Prevalence of diabetes mellitus in patients with shoulder symptoms is low

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ABSTRACT

INTRODUCTION: Patients with diabetes mellitus have a high risk of developing symptoms from their shoulder. The generally accepted theory is that high blood glucose levels cause excessive glycosylation and that the delay in diagnosing diabetes mellitus may influence the risk of acquiring a musculoskeletal disorder. The aim of the study was to determine whether there was a large percentage of undiagnosed diabetes mellitus in a population of patients with shoulder symptoms. MATERIAL AND METHODS: The study population consisted of patients who were referred by their GP with shoulder symptoms. HbA1c level was measured, and height, weight, sex, age and diabetes status were registered. Patients with shoulder symptoms were compared to a group of patients who had been referred with knee symptoms and to the regional prevalence of unknown and diagnosed diabetes mellitus. RESULTS: A total of 221 patients with shoulder symptoms were included. There was no significant difference in the prevalence of unknown diabetes mellitus between the group of patients with shoulder symptoms and the group of patients with knee symptoms or the regional prevalence. There was a significantly higher prevalence of diagnosed diabetes mellitus in the group of patients with shoulder symptoms. CONCLUSION: The low prevalence of unknown diabetes mellitus we observed in this study may be owed to the fact that upper extremity disorder often occurs years after onset of diabetes, and for that reason patients have already been diagnosed when the extremity disorder present. This study demonstrates a higher prevalence of diagnosed diabetes mellitus among patients with shoulder symptoms. It is important for physicians to be aware of this in the treatment of patients with shoulder symptoms. FUNDING: not relevant. TRIAL REGISTRATION: not relevant.

The prevalence of diabetes mellitus is high in both developing and developed countries, and it is estimated that it increases rapidly worldwide [8]. Patients are often diagnosed with diabetes years after its onset [9], which have led some authors to conclude that the diagnostic delay – which is associated with a long period of poor glycaemic control – may influence the risk of acquiring a musculoskeletal disorder of the shoulder [1, 2]. Presumably, early diagnosis of diabetes mellitus – and therefore glycaemic control – may reduce the risk of long-term chronic disability of the shoulder as well as other complications. A population study in Denmark has shown that the prevalence of type 2 diabetes is high and that two out of three go undiagnosed [10]. The aim of this study was to investigate the percentage of undiagnosed or diagnosed diabetes mellitus cases in a population of patients with shoulder symptoms.

MATERIAL AND METHODS

We conducted a cross-sectional study in which newly referred patients had their HbA1c level measured. The inclusion period ran from February to September 2012. The study was set-up to compare two groups of patients: a group with shoulder symptoms (PSS) and a group with knee symptoms (PKS). The patients with knee symptoms were chosen as a control group as diabetes is not associated with symptoms from the knee.

Inclusion criteria were all patients whose general practitioner had recently referred them to the Orthopaedic Department at Hospital of Lillebaelt, Vejle Hospital, due to symptoms of either the shoulder or knee. The exclusion criteria were: injection with corticosteroids within the past four months, age under 18 years, not being able to read or understand Danish, not being a Danish citizen, mental disorder, pregnancy, and musculoskeletal disorder in both the shoulder and the knee.

Information about the study was mailed to patients two weeks before their visit to the hospital. Upon arrival they were informed about the study by a physician, a chiropractor or a physiotherapist. If they agreed to participate, the patient’s age, sex, weight, height, and known diabetes mellitus diagnosis were recorded. For patients with shoulder symptoms, we registered the
diagnosis made by the physician, chiropractor or physiotherapist at the first visit. The patients were then asked to give a blood sample to measure their HbA1c level by high-performance liquid chromatography. An HbA1c level above 6.5% (International Federation of Clinical Chemistry standard (IFCC) ≥ 48 mmol/mol) was set as the cut-off point for diagnosing diabetes mellitus. Patients with an HbA1c level above 6.0% (IFCC ≥ 42 mmol/mol) were defined as having an elevated HbA1c level and a high risk of developing diabetes mellitus.

All patients gave their written consent before taking part in the survey, and the protocol was approved by the local ethical committee and the Danish Data Protection Agency.

The PSS group was matched 1:5 (on age and body mass index (BMI)) with a similar group from a research database containing information about 5,222 randomly selected inhabitants from the county of Vejle where the Hospital of Lillebælt, Vejle Hospital, is situated. The inhabitants who were invited to be included in the database were randomly picked by a programme using their civil registration number. The database contains information, among others, on HbA1c level measured at the time of inclusion, weight, height, and sex. Approximately 40% of the inhabitants who were invited agreed to participate.

