

## Assessment of Tendon Alterations In Diabetic Patients: An Ultrasonographic study

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### Abstract

Complications that might arise from diabetes include kidney illness; neuropathy; retinopathy; and musculoskeletal (MSK) symptoms. MSK symptoms in people with DM might have a negative influence on their quality of life. Adhesive capsulitis, shoulder hand syndrome (SHS), diabetic hand syndrome (DHS), DISH, Dupuytren's contracture (DC), and neuroarthropathy are a few of the symptoms that might appear. Musculoskeletal imaging is becoming more and more common with the use of ultrasound, a very effective imaging modality. Patients with diabetes mellitus (DM) were studied utilising musculoskeletal ultrasound (MSUS) imaging in order to examine alterations in certain tendons, in both the upper and lower limbs, as well as their clinical condition, illness duration, glycemic management, and other laboratory data. Methods: Forty diabetic individuals who met the American Diabetes Association's definition of diabetes mellitus (DM) were studied in this research (Group I). Attendants of the Endocrinology unit of Benha University Hospitals' Internal Medicine department were invited to participate in the study. Group II: twenty-five seemingly healthy participants were chosen from hospital staff and relatives of other patients to serve as a control group. Conclusions: In this investigation, tendons were found to be prominent on one side in both the control and non-complaining groups. Tenderness in the biceps tendon was found in three healthy controls and 18 cases, whereas discomfort in the supraspinatus tendons was found in three healthy controls and six diabetes patients who underwent palpation testing. DM patients' Subscapularis tendons were found to be 10% painful, whereas Achilles tendons were found to be 25% tender. Twelve biceps tendons, eight supraspinatus tendons, and eight subscapularis tendons in DM patients had statistically negligible differences from healthy controls in terms of tendon degeneration. Tendon thickness differences between DM patients and healthy controls were found to be statistically significant. There was evidence of effusion in four out of the eight biceps tendons evaluated, despite the fact that none of the healthy controls exhibited any signs of bicipital tendinitis. Diabetes patients had higher tendon calcifications in their biceps, supraspinatus, and subscapularis than healthy controls, although the differences were not statistically significant. Over 5 percent of the supraspinatus tendons had partial tendon tears, but no partial tendon tears were found in any of the Subscapularis tendons, and no full thickness tears were found in any of the tendons we investigated. Tenderness in the Achilles tendon was seen more often in people with diabetes than in healthy controls, although the difference was statistically insignificant. According to MSUS, the investigated patients had greater Achilles tendon degeneration, calcium deposits, and a retrocalcaneal bursa than the healthy controls did, although the differences were statistically insignificant. Even though there was a statistically significant difference in the thickness of the tendon between the two groups investigated, the DM patients had the thickest tendon. Tendon thickness was shown to have a strong connection with illness duration and HbA1C. Biceps tendon thickness was shown to be significantly correlated with patient age. Our findings demonstrate that DM may lead to degenerative alterations in the investigated tendons. Using ultrasonography, a nonradioactive diagnostic technology that aids in the diagnosis of disease and degeneration, doctors may examine patient's right at their bedsides.

**Key words:** Tendon Alterations, Diabetic Patients, Ultrasonography.

### 1. Background

High blood sugar levels over an extended length of time characterise a set of metabolic illnesses referred to as diabetes mellitus (DM). It causes frequent urination, thirst, and hunger as a result of the elevated blood sugar. Having diabetes and not managing it may lead to a slew of problems. Diabetic ketoacidosis and nonketotic hyperosmolar coma are both acute consequences. Heart disease, stroke, renal failure, foot ulcers, musculoskeletal system damage, and eye impairment are just a few of the serious long-term side effects [1].

Ultrasonography is a safe, non-ionizing, and cost-effective method that has few technical limits and is well accepted by patients. For real-time dynamic examinations and treatments, high-frequency ultrasound provides a superior spatial resolution than magnetic resonance imaging (MRI). Contralateral comparisons may be made easily with sonography, which can aid in detecting small abnormalities [2].

In the previous decade, musculoskeletal ultrasonography (MSUS) was utilised to diagnose synovitis that would otherwise go undetected by clinical or laboratory examinations [3]. It is a pricey imaging method that is on par with or even better than MRI in terms of quality, but the lengthy learning curve is a significant stumbling block [4].

### 2. Aim of the work

Patients with diabetes undergoing musculoskeletal ultrasound (MSUS) imaging will have their subscapularis tendon examined as part of this investigation.

### 3. Methods

This study was conducted on forty diabetic patients who fulfilled the criteria of diabetes mellitus (DM) based on the American Diabetes Association criteria (American Diabetes Association,2010) (Group1)

A written consent was taken from all patients and control subjects prior to participation in the study that was approved by the ethical committee of the faculty of Medicine, Benha University.

