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Case Report

Therapeutic Vitamin D improves HbA1c and Clinical Outcome in Frozen Shoulder in Type 2 Diabetes Mellitus

Utsa Basu*, Dipak Pal, Debashis Dutt*** G.K.Pandey****

Abstract:

A 39 year old lady, with type 2 diabetes presented with complains of pain in the right shoulder with restricted active and passive movements for more than three months. On Examination patient had painful arc, with no obvious signs of inflammation around the shoulder. Her HbA1C was 9.3%, serum calcium was 6mg/dl and serum 25-hydroxyvitamin D [25(OH) D] was 8ng/dl. X-ray of the right shoulder was within normal limit.Inj. Arachitol 6 lakhs IU deep IM stat was given, and then calcium 500mg and Vit D 250 IU BD for 3 months along with other dietary modifications and shoulder and neck strengthening isometric exercises were advised. The patient followed up with improved HbA1C, serum 25-hydroxyvitamin D [25(OH) D] and calcium reports after three months. The symptoms of painful arch were assessed and showed wide range of movement. She was advised to continue shoulder strengthening exercises along with strict diabetic diet, other life style modifications and routine medications.

Key-words-Vitamin-D deficiency, Type-2 Diabetes, Adhesive Capsulitis (Frozen Shoulder)

*** Junior Resident-MPH (Epidemiology), All India Institute of Hygiene and Public Health, Kolkata.**
**** Director-Professor, Department of Epidemiology, All India Institute of Hygiene and Public Health, Kolkata.**
***** Director-Professor & Head of Department, Department of Epidemiology, All India Institute of Hygiene and Public Health, Kolkata.**

Corresponding author:
Dr.Utsa Basu, E mail- dr.utsabasu@yahoo.com

Introduction:

The major function of vitamin D is to maintain calcium and phosphorus homeostasis and promote bone mineralization. Vitamin D insufficiency has long been suspected to be one of the risk factors for type 1 diabetes mellitus based on animal and human observational studies. Recent studies suggest that altered vitamin D and calcium homeostasis may also play a role in the development of type 2 DM

PRESENTING FEATURES:

A 39 year old woman, weighing 69kg presented at Nasibpur Primary Health Centre, Singur Block, Hooghly district, West Bengal (on March 2017) with complaints of pain in the right shoulder for last one month, inability to lie on the affected shoulder, and restricted shoulder movements

SOCIO-ECONOMIC HISTORY:

Patient was a married woman, housewife by occupation. She lived in a Joint Family. Per capita income of the family was Rs.5000/month. Living area of the house had no direct exposure to Sunlight.

FAMILY HISTORY:

No significant family history

PERSONAL HISTORY:

Patient was a sedentary worker. Her physical activities were restricted to doing routine household chores. She had the habit of occasionally taking betel leaves with tobacco.

DIET:

She was non-vegetarian eating chicken weekly and mutton occasionally, rarely ate fruits and avoided egg and milk products due to her allergy. She did not like eating fish due to smell. She regularly ate deep fried food like potato, fried brinjal etc.

MEDICAL HISTORY:

Patient was a known case of diabetes for more than five years and was on Tab Metformin 500mg SR once daily. She was non-hypertensive. There was no history of trauma or any other orthopaedic problem. She had felt pain off and on for the last three months for which she took analgesics. Since last one month pain in the shoulder became constant which had severely restricted the movements of the affected joint.

EXAMINATION:

On examination her blood pressure was recorded as 132/80 mm Hg (sitting),Weight- 69kgs,Height- 5ft 1inch,BMI- 27.6kg/m2 (over weight). Her systemic examinations were all within normal limit. Her right Shoulder showed painful arc, without signs of inflammation around the shoulder.

