

A Case Report Showing Association between Vitamin D, HbA1C and Frozen Shoulder in Type II Diabetes Patient



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Abstract

The major and most well-known function of vitamin D is to maintain calcium and phosphorus homeostasis and promote bone mineralization. Vitamin D insufficiency has long been suspected as a risk factor for type 1 diabetes based on animal and human observational studies [1] More recently, there is accumulating evidence to suggest that altered vitamin D and calcium homeostasis may also play a role in the development of type 2 DM. Vitamin D replenishment improves glycaemia and insulin secretion in patients with type 2 diabetes with established hypovitaminosis D, thereby suggesting a role for vitamin D in the pathogenesis of type 2 diabetes mellitus. The presence of vitamin D receptors (VDR) and vitamin D-binding proteins (DBP) in pancreatic tissue and the relationship between certain allelic variations in the VDR and DBP genes with glucose tolerance and insulin secretion have further supported this hypothesis [2-4] Hyperglycemia may accelerate non-enzymatic glycosylation and abnormal collagen deposition in periarticular connective tissues, which alters the structural matrix and mechanical properties of these tissues leading to diffuse arthrofibrosis. [5,6] As a result patients' quality of life may decrease and they may be debilitated by cheiroarthropathy, frozen shoulder etc [7,8]. This study is also an evidence for the same.

Keywords: Vitamin D; Frozen shoulder; Diabetes mellitus

Abbreviations: VDR: vitamin D receptors; DBP: D-Binding Proteins; ROM: Reduced Range of Motion

Case Report

A 39 year old lady, weighing 59kg a known type 2 diabetic >5yrs on T.Metformin in 500mg sustained release tablets OD present with c/o pain in the shoulder for at least 1 month, an inability to lie on the affected shoulder, and restricted active and passive shoulder joint movements (ROM) in at least three planes, muscle weakness for more than 3 months with on and off temporary relief on oral analgesics (self medication) with no known history of any injury. O/E pt have painful arc, with no obvious signs of inflammation around the shoulder. On blood examination her HbA1C was 9.3%, calcium was 6mg and Vit D level was 8ng/dl.

Diagnosis: uncontrolled diabetes with frozen shoulder (stage 1)

Calcium and Vitamin D Deficiency.

Aim and objective

The aim of the study is

- 1) To treat the patient (to correct Ca²⁺, Vit D deficiency)

- 2) To evaluate the association between vitamin D and calcium status on HbA1C; the effect of HbA1C on frozen shoulder.

Treatment for the case

The Patient was treated with

1. T.metformin 500mg BD
2. Inj.Arachitol 6 lakhs IU deep IM stat, then calcium 500mg and vit D 250 IU BD for 3 months.

Advised

- I. Life style modification
 - Diet (Low carbs, calcium rich diet-dairy products, ragi, guava, dates, etc),
 - Regular sleep pattern
 - Exercise (preferably aerobic or brisk walking in morning favoring sun exposure) for 30 minutes 6 days a week,
 - Reduce emotional stress.

II. Self blood glucose monitoring once in 15 days- she was also taught about hypoglycemic symptoms

III. Shoulder and neck strengthening isometric exercises,

The patient was followed after 3 months with HbA1c, vit D and calcium reports. The symptoms of painful arch were assessed and shows wide range of movement. She was advised to continue shoulder strengthening exercises along with strict diabetic diet.

Results (Table 1)

Table 1

S No	Parameter	Before	After
1	Wt in Kg	59	57
2	HbA1c in %	9.30%	
3	Vit D in ng/dl	6	27
4	Calcium in mg/dl	6	9
5	Grading of shoulder pain	Moderate with ROM	Mild with no ROM

Discussion

While so much emphasis is given to micro and macro vascular complications of diabetes, other long-term complications especially musculoskeletal are often overlooked and underappreciated. Patients with Upper limb locomotor abnormalities are very common in diabetes and are associated with worse glycaemic control and more diabetic complications. Assessment of upper limb locomotor disease in diabetes should include an estimate of glycaemic control and a search for other complications [8], Duration of diabetes was also associated with the development of frozen shoulder, [9] Adhesive capsulitis (frozen shoulder or periarthritis shoulder) has a prevalence of 2% in the general population, but is reported to occur in 10 to 29% of those with diabetes [10].

Stage 1: The Initialization Stage has duration of 0 to 3 months is associated with pain and reduced range of motion (ROM). It may be noticed when the person can no longer do things like comb their hair or reach a shelf above their shoulder.

Stage 2: The Freezing Stage, which lasts from 3 to 9 months, presents itself with chronic pain and further reduced ROM. This stage moves from the inflammatory stage to the fibrotic process.

Stage 3: The Frozen Stage has a duration from 9 to 14 months with minimal pain, but a significantly limited range of motion in the shoulder. In stage 3, a person shows marked stiffening of the shoulder and substantial loss of ROM

Stage 4: The Thawing Stage is from 15 to 24 months and shows minimal pain and progressive improvement in ROM.

Vitamin D deficiency is more common than previously thought the Centers for Disease Control and Prevention has reported that the percentage of adults achieving vitamin D sufficiency as defined by 25(OH)D of at least 30ng/mL [11]

Medical Laboratories Reference Ranges for Total Serum 25-hydroxyvitamin D [25(OH) D]

Severe deficiency <10ng/mL

Mild to moderate deficiency 10-24ng/mL

Optimal 25-80ng/mL

Possible toxicity >80ng/mL

Calcium requirement for the age >50yrs is 1000mg/day which is mainly through dairy products, deficiency of which can cause muscle cramps, easy fracturing of bones, numbness etc. By correcting VIT D deficiency it improves calcium reabsorption, Maintenance of mineral homeostasis, increase the uptake of ingested ca2+, increase insulin synthesis and secretion [12].

Conclusion

This study contributes to the evidence that by correcting Vitamin D and calcium deficiency there is improvement in both HbA1C and thereby favoring the prognosis of frozen shoulder in a type II Diabetes mellitus patient.

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