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Original Investigation

Articular and abarticular manifestations in type 2 diabetes mellitus

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Abstract

Objective: Diabetes mellitus (DM), a worldwide high-prevalence disease, is associated with a large variety of rheumatic manifestations. It affects the connective tissues in many ways and causes alterations in the periarticular and the musculoskeletal systems. In most cases, these manifestations are associated with functional disability and pain, affecting the quality of life of the diabetic patient. The aim of our study is to review the different articular and abarticular manifestations in diabetic patients and the associated factors of these rheumatic manifestations.

Material and Methods: A cross-sectional study that includes all patients suffering from type 2 DM who present with articular or abarticular manifestations.

Results: We included 116 diabetic patients presenting with articular or abarticular manifestations. Our study showed four important findings. First, a large variety of articular and abarticular manifestations were present in patients with type 2 DM. Second, osteoarthritis (OA) of the knee was the most frequent articular manifestations. It was seen in 49% of our patients. Third, the most common manifestations in diabetic Moroccan patients were carpal tunnel syndrome (CTS), adhesive capsulitis of the shoulder, and diabetic cheiroarthropathy (29%, 23%, and 16%, respectively). Fourth, there was a significant association between vascular complications and the development of articular and abarticular manifestations.

Conclusion: This study shows that the articular and abarticular manifestations in diabetic Moroccan patients are dominated by CTS, adhesive capsulitis of the shoulder, and diabetic cheiroarthropathy, with a significant association between vascular complications and the development of some of these manifestations.

Key words: Type 2 diabetes mellitus, articular manifestations, abarticular manifestations

Introduction

Diabetes mellitus (DM) is a chronic metabolic condition characterized by persistent hyperglycemia, with resultant morbidity and mortality related primarily to its associated vascular complications (1). Rheumatic manifestations of DM, especially those that involve joints and soft tissues, are the most frequent of all other diabetic complications. They include cheiroarthropathy, Dupuytren's disease, adhesive capsulitis of the shoulder, carpal tunnel syndrome (CTS), Charcot neuropathic osteoarthropathy, diabetic amyotrophy, muscle infraction, diffuse idiopathic skeletal hyperostosis, reflex sympathetic dystrophy, and septic arthritis. The aim of our study is to review the different articular and abarticular manifestations in diabetic patients and the associated factors of these rheumatic manifestations.

Material and Methods

A cross-sectional study, including all patients suffering from type 2 DM who presented with articular or abarticular manifestations, was conducted in the rheumatology department in collaboration with the endocrinology department. This study was performed during 1 year, between December 2011 and December 2012. We excluded patients who suffered from autoimmune diabetes or MODY-type diabetes and patients who had any chronic rheumatic disease and microcrystalline or metabolic arthritis. Information was obtained from the patients' symptoms. All patients had a complete osteoarticular examination. For all patients included in the study, we recorded the following information: demographic features, including age, gender, physical activity (walking for 30 minutes, 3 times per week), and body mass index (BMI). We considered overweight subjects with a BMI between 25 and 29.9 kg/m^2 and obesity with BMI ≥ 30 kg/m^2, as per the 2000 World Health Organization (WHO) classification for BMI (2). We obtained the following clinical information: duration of diabetes (in years), disease control, adherence to antidiabetic treatment, and diabetic complications. We also recorded the hemoglobin A1C (HbA1c) levels of the patients. Poor glycemic control was considered when HbA1c levels were >8.0%.

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Data were analyzed using the SPSS (Statistical Package for Social Sciences) for Windows, version 20 (Armonk, IBM Corp 2011, NY, USA). Mean demographic differences were examined using chi tests for dichotomous variables and independent student's t-tests for continuous data. A backwards stepwise logistic regression model with a confidence interval of 95% was carried out for the multivariate analysis to identify associated factors for this kind of articular and abarticular disease in our population suffering from type 2 DM. Results were considered significant if the P-value was <0.05. This study was approved by the local research ethics committee, and informed consent was obtained from all patients.

