

# Association of glycemic control and duration of diabetes with rheumatological manifestations

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## Abstract

**Background:** Many rheumatological diseases occur more frequently in patients with diabetes than in the general population. All these diseases have a severe clinical course and unfavorable prognosis in the diabetic patients with longer duration of diabetes and poor glycaemic control. This study was aimed to investigate an association of glycemic control and duration of diabetes with rheumatological manifestations. **Material and Methods:** The present study included 210 diabetic patients and 200 non-diabetic healthy cases from medicine and orthopedic departments of a tertiary care hospital. The association between these complications and duration of diabetes and long-term glycemic control was determined. **Results:** Rheumatological complications such as LJM syndrome 99 (24.2%), DISH 93 (22.8%), frozen shoulder 68 (16.7%) were more prevalent in diabetics than non-diabetics. These were also commonly seen in diabetics with more than 5 years and poor glycemic control (HbA1C >10%). **Discussion:** The rheumatological manifestations were proportionately higher among patients with duration of diabetes and poor glycemic control.

**Key Words:** Diabetes, Rheumatological manifestations, duration, glycemic control.

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## INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic condition characterized by persistent hyperglycaemia with resultant morbidity and mortality. Although the cardiovascular, renal, and ocular complications of diabetes are the most severe, many rheumatic syndromes occur more frequently in patients with diabetes than in the general population<sup>1-4</sup>. Some are the consequence of diabetic complications (e.g., neuropathic joint disease); others probably share pathogenic mechanisms with microvascular disease. Various rheumatological manifestations like limited joint mobility (LJM) syndrome (diabetic cheiroarthropathy),

adhesive capsulitis (frozen shoulder), shoulder hand syndrome (SHS), diabetic hand syndrome (DHS), diffuse idiopathic skeletal hyperostosis (DISH), Dupuytren's contracture (DC) and neuroarthropathy are characteristically associated with DM. Other rheumatological diseases, such as, osteoarthritis (OA), osteoporosis, osteolysis of the forefoot, migratory osteolysis of hip and knee and pseudogout, which are common in the general population, have an increased prevalence in the diabetic patients<sup>5</sup>. All these diseases have a severe clinical course and unfavorable prognosis in the diabetic patients<sup>6</sup>. DM is associated with chronic, low-grade inflammation and could potentially trigger the progression of other, more prominent inflammatory diseases such as rheumatoid arthritis (RA). Therefore, it is important to obtain and maintain optimal glycaemic control, as poor glycaemic control is associated with increased prevalence of diabetic complications. This study was aimed to investigate an association of glycemic control and duration of diabetes with rheumatological manifestations.

## MATERIAL AND METHODS

The present study included 210 diabetic patients treated in medicine and orthopedic departments of a tertiary care hospital. A total of 200 non-diabetic adult men with serum uric acid level up to 7.0 mg/dl and post-menopausal non-diabetic women were taken as normal healthy controls. Diabetic patients were selected as per American Diabetic Association diagnostic criteria for diabetes. Written consent was obtained from all subjects. Patients with documented diabetic nephropathy and those primarily diagnosed as having rheumatoid arthritis, systemic lupus erythematosus and other connective tissue disorders as well as those end stage renal disease were excluded. Data collected included age, sex, body mass index and duration of diabetes. Routine investigations including complete blood count, urine analysis, fasting and post-prandial plasma glucose, serum uric acid and urea, creatinine, calcium and lipid profile were done. Long-term glycemic control was assessed by hemoglobin A1c (HbA1c) levels. Only those patients with normal renal parameters, uric acid and calcium were considered for inclusion in the study. Skiagrams of the involved joints were done.

A detailed physical examination of the patients was carried out. Cheiroarthropathy was evaluated by the “prayer sign”, in which the patient was asked to touch the palmar surfaces of the interphalangeal joints together with the fingers fanned and the wrist maximally extended. If they were unable to do so, the test was considered to be positive. The diagnosis of periartthritis (Frozen shoulder) was made in patients with 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 in at least three planes<sup>6,7</sup>. Diagnosis of Dupuytren’s contracture was based on one or more of the following features: palmar or digital nodule; tethering of palmar or digital skin; a pretendinous band and a digital flexion contracture. Trigger finger was diagnosed by palpating a nodule or thickened flexor tendon with locking phenomenon during extension or flexion of any finger<sup>8</sup>. Diffuse idiopathic skeletal hyperostosis (DISH) required radiographic finding of new bone formation adjacent to the vertebral body, but separated by a clearly definable space.

## RESULTS

Out of 410 study population, 210 were having diabetes and the remaining 200 were non-diabetic healthy controls. Age and sex did not significantly influence the occurrence of musculoskeletal complications.

