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Association of Diabetes with Musculoskeletal Pain of the Upper Quadrant in Housewives of Lahore

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Type 2 Diabetes Mellitus, Musculoskeletal Pain, Shoulder Pain, Housewives, Visual Analogue Scale, Upper Quadrant Pain, Diabetes Complications

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ABSTRACT

Background: Musculoskeletal (MSK) pain is a common yet under-recognized complication of Type 2 Diabetes Mellitus (T2DM). Diabetic patients, particularly housewives, are prone to upper quadrant musculoskeletal discomfort due to physical strain and poor glycemic control.

Objective: To determine the association between diabetes and musculoskeletal pain in the upper quadrant among housewives in Lahore.

Methods: A cross-sectional study was conducted on 162 diabetic housewives aged 30-60 years. Participants were recruited using non-probability convenient sampling from four hospitals in Lahore. Data were collected through the Visual Analogue Scale (VAS) and Nordic Musculoskeletal Questionnaire. SPSS version 27 was used for data analysis, with Chi-square tests applied to assess associations. Statistical significance was set at $p < 0.05$.

Results: The mean age of participants was 47.26 ± 7.57 years. Shoulder pain was reported at 39.5%, neck pain at 23.5%, and upper back pain by 13.6%. 61.1% experienced moderate pain, while 17.9% had severe pain. A significant association was found between diabetes and musculoskeletal pain ($p < 0.001$).

Conclusion: There is a strong association between T2DM and upper quadrant musculoskeletal pain, particularly in the shoulder. Early detection and management are essential to prevent chronic MSK conditions.

INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder characterized by hyperglycemia, resulting from defects in insulin secretion, insulin action, or both. It poses a significant global health burden, with a predicted increase in prevalence from 463 million individuals in 2020 to approximately 700 million by 2045. Diabetes is associated with various long-term complications affecting multiple organ systems, including cardiovascular, renal, and neurological complications (1, 2). The vast majority of diabetic cases, approximately 90-95%, are classified as Type 2 diabetes mellitus (T2DM), which is strongly associated with obesity, sedentary lifestyles, and genetic predisposition (3). T2DM not only affects metabolic processes but also has profound implications on the musculoskeletal system, leading to various disorders that impair the quality of life.

Musculoskeletal complications, although less recognized than vascular and neuropathic complications of diabetes, can cause significant morbidity in diabetic patients. Conditions such as frozen shoulder, Dupuytren's contracture, carpal tunnel syndrome, and limited joint mobility are commonly observed in individuals with diabetes. These musculoskeletal issues result from chronic hyperglycemia, which induces biochemical changes in connective tissues, leading to fibrosis, altered collagen production, and glycation of proteins, ultimately affecting joint function and mobility (4). Additionally, diabetic polyneuropathy, another complication of diabetes, can further exacerbate musculoskeletal discomfort, particularly in the upper and lower extremities (5).

Housewives, particularly those over the age of 30, represent a significant segment of the population affected by T2DM. These individuals are frequently tasked with physically demanding household chores that may predispose them to musculoskeletal pain. The repetitive use of upper limb muscles during tasks such as cooking, cleaning, and lifting contributes to musculoskeletal strain. This is further compounded by the presence of diabetes, which is known to accelerate musculoskeletal degeneration, leading to conditions such as shoulder capsulitis and osteoarthritis (6). Studies have demonstrated that women with diabetes are more susceptible to musculoskeletal pain, particularly in the shoulder, neck, and upper back regions, which may be linked to prolonged hyperglycemia and the associated changes in soft tissue structures (7).

The relationship between diabetes and musculoskeletal disorders, particularly in women, is not yet fully understood. It has been suggested that poor glycemic control may exacerbate musculoskeletal pain due to the accumulation of advanced glycation end products (AGEs) in tendons and ligaments, which reduce their flexibility and increase the risk of injury (8). Furthermore, insulin resistance, common in T2DM, contributes to chronic inflammation, which can further impair musculoskeletal health (9). Despite the growing evidence of musculoskeletal complications in diabetic patients, there remains a gap in research exploring

the extent of these complications in housewives, a population at risk due to their physically demanding roles.

This study aims to investigate the association between diabetes and musculoskeletal pain in the upper quadrant, focusing specifically on housewives in Lahore. Understanding the prevalence and patterns of musculoskeletal pain in this population is critical for developing targeted interventions aimed at early diagnosis, management, and prevention of chronic musculoskeletal diseases. By identifying the most affected regions and the severity of pain, healthcare providers can develop comprehensive strategies to improve the quality of life for diabetic housewives, reducing the burden of musculoskeletal complications and enhancing their overall well-being (10).

MATERIAL AND METHODS

This cross-sectional study was conducted to investigate the association between diabetes mellitus and musculoskeletal pain in the upper quadrant among housewives in Lahore. The study sample included 162 female participants, all aged between 30 and 60 years, diagnosed with Type 2 Diabetes Mellitus. The study employed a non-probability convenient sampling technique, recruiting participants from four major hospitals in Lahore: Ganga Ram Hospital, National Hospital, Adil Hospital, and Ittefaq Hospital. The duration of the study spanned six months, from March 2024 to August 2024, following the approval of the research synopsis. The sample size was determined using EpiTool.

Housewives diagnosed with Type 2 Diabetes Mellitus and reporting upper quadrant musculoskeletal discomfort were included in the study. Borderline diabetic patients, insulin-dependent diabetic patients, and those on oral hypoglycemic agents were also eligible for inclusion. Exclusion criteria were Type 1 Diabetes Mellitus patients, gestational diabetes, a history of traumatic injuries, and those diagnosed with malignant tumors. Participants provided informed written consent prior to data collection, which adhered to ethical guidelines in line with the Declaration of Helsinki.