Results

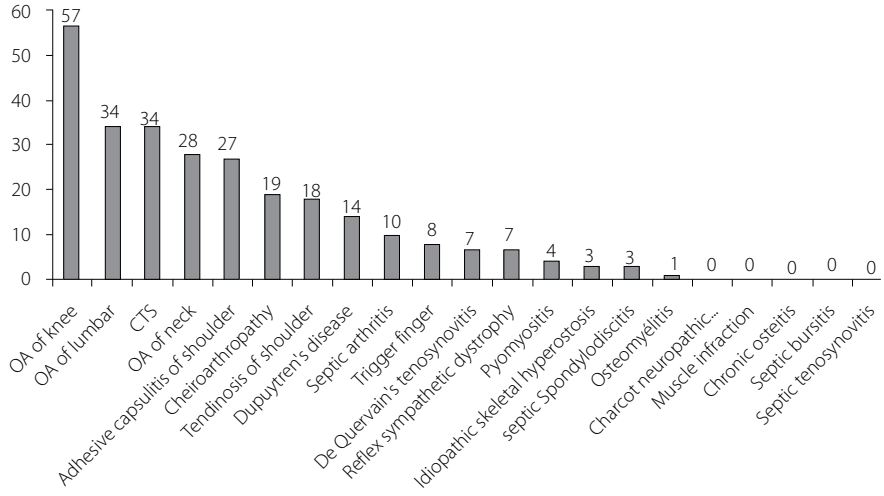
We included 116 diabetic patients presenting with articular or abarticular manifestations. The mean age was 61±10 years [35-92 years]. The sex (men/women) ratio was 0.27 (women: 76% and men: 24%). The mean of BMI was 28.4±5 kg/m^2 [17.6-48]. One-third of patients were overweight, while 31.9% was obese. Eighty percent was sedentary, while only 20% had regular physical activity (walking for 30 minutes, 3 times per week). Poor adherence to antidiabetic treatment was noted in 71% of patients, with poor glycemic control in 83%.

The mean duration of DM in our patients was 8.67±7.24 years [0–36 years]. Forty-two percent of our patients had more than 10 years of diabetes. Degenerative complications of diabetes were dominated by diabetic nephropathy in 64% of cases. Diabetic neuropathy and retinopathy touched, respectively, 38% and 35% of our patients. OA of the knee was the most frequent articular manifestation. It was seen in 49% of our study population.

Carpal tunnel syndrome was the most frequent manifestation involving the hands; it was seen in 34 patients (29% of all rheumatic manifestations and 41% of all abarticular manifestations of the hands), followed by diabetic cheiroarthropathy in 19 patients (16%) and Dupuytren's disease in 14 patients (12 %). Trigger finger and De Quervain's tenosynovitis were observed in 8 (7%) and 7 patients (6%), respectively.

In our study, adhesive capsulitis of the shoulder developed in 23%; reflex sympathetic dystrophy of shoulder was seen in 5%. Three diabetic patients developed diffuse idiopathic skeletal hyperostosis. No case of Charcot neuropathic osteoarthropathy was found in our study. Thirteen cases of septic arthritis occurred in our patients: 10 septic monoarthritis and 3 cases of septic spondylodiscitis (Figure 1).

Figure 1. Prevalence of articular and abarticular manifestations among the diabetic patients studied



Statistical analysis by the final regression model variables found that diabetic retinopathy was an associated factor of Dupuytren's disease (OR=5.03) [95%: 1.39-18.13] (p=0.01), CTS (OR=8.99) [95%: 3.38-23.91] (p<0.0001), and neck osteoarthritis (OR=2.63) [95%: 1.06-6.53] (p=0.03). Diabetic neuropathy, poor therapeutic adherence, lack of physical activity, and overweightedness were statistically associated to adhesive capsulitis of the shoulder in our diabetic patients, with an odds ratio equal to (OR=5.41) [95%: 1.73-16.96] (p=0.004), (OR=5.53) [95%: 1.37-22.24] (p=0.01), (OR=6.05) [95%: 1.55-23.51] (p=0.009), and (OR=3.56) [95%: 1.97-13.80] (p=0.05), respectively. Diabetic neuropathy was an associated factor for osteoarthritis of the knee (OR=2.9) [95%: 1.33-6.43] (p=0.007). Male patients with osteoarthritis of the knee increased the risk of developing septic arthritis (OR=11.49) [95%: 1.31-100] (p=0.03).

Discussion

Patients with DM may develop various musculoskeletal complications. These rheumatic manifestations are primarily noninflammatory. Typical manifestations can be seen in the hands, such as diabetic cheiroarthropathy, trigger finger, Dupuytren's disease, and CTS. Shoulder adhesive capsulitis is also more frequent. The most serious complications can occur in the form of diabetic foot, called Charcot neuropathic osteoarthropathy, which may lead to severe deformities and disability (3). Most rheumatic complications seem to be associated with the duration of DM and appear in diabetic patients of younger age. The physiopathology of these rheumatic disorders in DM is not clear. It could be associated with connective tissue disorders, such as the formation of abnormally glycosylated end products; it could also be indirectly related to the vasculopathy and neuropathy commonly complicating the primary disease, in addition to predisposing conditions, such as obesity and low physical activity (4).

