



## Comparison of Musculoskeletal Manifestations Between Diabetes and Hypothyroidism Patients

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### Abstract

**Background:** Worldwide, musculoskeletal (MSK) problems are prevalent and a primary source of disability and lost time at work. The spectrum of MSK diseases includes a wide range of ailments. Both Diabetes mellitus and hypothyroidism has been associated with a number of musculoskeletal manifestations.

**Objectives:** The aim of the study was to compare the musculoskeletal manifestations between diabetes and hypothyroidism patients.

**Methods:** This cross-sectional study was carried out in the Department of Physical Medicine and Rehabilitation, Bangabandhu Sheikh Mujib Medical University (BSMMU) during January 2016 to December 2016. A total of 190 patients were participated in the study. Among them 95 were diabetic patients (Group-A) and 95 were patients with hypothyroidism (Group-B). Statistical analyses of the results were obtained by using window based Microsoft Excel and Statistical Packages for Social Sciences (SPSS-22), where required.

**Results:** More than half (52.63%) patients were belonged to age 51-60 years in group A and half (50.53%) in group B. The mean BMI was found 25.2(±2.9) kg/m<sup>2</sup> in group A and 27.2(±3.2) kg/m<sup>2</sup> in group-B. Nineteen (20.0%) patients had osteoarthritis of knee in group A and 24(25.26%) in group B. Twelve (12.63%) patients had Adhesive capsulitis in group A and 5(5.26%) in group B. Nine (9.47%) patients had Flexor tenosynovitis in group A and 3(3.15%) in group B. Seven (7.37%) patients had Fibromyalgia in group A and 6(6.31%) in group B. Seven (7.37%) patients had Planter fasciitis in group A and 6(6.31%) in group B. Which were statistically significant (p<0.05).

**Conclusion:** Musculoskeletal conditions are persistent, incapacitating, and expensive. They have an impact on individual's ages, cultures, and ethnicities. Identification and treatment of musculoskeletal manifestations are important to improve the patients' quality of life.

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### Introduction

Worldwide, musculoskeletal (MSK) problems are prevalent and a primary source of disability and lost time at work. The spectrum of MSK diseases includes a wide range of ailments. They may involve a variety of anatomical components, including bone, structures within joints, and periarticular structures, which include muscles, tendons, ligaments, or bursae [1]. Measures like the International Classification of Functioning, Disability and

Health (ICF) by the World Health Organization (WHO) can be used to assess the severity of a specific issue regardless of its root cause. The ICF comprises an evaluation of the body's structure and function as well as any restrictions on activity and involvement in everyday activities. Contextual factors, which can include individual and environmental factors, may have an impact on how any impairment manifests [2]. Diabetes mellitus (DM) is a chronic metabolic condition with a significant morbidity and mortality rate [3]. As the number of people with diabetes rises, the proportion of those who have functional disabilities will rise as well, creating a serious public health issue [4]. The most prevalent endocrine arthropathies are the musculoskeletal (MSK) consequences of diabetes mellitus (DM) [5]. Bangladesh is a developing nation with a disproportionately high prevalence of diabetes. Bangladesh is residence to more than one-third of all diabetics in the 48 least developed nations [6]. The musculoskeletal system may be impacted by diabetes mellitus (DM) in a variety of ways. Individuals with DM have been found to experience many rheumatologic problems more frequently than people without DM [7]. DM is associated with several musculoskeletal manifestations which are generally ignored and poorly treated as compared to other complications such as neuropathy, retinopathy and nephropathy. DM affects connective tissues in many ways and cause different alterations in periarticular and skeletal systems [8]. Patients with a lengthy history of type 1 diabetes are more likely to experience musculoskeletal issues, while type 2 diabetes patients might also experience them [9]. The body's balance depends on thyroid hormones (THs), which are essential. One of the main regulators of metabolism is the thyroid hormone, which modifies how much protein, carbohydrate, fat, and mineral the body uses [10]. Thyroid hormones are crucial for the growth, maturation, and preservation of the morpho-functional integrity of the musculoskeletal structures. Hormone deficit has negative effects on bone modeling and development, which have an impact on bone density and neuromuscular function. The mimicking of rheumatic diseases is undoubtedly one of the additional characteristics of the association between musculoskeletal impairment and thyroid disorders [11]. Thyroid gland pathology is currently regarded as one of the most prevalent endocrine illnesses in structure. Primary hypothyroidism is a significant endocrine disorder that affects several organs and is commonly accompanied by musculoskeletal dysfunction [12-14]. The aim of the study was to compare the musculoskeletal manifestations between diabetes and hypothyroidism patients.