Prevalence of unknown diabetes mellitus
Four patients (2%) who had not previously been diagnosed with diabetes mellitus in the PSS group were found to have an HbA1c level above 0.065. In the PKS group, only one (0.5%) patient without known diabetes mellitus was found to have an HbA1c level above 0.065. The difference was not significant (p = 0.37), Table 1.

Prevalence of diagnosed diabetes mellitus
In the PSS group, 20 patients (9%) were diagnosed with diabetes mellitus before their visit to the clinic. This was significantly more than in the PKS group where only six patients (3%) were diagnosed with diabetes mellitus.
The study has shown that there is a low prevalence of undiagnosed diabetes, but a high prevalence of diagnosed diabetes mellitus in patients with shoulder symptoms, which is consistent with other reports which have shown a high prevalence of shoulder symptoms in patients with diabetes mellitus [1-4, 12].

Much to our surprise, we did not find a higher proportion of unknown diabetes mellitus in patients with shoulder symptoms than in patients with knee symptoms or in the general population. Limited joint mobility, which is common for most patients with shoulder symptoms, normally only occurs after years with a high glucose level [1, 13, 14], which may possibly explain why only a few patients in the shoulder group remained with an undiagnosed diabetes while there was a high prevalence of patients with diagnosed diabetes.

The reason for the low prevalence may be that the awareness of diabetes and the importance of early diagnosing may have increased during the past decade reducing the prevalence of unknown diabetes in Denmark as compared to the prevalence observed in 2003 [10].

Diagnosis of unknown diabetes is of much importance as early treatment can reduce the risk of complications. Patients with shoulder symptoms are often treated with injections of corticosteroid which can have serious adverse effects in patients with diabetes mellitus. Therefore it is of great importance to be aware of the observed higher prevalence of diabetes in the treatment of patients with shoulder symptoms, but we did, however, not find sufficiently strong reasons to recommend the implementation of standard testing for diabetes of all patients with shoulder symptoms.

A limitation of the present study was that 33% of the eligible patients declined to participate. As a result of this, we cannot exclude that self-selection may have occurred, which possibly caused either an overrepresentation of individuals with an interest in diabetes mellitus or an underrepresentation of individuals with a high risk of diabetes mellitus, and an apprehension towards being diagnosed with diabetes mellitus.

Another limitation of this study is that we did not exclude shoulder symptoms that are not directly associated with diabetes mellitus. The reason why we included all patients with shoulder symptoms was that limited joint mobility is common among almost all patients referred with shoulder symptoms and that the aim of the study was to investigate the prevalence of unknown diabetes in patients with shoulder symptoms regardless of their diagnosis. However, this inclusion of all patients with shoulder symptoms might lead to an overrepresentation of individuals who do not have a high risk of diabetes mellitus because their shoulder disability is not directly associated with diabetes, e.g. bankart lesion, shoulder impingement, etc. Further research into those shoulder symptoms which are directly related with diabetes, e.g. frozen shoulder [15], is needed to elucidate the association between the shoulder symptoms and the prevalence of unknown diabetes, the duration and the type of diabetes. Investigation of these questions calls for larger sample sizes and multicentre trials.

CONCLUSION
The prevalence of undiagnosed diabetes in patients with shoulder symptoms is not higher than the prevalence in patients with other symptoms or than prevalence in the general population. However, there is a high prevalence of diagnosed diabetes mellitus among patients with shoulder symptoms. This may possibly be explained by the fact that limited joint mobility only occurs years after the onset of diabetes why patients have often been
diagnosed with diabetes before they experience symptoms from their shoulder. As patients with shoulder symptoms are often treated with injections of corticosteroids, we stress the need for awareness of the high prevalence of diabetes (>10%) in this group of patients.

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ACCEPTED: 17 July 2013

CONFLICTS OF INTEREST: none. Disclosure forms provided by the authors are available with the full text of this article at www.danmedj.dk

ACKNOWLEDGEMENTS: We would like to express our gratitude to Aneta Aleksandra Nielsen and Henry Christensen, Laboratory Centre, Hospital of Lillebælt, Vejle Hospital, for their analysis of the data from matched controls in the general population.

LITERATURE