Our study showed four important findings. First, there was a large variety of articular and abarticular manifestations in type 2 DM. Second, OA of the knee was the most frequent articular manifestation. It was seen in 49% of our patients. Third, the most common abarticular manifestations in diabetic Moroccan patients were CTS, adhesive capsulitis of the shoulder, and diabetic cheiroarthropathy (29%, 23%, and 16%, respectively). Fourth, there was a significant association between vascular complications and the development of articular and abarticular manifestations.

OA of the knee is a separate type of arthritis and the most common form in the general population (5). It is a multifactorial degenerative disease that slowly destroys cartilage and bone. Obesity, age, female gender, race, genetics, and occupation are some of the known risk factors for osteoarthritis in the general population and diabetic patients (6-12). Knee OA was the most common and frequent in diabetics, because the majority of our patients was elderly (mean age was 61 years) and female (women represent 76% of our population), and two-thirds of our patients were overweight and obese.

The potential relationship between DM and the development of OA needs to be clarified. At the molecular level, recent studies show the potential contribution of adipokines to the development of OA (13). Based on the fact that the majority of diabetics is obese, the identification of such molecular targets for therapy could be very interesting for this disease.

The most frequent abarticular complication in this study was CTS, observed in (29%) of our patients; however, this was more than the 6.7% reported by Attar and al (14). In the literature, CTS is observed in up to 20% of patients with diabetes (15). Adhesive capsulitis was observed in 23% of our patients, less than the 25% reported from a British cohort (16).

Vascular complications are another important predisposing factor. We found a significant association between certain articular and abarticular manifestations and vascular complications. Diabetic retinopathy and neuropathy were the most significant predictors of rheumatic disease. Thus, patients with diabetic retinopathy were more likely to develop CTS ($p<0.0001$), Dupuytren's disease ($p=0.01$), and neck OA ($p=0.03$). Diabetic neuropathy increases the risk of developing adhesive capsulitis of the shoulder ($p=0.004$) and OA of the knee ($p=0.007$).

Over the past years, it has been shown that the most important predictor of the development of rheumatic complications in diabetes is blood glucose control (17-21). In our study, there was no significant association between blood glucose control and articular or abarticular manifestations. This is in line with the findings of Thomas (20) and Attar (14) but contradicts the results obtained in a British cohort that demonstrated a strong association between rheumatic manifestations and poor blood glucose control (16). However, we found a significant association between poor therapeutic adherence and adhesive capsulitis of the shoulder ($p=0.01$). Consequently, with good therapeutic adherence, the symptoms and signs of adhesive capsulitis can be ameliorated.

Through this study, we suggest a systematic rheumatologic exam to screen any musculoskeletal complications, which can be potentially treatable, especially if diagnosed early. We encourage multidisciplinary collaboration between the rheumatologist, endocrinologist, and physiotherapist. Finally, prospective, case-control, cohort studies are needed to establish the true prevalence of musculoskeletal complications in DM, especially in this era of tighter glycemic control.

Conclusion

This work underlines the large variety of articular and abarticular manifestations in type 2 DM. The rheumatic manifestations associated with DM in Moroccan patients are characterized by the frequency of CTS, adhesive capsulitis, and cheiroarthropathy, with a significant association with vascular complications, like diabetic retinopathy and neuropathy.

The management of such clinical conditions requires multidisciplinary team effort to diagnose them, since early diagnosis leads to a better outcome.

Ethics Committee Approval: Ethics committee approval was received for this study from the Local Research Ethics Committee.

Informed Consent: Informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author contributions: Concept - F.E.A., G.S.H., F.A., T.H.; Design - F.E.A., G.S.H., S.B.E., H.H.; Supervision - F.E.A., F.A., T.H.; Materials - F.E.A., N.A., G.S.H., S.Ba., S.Be., H.H.; Data Collection&/or Processing - G.S.H., S.Ba., S.Be., H.H.; Analysis&/or Interpretation F.E.A, G.S.H., S.Ba., S.Be., H.H.; Literature Search - F.E.A., N.A., G.S.H., S.Ba., S.Be., H.H.; Writing - F.E.A., N.A., G.S.H.; Critical Reviews - F.A., T.H.

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