## Methodology

This cross-sectional study was carried out in the Department of Physical Medicine and Rehabilitation, Bangabandhu Sheikh Mujib Medical University (BSMMU) during January 2016 to December 2016. A total of 190

patients were participated in the study. Among them 95 were diabetic patients (Group-A) and 95 were patients with hypothyroidism (Group-B). Patients aged between 40-70 years both male and female, clinically diagnosed with diabetes and hypothyroidism for at least 5 years were included in the study. History/ evidence of infections, recent trauma, fracture, malignancy, tuberculosis etc., severely ill patients and not willing to participate were excluded from the study. After taking consent and matching eligibility criteria, data were collected from patients on variables of interest using the predesigned structured questionnaire by interview, observation. Statistical analyses of the results were be obtained by using window based Microsoft Excel and Statistical Packages for Social Sciences (SPSS-22), where required.

## Results

Table 1 shows age distribution of the study population, it was observed that more than half (52.63%) patients were belonged to age 51-60 years in group A and half (50.52%) in group B. The mean age was  $49.37 \pm 12.03$  in diabetes patients and  $48.62 \pm 11.13$  years in hypothyroid patients.

Table 2 shows sex distribution of the study population, it was observed that majority (57.80%) patients were female in group A and 52(54.74%) in group B. The difference was not statistically significant ( $p > 0.05$ ) between two groups.

Table 3 shows occupational status of the study population, it was observed that 23(24.21%) patients were house wives in group A and 24(25.26%) in group B. Followed by 23.16% retired in group A and 18.94% in group B and 20% service holder in group A and 20(21.05%) in group B. The difference was not statistically significant ( $p > 0.05$ ) between two groups.

Table 4 shows socio-economic status of the study population, it was observed that almost two third (65.26%) of the patients come from middle class family in group A and 51(53.68%) in group B. The difference was not statistically significant ( $p > 0.05$ ) between two groups (Table 5).

Mean height was found  $5.39 (\pm 0.28)$  inches in group A and  $5.31 (\pm 0.34)$  inches in group-B. The mean weight was found  $60.22 (\pm 8.83)$  kg in group A and  $88.0 (\pm 8.02)$  kg in group-B. The mean BMI was found  $25.2 (\pm 2.9)$  kg/m<sup>2</sup> in group A and  $27.2 (\pm 3.2)$  kg/m<sup>2</sup> in group-B. The difference were not statistically significant ( $p > 0.05$ ) between two groups (Table 6).

**Table 1:** Age distribution of the study population.

Age (years)	Group-A n(%)	Group-B n(%)	P value
40-50	27(28.47)	36(37.84)	0.518 <sup>ns</sup>
51-60	50(52.63)	48(50.52)	
61-70	18(18.94)	11(11.58)	
Total	95(100)	95(100)	
Mean $\pm$ SD	$49.37 \pm 12.03$	$48.62 \pm 11.13$	

ns= not significant, P value reached from chi square test

**Table 2:** Sex distribution of the study population.

Sex	Group-A n(%)	Group-B n(%)	P value
Male	40(42.10)	43(45.26)	0.210 <sup>ns</sup>
Female	55(57.80)	52(54.74)	
Total	95(100)	95(100)	

ns= not significant, P value reached from chi square test

**Table 3:** Occupational status of study population.

Occupational status	Group-A n(%)	Group-B n(%)	P value
House wife	23(24.21)	24(25.26)	0.842 <sup>ns</sup>
Retried	22 (23.16)	18(18.94)	
Service	19(20.00)	20(21.05)	
Day labour	9(9.47)	8(8.42)	
Teacher	08(8.42)	7(7.36)	
Farmer	07(7.37)	9(9.47)	
Business	7(7.37)	9(9.47)	

ns= not significant, P value reached from chi square test

**Table 4:** Socio-economic condition of study population.

Socio-economic condition	Group-A n (%)	Group-B n (%)	P value
Low	21(22.11)	30(31.58)	0.245 <sup>ns</sup>
Middle	62(65.26)	51(53.68)	
High	12(12.63)	14(14.74)	

