcomes [3-6]. Previous study, found that the thalassemia- B patients have a significant elevation in serum hepatic enzymes level, serum ferritin, Total serum bilirubin and IL-10 [6].

Regarding the serum ferritin, in thalassemic patients there was significant increment in serum ferritin, in comparison with normal healthy subjects [7]. Also, recent study in Iraq found a significant reduction in serum cortisol in thalassemia patients as compare with normal healthy subjects [8].

D-vitamin considered as lipid soluble vitamin plays a role in the absorption of calcium, magnesium, zinc, phosphate and iron in the gut. There are two types of D-vitamin one of them known as Vitamin D3 (cholecalciferol) and the second called (ergocalciferol) vitamin D2 [9].

Previous studies found that there was relation between low vitamin D measurements and rise percent of common malignancies, insulin dependent diabetes, multiple sclerosis, high blood pressure, depression and long term inflammatory diseases, such as rheumatoid joints disorders and inflammatory bowel disease [10,11].

### Aim of the Study

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### Patients and Methods

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- Group 1 = Thalassemic male patients age less than 18 years (40 patients).
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Full history was taken from all contributors and all of them experience complete physical examination. All blood samples had been collected at afternoon after overnight fasting. Serum vitamin D was measured by immune assay methods by Abbot equipment and by vidas equipment, we measured the samples in two devices at the same time, but we did not find a statistically significant difference, and thus it is possible to mention one device, but for the Scientific research ethics we mentioned the name of the two devices, and it is now possible to mention the name of one device because there was no significant difference between them. Serum ferritin was measured according standard procedures [6].

### Including criteria

1. Thalassemic non-diabetic patients.

2. non-diabetic healthy subjects.
3. Age of subjects less than 18 years.

**Excluding criteria**

1. Chronic renal and liver disease, and Diabetic patients.
2. Patients received treatment with vitamin D supplements in the last 6 months.
3. Malignant diseases.
4. Chronic anti-epileptic and glucocorticoid drugs use.

**Statistical analysis**

All data were presented as a mean and standard deviation, (SD). Unpaired student T-test was used to compare between means and standard deviations measured variables. SPSS version 21 has been used for analysis of data. P value less than 0.05, ( $P \leq 0.05$ ) was used as significant value.

**Results**

The mean age was ( $13.02 \pm 3.8$ ) years for thalassemic males and ( $14.9 \pm 3.7$ ) years for normal healthy control male subjects.

There was a highly significant reduction ( $p \leq 0.001$ ) in the concentration of Hemoglobin in thalassemic male patients ( $8.3 \pm 2.1$  g/dL) as compared with normal control healthy male subjects ( $13.8 \pm 1.8$  g/dL).

At the same time, the PCV was significantly ( $p \leq 0.001$ ) reduced in thalassemic male patients ( $29 \pm 5\%$ ) as compare to control male subjects ( $41 \pm 3\%$ ).

The results showed that there was a highly significant elevation ( $p \leq 0.01$ ) in the concentration of serum ferritin in thalassemia male patients (3686.3 ng/ml) as compare to normal control male subjects (59.3 ng/ml) (Table 1).

Parameters	Patients	Control	P value
Age (years)	$13.02 \pm 3.8$	$14.9 \pm 3.7$	NS
Hb (g/dl)	$8.3 \pm 2.1$	$13.8 \pm 1.8$	0.01
PCV %	$29 \pm 5$	$41 \pm 3\%$	0.01
Ferritin (ng/ml)	3686.3	59.3	0.01

**Table 1:** Show hemoglobin, PCV and serum ferritin in thalassemia patients and control subjects.

Moreover, a highly significant elevation ( $p \leq 0.001$ ) was found in the serum activities of AST, ALT and ALP in thalassemic males ( $21.4 \pm 3.2$  U/L,  $24.53 \pm 4.1$  U/L,  $116.6 \pm 8.4$  U/L respectively) when compared to control males ( $6.86 \pm 2.3$  U/L,  $9.27 \pm 1.9$  U/L,  $72.5 \pm 9.4$  U/L respectively).

Table 2 show the mean and SD of Vitamin D concentration in male thalassemia patients and normal healthy subjects. There is significant reduction in the concentration of vitamin D in the sera of male thalassemia patients ( $14.6 \pm 4.3$ ) as compared with control subjects ( $21.75 \pm 7.5$ ).

	Mean	SD	P value
Thalassemia	14.6	4.3	0.05
Controls	21.75	7.5	

**Table 2:** The mean and standard deviation (SD) of Vitamin D concentration in thalassemia and normal healthy men.

### Discussion

In the present study, the measurement of mean hemoglobin level and PCV in patients with thalassemia before blood transfusion was reduced in comparison with normal healthy male subjects of same age, ( $p \leq 0.01$ ), this is expected in thalassemic patients, because hemoglobin formation is diminished. Similar findings were reported by other studies [12,13].

The present results showed that there was a highly significant elevation ( $p \leq 0.001$ ) in the concentration of serum ferritin in thalassemia male patients as compare to normal control male subjects, ( $p \leq 0.01$ ). This finding agree with previous result [6,14].

In the present study, the serum activities of AST, ALT and ALP in male patients were significantly increased ( $p \leq 0.01$ ) in comparison to control groups. This findings was agree with previous researches [6,15]. This is usually occur due to mainly caused by outflow of cytoplasmic and mitochondrial enzymes of injured hepatocytes to the plasma [15].

In the present study, there is significant decrement in the D3 vit. measurement in patients with thalassemia as compared with normal healthy control subjects. The present finding was agree with previous study which was done in Baghdad, which found a decrease in vitamin-D3 concentration associated with thalassemia patients [16].

Furthermore, previous studies found that vitamin D insufficiency was attributed to malfunctioning of hepatic 25 hydroxylation of D-vitamin because of excessive load of iron [17,18].

As in the present study there was a significant elevation in serum ferritin and this iron overload disturb hepatic function. So, major hydroxylation site of D vit. is the liver, vitamin D deficiency or insufficiency might occur due to defect in the synthesis of vitamin or abnormality in the metabolism, which complicate excessive iron accumulation in the hepatic tissues [6,19].

Previous study explain the reduction in serum Vitamin D in thalassemia patients was due to less exposure to sun light that affected the vitamin metabolism in their bodies [16].

### Conclusions and Recommendation

The reduction in vitamin-D3 concentration associated with Beta thalassemia patients need further study, and the study recommend to give patients vitamin D supplement and advice the patients especially male patients to expose to sun light.

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