INVESTIGATIONS SUGGESTED:

Blood- HBA1C, Serum Calcium, serum 25-hydroxyvitamin D [25(OH) D], and X-Ray right shoulder- AP + Lat

RESULTS:

Blood- HBA1C – 9.3%, Serum Calcium - 6mg/dl, serum 25-hydroxyvitamin D [25(OH) D] – 8 ng/dl X-Ray right shoulder- AP + Lat-No abnormality was detected

DIFFERENTIAL DIAGNOSIS:

- Adhesive Capsulitis (Frozen Shoulder)
- Inflammatory arthritis

Treatment -The Patient was treated with

1. Tab. Metformin 500mg BD
2. Inj. Arachitol 6 lakhs IU deep IM stat, then calcium 500mg and Vit D 250 IU BD for 3 months.

Advice-

I. On Life style modification
   - Diet – Eating Low carbohydrate and calcium rich products like ragi, guava, dates, etc was encouraged, (She was allergic towards milk products hence no advise given on intake of milk products)
   - Exercise (preferably aerobic or brisk walking in morning favoring sun exposure) for 30 minutes 6 days a week was advised,

II. Self blood glucose monitoring with glucometer was taught. She was also informed about hypoglycaemic symptoms

III. Shoulder and neck strengthening isometric exercises were shown to her.

OUTCOME AND FOLLOW UP:

Follow up of the patient after three months showed improvements in HbA1C, serum 25-hydroxyvitamin D [25(OH) D] and calcium levels. Affected shoulder showed increased range of flexion, extension, abduction, medial and lateral rotation. She was advised to continue shoulder strengthening exercises and other life style modifications along with strict diabetic diet and was advised to continue her regular medications.

COMPARISON:

Table-1- Comparison of Parameter before and after Treatment-

Parameter	Before	After 3 months
Wt in Kg	69	67
HbA1c in % (ADA-7)	9.3	7.2
Serum 25-hydroxyvitamin D [25(OH) D] in ng/dl (20-50)[1]	6	37
Serum Calcium in mg/dl (8.5-10.2)**[2]**	6	9.2
Grading of shoulder pain (Pain scale-1-10)[3]	Moderate with restriction of movement	Mild with no restriction of movement

DISCUSSION:

The major 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[4] 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 glycemia and insulin secretion in patients with type 2 diabetes with established hypo-vitaminosis D, thereby suggesting a role for vitamin D in the pathogenesis of type 2 diabetes mellitus. 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].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. Upper limb locomotor abnormalities are common in diabetes and are associated with worse glycemic control and more diabetic complications. 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].

According to the Office of Dietary Supplements (ODS), levels of vitamin D are measured by the 25-hydroxy level in nanomoles/litre (nmol/L) or nanograms/millilitre (ng/mL). The results can indicate the following:[1]

- deficiency: less than 30 nmol/L (12 ng/mL)
- potential deficiency: between 30 nmol/L (12 ng/mL) and 50 nmol/L (20 ng/mL)
- normal levels: between 50 nmol/L (20 ng/mL) and 125 nmol/L (50 ng/mL)
- high levels: higher than 125 nmol/L (50 ng/mL)

Calcium requirement for the age >50yrs is 1000mg/day for male and 1200mg/day for female [11] which is mainly through dairy products, deficiency of which can cause muscle cramps, easy fracturing of bones, numbness etc. By correcting Vitamin D deficiency it improves calcium re absorption, maintenance of mineral homeostasis, increase the uptake of ingested calcium, increase insulin synthesis and secretion [12]. Apparent risk reduction has also been shown with Type 2 diabetes. In 2006, the journal Diabetes care published a report from the Nurse's Health Study, which followed over 80,000 women for 20 years. Women in the study who had both a calcium intake of more than 1,200 mg and a vitamin D intake of more than 800 IU had a 33% lower risk of developing Type 2 diabetes.[13] These are promising reports, but to prove that vitamin D helps prevent diabetes, clinical trials, or studies on humans, are still needed.

CONCLUSION:

This report adds to the existing observation that correcting Vitamin D and calcium deficiency improves HbA1C and range of movements in frozen shoulder in type 2 Diabetes.

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