**This study group (1):** Forty patients who fulfilled the American association criteria for the diagnosis of diabetes mellitus (DM).

The control group was made by twenty-five age and sex matched apparently healthy subjects group (2).

**Patients were subjected to history taking, clinical examination and Ultrasound evaluation.**

US examination was performed for subscapularis tendon according to a standard protocol.

**Longitudinal scan of the subscapularis tendon 3):**

The probe was placed transversely to the bicipital groove. The bony landmarks that should be identified were the bicipital groove, the greater and lesser tuberosities of the humerus, and the coracoid process. Medial to the biceps tendon, the insertion of the

subscapularis tendon was identified on the lesser tuberosity with some fibers continuing across the bicipital groove to form the humeral transverse ligament. To scan the subscapularis tendon properly, the shoulder should be moved into external rotation. The hyperechoic profile of the coracoid process could be seen medially to the subscapularis musculotendinous junction.

**Transverse scan of the subscapularis tendon ( Bruyn et al, 2009):**

The probe was placed transversely to the subscapularis tendon. The bony landmark that should be identified was the lesser tuberosity of the humerus. The subscapularis tendon appeared convex-shaped with hyperechoic texture.

**Data analysis**

Data are reported and statistically analyzed using SPSS version 25. A p value <0.05 is considered significant, p value >0.05 was considered nonsignificant and p value <0.001 is considered highly significant.

#### 4. Results

**Table (1)** Comparison between the studied groups regarding Subscapularis tendon clinical tests .

		Group I (n=40)		Group II (n=25)		Test of sig.	p-value
		No.	%	No.	%		
Lift off	Negative	38	95.0%	25	100.0%	0.2	0.5
	Positive	2	5.0%	0	0.0%		

*No significant difference (p value=0.5) was detected between the studied groups regarding clinical test of Subscapularis tendon.*

**Table (2)** Comparison between the studied groups regarding ultrasonographic findings of Subscapularis tendon.

		Group I (n=40)		Group II (n=25)		Test of sig.	p-value
		No.	%	No.	%		
<b>Degeneration</b>	Negative	32	80.0%	19	76.0%	0.1	0.7
	Positive	8	20.0%	6	24.0%		
<b>Impairment test</b>	Negative	38	95.0%	25	100.0%	0.2	0.5
	Positive	2	5.0%	0	0.0%		
<b>Calcification</b>	Negative	38	95.0%	25	100.0%	0.2	0.5
	Positive	2	5.0%	0	0.0%		
<b>Tear</b>	Negative	40	100.0%	25	100.0%	---	---
	Positive	0	0.0%	0	0.0%		
<b>Tenderness</b>	Negative	36	90.0%	25	100.0%	1.2	0.2
	Positive	4	10.0%	0	0.0%		

*No significant difference (p value=0.7) was reported between the studied groups regarding Subscapularis tendon U.S.*

#### 5. Discussion

Over the last decade, ultrasound in rheumatology has quickly grown and become an integral part of daily clinical practise [1].

From the clinician's perspective, there are various benefits. Due to the absence of metal artefacts, it is able to do a contralateral examination without restrictions (MRI). Guidance techniques that involve real-time visualisation of needles and target structures are the most popular [3].

The musculoskeletal system may be imaged in real time and at high resolution using MSUS. Peroneal

tendon subluxation, snapping hip syndrome and ulnar nerve subluxation are all disorders that are difficult to detect on static imaging investigations [2].

Hyperglycemia has a direct impact on the body's physiological and behavioural reactions. The brain is able to detect hyperglycemia and send a signal to the pancreas and other organs to reduce its impact [4].

Many MSK disorders, including viral disease, vascular problem, diabetic neuropathy, and other diseases, may arise in diabetic individuals. Although confined to osseous lesions, sonography is an effective imaging technique for the diagnosis of the many MSK

disorders associated with diabetes mellitus. Identification of potential MSK disorders in diabetic patients, as well as characteristic sonographic features for each disease entity, may aid in a precise diagnosis [5].

Frozen shoulder and adhesive capsulitis are both terms used to describe the same condition. Thickening of the synovium and joint capsule are the primary symptoms of this condition. Adhesive capsulitis is more likely to occur in patients with diabetes mellitus. Its occurrence ranges from 10% to 20%. [2]. During passive lateral elevation of the arm, the supraspinatus tendon is restricted from slipping under the acromion, as seen sonographically [1]. Hyperechoic, thicker synovium along the cuff interval and fluid collecting around the biceps tendon at the bicipital groove level are further sonographic findings [3].

## 6. Conclusion

Tendon alterations, specifically increased tendon thickness, are more common in persons with diabetes, according to our research.

## References

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