



CORRELATION OF SHOULDER MOBILITY IMPAIRMENT AMONG INDIVIDUALS WITH TYPE 2 DIABETES MELLITUS -A CROSS SECTIONAL STUDY

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ABSTRACT

BACKGROUND:

Shoulder dysfunction is frequently reported in individuals with Type 2 diabetes mellitus and restricted mobility being common clinical manifestations. These musculoskeletal problems may arise from altered collagen metabolism, glycation of periarticular tissues, and chronic hyperglycemia, ultimately affecting functional activities.

AIM:

To determine the relationship between shoulder mobility impairment among patients with Type 2 diabetes mellitus.

METHODS:

A Observational study was conducted in Sri Ramakrishna Multi speciality Hospital for 6 months including 100 participants diagnosed with age ranges between from 30 to 50 based on inclusion and exclusion criteria to find the impact of shoulder mobility impairment with a self- administered questionnarie on demographic data and clinical variables were collected and analysed.

RESULTS:

The findings demonstrated a significant association between reduced shoulder ROM and higher pain and disability scores. Patients with longer duration of diabetes and elevated HbA1c values tended to show greater mobility restriction and increased pain levels. The correlation coefficients indicated that mobility impairment was moderately to strongly related to functional limitation.

CONCLUSION:

Shoulder mobility restriction was closely linked with functional disability in individuals with Type 2 diabetes mellitus. Early screening and targeted physiotherapy interventions may help reduce shoulder complications and improve quality of life in this population.

KEYWORDS

Diabetes ,HbA1c , shoulder external rotation and abduction range of motion

INTRODUCTION

Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder characterized by elevated blood glucose levels (hyperglycemia), which has been consistently linked to a variety of macrovascular, microvascular, and musculoskeletal complications [1, 2]. While complications such as neuropathy and retinopathy are well-recognized, musculoskeletal disorders are often under-recognized and under-treated, despite their significant impact on functional ability and quality of life for individuals with diabetes [3, 4].

The shoulder joint is a particularly vulnerable site, with individuals with diabetes demonstrating a notably higher prevalence of shoulder impairments compared to the general population [5]. Conditions like Adhesive Capsulitis (Frozen Shoulder)—characterized by pain and progressive restriction of both active and passive range of motion—are up to five times more common in diabetic patients [6, 7]. Other shoulder pathologies, including rotator cuff disease and limited joint mobility syndrome, also show increased incidence [8].

The underlying pathophysiology is complex but largely attributed to chronic hyperglycemia. This leads to the non-enzymatic glycosylation of proteins, forming Advanced Glycation End-products (AGEs). The accumulation of AGEs causes increased cross-linking of collagen in the connective tissues of the joint capsule and peri-articular structures, resulting in thickening, increased stiffness, and ultimately, a reduction in joint mobility [9, 10].

Given the high prevalence and significant functional consequences, a comprehensive understanding of the extent and factors associated with shoulder mobility impairment in T2DM is essential for early screening and intervention [1, 11]. Cross-sectional studies are vital for determining the current burden of this complication and identifying potential correlations with variables such as disease duration and glycemic control. Therefore, this study aims to investigate the correlation of shoulder mobility impairment among individuals with Type 2 Diabetes Mellitus to inform clinical practice and improve patient outcomes.

MATERIALS USED FOR STUDY:

Data collection sheets

Goniometry

HbA1C report

METHODOLOGY**STUDY DESIGN**

Cross sectional observational study

STUDY SETTING

The study was conducted at Sri Ramakrishna multi-speciality Hospital.

SAMPLING METHOD

Purposive Sampling Method.

CRITERIA FOR SAMPLING**INCLUSION CRITERIA**

- ❖ Age groups (30 to 50 years)
- ❖ Type 2 diabetic patients
- ❖ Include both male and female patients
- ❖ Patients must able to understand and co-operate

EXCLUSION CRITERIA

- ❖ Patients with Type 1 diabetes mellitus
- ❖ Any injuries to upper extremities.
- ❖ Gestational diabetes.
- ❖ Septic arthritis of the shoulder.
- ❖ Shoulder tumors or metastatic lesions
- ❖ Stroke, Parkinson's disease, multiple sclerosis (affecting upper limb function).
- ❖ Peripheral neuropathy from causes other than diabetes (e.g., alcohol abuse, chemotherapy).