**Table 1:** Disease distribution in diabetic and non-diabetic population

	Diabetic (n=210)	Non-diabetic (n=200)
Age (years)	52.46 ±6.72	51.74 ±3.58
Sex (M/F)	132/88	128/72
OA knee, hip, spine	140 (34.2%)	120 (29.3%)
LJM Syndrome	99 (24.2%)	15 (3.8%)
DISH	93 (22.8%)	--
Frozen shoulder	68 (16.7%)	14 (3.4%)
Dupuytren’s contracture	38 (9.4%)	--
Carpal tunnel syndrome	37 (9.2%)	11 (2.8%)
Neuroarthropathy	18 (4.5%)	3 (0.8%)
Trigger finger	27 (6.8%)	4 (1.1%)

Compared to the controls, patients with diabetes had significantly higher prevalence of osteoarthritis (OA) of knee, hip and spine. In 140 (34.2%) diabetes patients OA of knee, hip and spine was found as compared to 120 (29.3%) non-diabetes cases. Of these 140 patients, 42 patients had diabetes for more than 5 years with poor glycemic control (i.e., HbA1c level more than 10%). DISH was seen in 93 (22.8%) diabetic cases only. All were obese and had diabetes for more than 5 years. It was not observed in controls. As well, Dupuytren’s contracture was seen in only 38 (9.4%) diabetic patients. LJM syndrome was seen in 99 (24.2%) diabetic patients compared to 15 (3.8%) controls, with a *p* value of < 0.01 (statistically significant). Of these 99 patients, 78 (78.7%) had diabetes for more than 5 years with poor glycemic control (HbA1c > 10%). Frozen shoulder was seen in 68 (16.7%) diabetic patients and in 14 (3.4%) controls (*P* < 0.001); whereas, neuroarthropathy of knees and foot was seen in 18 (4.5%) diabetics and in 3 (0.8%) controls (*p* < 0.01). Carpal tunnel syndrome was also noted in 37 (9.2%) diabetics as compared to 11 (2.8%) controls. The trigger finger was seen in 27 (6.8%) diabetes patients and in 4 (1.1%) non-diabetic controls with *p* value of < 0.05 (statistically significant). Diabetics with HbA1c levels more than 9 had a statistically significant higher prevalence of rheumatological complications compared to controls (*p* < 0.05). There was also a statistically significant increase in joint complications when duration of diabetes was more than 5 years (*P* < 0.01). Rheumatological manifestations were less in patients with the duration of diabetes of <5 years and HbA1c <9% even with elevated fasting plasma glucose.

## DISCUSSION

Diabetes mellitus has been linked to disorders of bones and joints. The present study showed a high prevalence of rheumatological diseases like OA knee, hip, spine, LJM Syndrome, DISH, Frozen shoulder and Dupuytren’s contracture in the diabetic population. The prevalence of

osteoarthritis of large and small joints is higher among patients with diabetes than in the general population<sup>9-10</sup>. The impairment in glucose utilization in diabetic patients might alter glycosaminoglycan and proteoglycan production<sup>11</sup>. The association between diabetes and frozen shoulder is well established. Between 11% and 19% of patients with diabetes are affected<sup>12-15</sup>. The present study also showed high prevalence of frozen shoulder among diabetics and non-diabetics, i.e., 16.7% vs 3.4%. Patients complained of chronic pain or stiffness of shoulder joint. The loss of range of motion caused impaired function, including limited reaching and rotation. Bilateral involvement was common among diabetics as compared to non-diabetics. LJM is a condition of stiffness principally involving the hands primarily and evaluated by the simple “prayer sign” test. Most of the studies have suggested a prevalence of about 32% in diabetic population, which is comparable to an overall prevalence of 24.2% observed in the current report<sup>16</sup>. It was associated with the presence of shoulder capsulitis and Dupuytren's disease. It was also observed that these complications were seen in most of the type 1 diabetics with more than 5 years of duration and poor glycemic control. DISH is caused by excessive new bone growth predominantly in enthesal regions. From the distribution of the new bone, it is apparent that the condition is systemic and not just a reaction to local mechanical factors. Patients with DISH not only have type 2 diabetes more commonly than do age-, sex-, and body mass index – matched controls, but are also more likely to have hyperuricemia, dyslipidemia, and obesity<sup>17</sup>. This suggests that DISH arises in patients with the metabolic syndrome<sup>18</sup>. Obesity may be an independent risk factor for the development of DISH. Holt reported 25% prevalence of DISH, especially of the spine, and pelvic ligaments among patients with type 2 DM. Raj *et al* also observed DISH in 26% of diabetics<sup>12</sup>. Most of which were overweight and aged above 50 years. In our study also we had found 22.8% of prevalence and all were obese patients above 50 years of age. The features of Dupuytren's disease consist of palmar and digital nodules and cords, palmar skin tethering and digital contractures<sup>16</sup>. It has been observed that in the setting of diabetes mellitus, the ring and middle digits are predominantly involved, as opposed to non-diabetics, where the small and ring digits are more commonly involved<sup>19,20</sup>. The incidence of Dupuytren's disease have been reported to be about 27% among diabetics in various studies<sup>21,22</sup>. This is higher than a value of 9.4% observed in the current report. We also observed a statistically significant higher prevalence of carpal tunnel syndrome, trigger finger and neuropathic joints in diabetic population when compared to controls. We observed a

positive correlation between the duration of diabetes with the prevalence of joint complications, irrespective of the type of joint disorder. We also observed an increased prevalence of rheumatological complications in patients with elevated HbA1c levels, denoting a positive correlation with poor long-term glycemic control. In conclusion, the rheumatological manifestations were proportionately higher among patients with duration of diabetes and poor glycemic control. This study gives a clear understanding of the rheumatological complications that are prevalent in patients with diabetes mellitus.

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