ns= not significant, P value reached from chi square test

**Table 5:** Height, weight and BMI of study population.

	Group-A Mean (±SD)	Group-B Mean (±SD)	P value
Height (inch)	5.39(±0.28)	5.31(±0.34)	0.088 <sup>ns</sup>
Weight (kg)	60.22(±8.83)	88.0(±8.02)	0.087 <sup>ns</sup>
BMI (kg/m <sup>2</sup> )	25.2(±2.9)	27.2(±3.2)	0.063 <sup>ns</sup>

ns= not significant, P value reached from unpaired t-test

**Table 6:** Common musculoskeletal disorders of study population.

Musculoskeletal disorders	Group-A n(%)	Group-B n(%)	Total	p value
Osteoarthritis of knee	19(20.0)	24(25.26)	46	0.001 <sup>s</sup>
Adhesive capsulitis	12(12.63)	5(5.26)	15	0.017 <sup>s</sup>
Lumbar spondylosis	17(17.89)	20(11.58)	28	0.111 <sup>ns</sup>
Rheumatoid arthritis	5(5.26)	7(7.37)	9	0.468 <sup>ns</sup>
Flexor tenosynovitis	9(9.47)	3(3.15)	12	0.009 <sup>s</sup>
Cervical spondylosis	11(11.57)	16(12.63)	23	0.533 <sup>ns</sup>
Fibromyalgia	7(7.37)	6(6.31)	11	0.001 <sup>s</sup>
Planter fasciitis	7 (7.37)	4(4.21)	10	0.015 <sup>s</sup>
Carpel tunnel syndrome	4(4.21)	6(6.31)	9	0.001 <sup>s</sup>
Osteoporosis	3(5.26)	5(5.26)	7	0.087 <sup>ns</sup>
DISH	2(2.11)	1(1.05)	3	0.001 <sup>s</sup>
Dupuytren's contracture	3(3.15)	1(1.05)	6	0.097 <sup>ns</sup>
Lateral Epicondylitis	7 (7.37)	3(3.15)	12	0.650 <sup>ns</sup>

s= significant, ns= not significant, P value reached from chi square test

Nineteen (20.0%) patients had osteoarthritis of knee in group A and 24(25.26%) in group B. Twelve (12.63%) patients had Adhesive capsulitis in group A and 5(5.26%) in group B. Nine (9.47%) patients had Flexor tenosynovitis in group A and 3(3.15%) in group B. Seven (7.37%) patients had Fibromyalgia in group A and 6(6.31%) in group B. Seven (7.37%) patients had Planter fasciitis in group A and 4(4.21%) in group B. Four (4.21%) patients had Carpel tunnel syndrome in group A and 6(6.31%) in group B. Which were statistically significant (p<0.05) but other musculoskeletal disorders being not statistically significant (p>0.05) between two groups.

## Discussion

This cross-sectional study was carried out in the Department of Physical Medicine and Rehabilitation, Bangabandhu Sheikh Mujib Medical University, Dhaka. During six month of study period, total 190 samples were included in this study, among them 95 patients were diabetics in group A and 95 were in hypothyroidism group B.

In this study it was observed that more than half (52.63%) patients were belonged to age 51-60 years in group A and half 48(50.52%) in group B. The mean age was 49.37 ± 12.03 in diabetes patients and 48.62±11.13 years in Hypothyroid patients. A previous study showed that mean age was found 48.87 ± 12.03 year in diabetes group [15]. A study showed the mean age of the study group was 46 ± 12 (20–76) years among them 7.3% (n = 10) had subclinical hypothyroidism [16]. Here, 57.80% patients were female in group A and 54.74 in group B. Barki et al. [17] showed that in diabetes mellitus, 158(42.1%) patients were males and 217(57.9%) were females [17]. A previous study titled Musculoskeletal manifestations in patients with thyroid disease; showed, 81% were female and 19% male [16].