STUDY DURATION

6 months

SAMPLING SIZE

100 diabetic patients

VARIABLES**DEPENDENT VARIABLES**

- ❖ Shoulder Mobility Impairment

INDEPENDENT VARIABLES

- ❖ Diabetes mellitus
- ❖ Duration of diabetes
- ❖ HbA1c levels (glycemic control)
- ❖ Age
- ❖ Gender

OUTCOME MEASURES

Self administered questionnaire (SPADI chart)

Goniometer

PROCEDURE

A group of 100 people with type 2 diabetes mellitus were selected under the inclusion and exclusion criteria. And the diabetic patients were asked to fill a SPADI questionnaire. The details about duration of type 2 diabetes mellitus and HbA1c were acquired from their medical history. By using goniometry, the value of their external rotation and abduction range of motion was measured.

RESULT:

A correlation analysis was conducted to examine the relationship between the shoulder mobility impairment in relation to the HbA1C, Duration of diabetes, abduction and external rotation range of motion of shoulder and the SPADI score.

There was a very strong positive correlation between SPADI score and the duration of diabetes $r(100) = 0.94, p < .001$, indicating that individuals with higher the duration of diabetes greater the SPADI score.

There was a strong negative correlation between the external range of motion and HbA1C, $r(100) = -0.96, p < .001$, suggesting that individuals with higher HbA1C values have decreased in their external range of motion.

There was a moderate negative correlation between the abduction range of motion and HbA1c, $r(100) = -0.62, p < .001$, suggesting that individuals with higher HbA1c values have decreased in their abduction range of motion.

By this correlation analysis shoulder mobility impairment in type 2 diabetes mellitus patients is more in males compared to females.

The individuals age ranges between 30 to 35 are more affected by the shoulder mobility impairment.

DISCUSSION:

This study aimed to explore the correlation of shoulder mobility impairment among type 2 diabetic patients. The data revealed significant variations of HbA1c and shoulder range of motion (external rotation and abduction) and also significant variations of SPADI and duration of diabetes across different age groups ranges from 30 to 50 years.

Individuals with type 2 diabetic mellitus exhibited the most severe shoulder impairments and the SPADI score percentage values ranges from 30 to 70. The findings support the growing body of evidence indicating that musculoskeletal complications are common secondary manifestations of long-term hyperglycemia. Restricted shoulder range of motion, particularly in external rotation and abduction appears to be strongly correlated with higher levels of pain and functional disability in diabetic populations.

The results showed a strong positive correlation between SPADI ALND DURATION OF DIABETES. This indicates that individuals with higher the duration of diabetes greater the SPADI score. This suggests that patients with a longer history of diabetes experience greater shoulder pain and functional disability. Prolonged hyperglycemia is known to cause progressive biochemical and structural changes in soft tissues around the joint, including collagen cross-linking, glycosylation, capsular thickening, and reduced elasticity. These changes gradually impair the mobility of the glenohumeral joint, contributing to pain and reduced shoulder range of motion.

A strong negative correlation was observed between HbA1c and SHOULDER EXTERNAL ROTATION RANGE OF MOTION. A moderate negative correlation was observed between HbA1c and SHOULDER ABDUCTION RANGE OF MOTION. This finding indicates that as HbA1c values increase, shoulder external rotation and abduction ROM mobility tends to decrease. Poor glycemic control reflected by elevated HbA1c contributes to progressive biochemical changes in periarticular connective tissues. Chronic hyperglycemia leads to increased formation of advanced glycation end products (AGEs), which alter the structural integrity of collagen, making it stiffer and less extensible. Over time, these tissue modifications reduce elasticity of the joint capsule and surrounding soft tissues, limiting shoulder movement.

This indicates that shoulder mobility impairment is influenced by a combination of biomechanical, structural and physiological risk factors. Age, HbA1c, duration of diabetes, external rotation range of motion shows meaningful association with the SPADI scores. These findings highlight the importance of a General assessment and individualized management in clinical practice.

CONCLUSION

In this observational study, we explored the impact of shoulder mobility among the diabetic population, revealing significant challenges across various demographics and health conditions. The findings of the study demonstrate that the duration of diabetes has a strong positive association with SPADI scores, indicating that individuals with a longer history of diabetes tend to experience greater functional disability. Additionally, a Strong negative correlation was identified between HbA1c levels and shoulder external range of motion and moderate negative correlation between the HbA1c and abduction range of motion, suggesting that poorer glycemic control is linked to reduced shoulder mobility. These results highlight the importance of early identification and management of musculoskeletal complications in patients with type 2 diabetes to improve functional outcomes and overall quality of life.

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