In this current study mean height was found 5.39 (±0.28) inches in group A and 5.31 (±0.34) inches in group-B. The mean weight was found 60.22(±8.83) kg in group A and 88.0(±8.02) kg in group-B. The mean BMI was found 25.2(±2.9) kg/m<sup>2</sup> in group A and 27.2(±3.2) kg/m<sup>2</sup> in group-B. The difference were not statistically significant (p>0.05) between two groups. Wang et al. [18] showed that, the mean BMI was found 24.79 ± 2.58 kg/m<sup>2</sup> in diabetes group [18]. Another study named Rheumatic manifestations in primary hypothyroidism; revealed that, mean body mass index (BMI) was 29.3 (±3.4) kg/m<sup>2</sup> which was a high BMI and not matched with our study [19]. In this study, 19(20.0%) patients had osteoarthritis of knee in group A and 24(25.26%) in group B. Nieves-Plaza et al. [20] in 2013 reported OA among diabetics patients was 49.0%. Kole et al. [19] showed osteoarthritis in 80 (66.7%) in hypothyroid patients [19]. Here, 12(12.63%) patients had Adhesive capsulitis in group A and 5(5.26%) in group B. In study by Khan et al. [21] in 2008 reported 16.5%

frozen shoulder in diabetes patients [21]. Schiefer et al. [22] showed, in the FS group, the prevalence of hypothyroidism diagnoses was significantly greater (27.2% vs. 10.7%;  $P = .001$ ).

The study revealed that 5(5.26%) Rheumatoid arthritis was diagnosed in diabetes patients and 7(7.37%) was in hypothyroid patients. In study of Khan et al. [21] had observed they showed 20.1% Rheumatoid arthritis in diabetes group. Kole et al. [19] showed rheumatoid arthritis in 20 (16.67%) in hypothyroid patients. In this study showed Fibromyalgia 7(7.37%) in diabetics and 6(6.31%) in hypothyroid patients. Tishler et al. [23] study showed Fibromyalgia was diagnosed in 17% with DM. Kole et al. [19] showed fibromyalgia in 6 (5%) in hypothyroid patients. About 3 (3.15%) diabetic patients in present study have Dupuytren's contracture. Fitzgibbons and Weiss study found that diabetes mellitus in their population of Dupuytren's contracture patients was only slightly higher than in the general population (11 vs. 7%). Dupuytren's contracture in diabetics patient's ranges from 20 to 63% that observation was not supported our study. The discrepancy could be due to they include only the patients with Dupuytren's contracture and studied 20 years ago. The finding of 5.26% cases of Dupuytren's contracture indicates that it is not uncommon in our country [24,25]. A study of Sencan et al., who neither found significantly different prevalences of diabetes between Diffuse idiopathic skeletal hyperostosis (DISH) patients. The present study shows, 2(2.11) patients in diabetes patients and 1(1.05) patients in hypothyroid patients. A superiority of US-guided tendon sheath injections over convectional blind injection in patients with Flexor tenosynovitis (FT) has been reported, obtaining a better response measured with clinical and US outcomes. And in this current study 9(9.47) were in group A and 3(3.15) were in group A. Nerve conduction study is the most precise diagnostic test for Carpal tunnel syndrome (CTS); however, nerve conduction studies were reported to be normal in 22% of the patients who were definitely diagnosed with CTS in the clinic setting. And in our study, 4(4.21%) patients had Carpel tunnel syndrome in group A and 6(6.31%) in group B. In all reviewed studies, the authors reported positive results in favor of US imaging in the assessment of Plantar fasciitis (PF) and the results of this review support the use of US imaging in the assessment of PF. However, this present study shows 7 (7.37) were in diabetes patients and 4(4.21) were in hypothyroid patients. We found that, 1(1.05%) hypothyroid patient had Dupuytren's contracture but Kole et al. [19] showed HYPERLINK "https://www.sciencedirect.com/topics/medicine-and-dentistry/dupuytren-contracture" Dupuytren's contracture in 4 (3.33%) hypothyroid patients [19].

## Conclusion

Musculoskeletal conditions are persistent, incapacitating,

and expensive. They have an impact on individuals of all ages, cultures, and ethnicities. For adults over the age of 18, these disorders are the primary cause of disability, loss of function, as well as restriction and impairment of activities [26]. Both Diabetes mellitus and hypothyroidism has been associated with a number of musculoskeletal manifestations. Identification and treatment of musculoskeletal manifestations are important to improve the patients' quality of life.

## Limitations of the study

The present study was conducted in a very short period due to time constraints and funding limitations. The small sample size was also a limitation of the present study.

## Recommendation

This study can serve as a pilot to much larger research involving multiple centers that can provide a nationwide picture, validate regression models proposed in this study for future use and emphasize points to ensure better management and adherence.

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## Declaration

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**Conflict of interest:** None declared.

**Ethical approval:** The study was approved by the ethical committee of Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh.

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