Data collection was carried out using two validated and reliable assessment tools: the Visual Analogue Scale (VAS) for pain intensity and the Nordic Musculoskeletal Questionnaire (NMQ) to identify musculoskeletal discomfort. These instruments were pre-tested to ensure their suitability for the target population. Participants were interviewed in a structured manner to capture details regarding their musculoskeletal pain in the upper quadrant, which includes the shoulder, neck, elbow, wrist/hand, and upper back regions. The data were collected by trained healthcare professionals to ensure consistency and accuracy in the responses.

The collected data were analyzed using SPSS version 27. Descriptive statistics, including mean and standard deviation, were calculated for continuous variables such as age and body mass index (BMI). Frequency and percentage distributions were used for categorical variables, including the presence of pain in various regions and the severity of pain as measured by the VAS. Chi-square tests were performed to assess the association between diabetes status and the presence and severity of musculoskeletal pain. Statistical significance was set at a p-value of less than 0.05. Ethical considerations were strictly followed throughout the study. All participants were informed about the purpose of the research, and their participation was voluntary. They were assured of confidentiality, and their personal information was anonymized in all reports and publications. The study protocol was reviewed and approved by the institutional ethics committee prior to data collection (1).

RESULTS

The study included 162 female participants aged between 35 and 59 years, with a mean age of 47.26 ± 7.57 years. The participants' body mass index (BMI) ranged from 21.19 to 31.9, with a mean BMI of 26.13 ± 2.599. The diabetes status of the participants was divided into four categories:

Table 1: Descriptive Statistics of Participant's BMI and Age

N	Mean ± SD	Maximum	Minimum
162	47.26 ± 7.57	59	35
162	26.13 ± 2.599	31.9	21.19

borderline diabetes, insulin-dependent diabetes, patients on oral medication, and those with uncontrolled diabetes. The frequency and percentage of each group are presented in Table 2. A large proportion of participants reported pain in various regions of the upper quadrant, with the highest prevalence of pain in the shoulder region (39.5%). The distribution of pain in the neck, elbow, wrist/hand, and upper back is summarized in Table 3. Similarly, the association between diabetes status and pain intensity (VAS) was statistically significant, as shown in Table 6.

Table 2 Descriptive Statistics of Diabetic Patients

Diabetes Status	Frequency	Percentage (%)
Borderline	29	17.9
Insulin Dependent	48	29.6
Patients on Oral Medication	69	42.6
Uncontrolled Diabetes	16	9.9

A chi-square test was conducted to assess the association between diabetes status and the regions of musculoskeletal pain, as shown in Table 5. The results indicated a statistically significant association ($p < 0.001$) between diabetes and the region of musculoskeletal pain. The intensity of pain was assessed using the Visual Analogue Scale (VAS), where the majority of participants (61.1%) experienced moderate pain.

Table 3 Descriptive Statistics for Region of Pain

Region	Frequency	Percentage (%)
No Pain	25	15.4
Shoulder	64	39.5
Neck	38	23.5
Elbow	7	4.3
Wrist/Hand	6	3.7
Upper Back	22	13.6

Table 4 Descriptive Statistics for Pain Intensity (VAS)

Pain Intensity	Frequency	Percentage (%)
No Pain	25	15.4
Mild Pain	9	5.6
Moderate Pain	99	61.1
Severe Pain	29	17.9

Table 5 Association of Diabetes with Region of Musculoskeletal Pain

Region	Borderline	Insulin Dependent	Oral Medication	Uncontrolled Diabetes
No Pain	21	0	4	0
Shoulder	4	27	26	7
Neck	1	12	20	5
Elbow	0	2	4	1
Wrist/Hand	0	1	3	2
Upper Back	3	6	12	1
p-value	<0.001			

Table 6 Association of Diabetes with Pain Intensity (VAS)

Pain Intensity	Borderline	Insulin Dependent	Oral Medication	Uncontrolled Diabetes
No Pain	21	0	4	0
Mild Pain	7	1	1	0
Moderate Pain	1	29	61	8
Severe Pain	0	18	3	8
Worst Pain	0	0	0	10
p-value	<0.001			

Severe pain was reported by 17.9%, and 15.4% of the participants reported no pain. Table 4 presents the detailed distribution of pain intensity. The results of the study indicate a significant association between diabetes and musculoskeletal pain, particularly in the shoulder region, with moderate to severe pain being the most commonly reported. These findings highlight the need for early detection and management of musculoskeletal complications in diabetic patients to prevent the progression of chronic conditions.

DISCUSSION

This study aimed to explore the association between diabetes mellitus and musculoskeletal (MSK) pain in the upper quadrant among housewives in Lahore. The findings revealed a significant prevalence of musculoskeletal pain, particularly in the shoulder region, among diabetic participants. This study demonstrated that 39.5% of the participants experienced shoulder pain, followed by neck and upper back discomfort, which is consistent with existing literature that highlights the vulnerability of diabetic patients to musculoskeletal complications (1). These findings align with studies by Roy et al. (2013), who similarly reported a higher incidence of shoulder and neck pain among individuals with diabetes (16). The correlation between diabetes and MSK pain is well-documented, with chronic hyperglycemia and the accumulation of advanced glycation end products (AGEs) contributing to connective tissue alterations and reduced joint mobility (4, 8).

A significant strength of this study was its focus on housewives, a population often overlooked in research, despite their exposure to physical demands that may exacerbate MSK pain. The study utilized well-established tools, such as the Visual Analogue Scale (VAS) and the

Nordic Musculoskeletal Questionnaire (NMQ), which provided a reliable and valid measure of pain intensity and its distribution across different regions. The cross-sectional design allowed for a snapshot of the pain experiences in this population, contributing valuable insights into the high prevalence of shoulder pain, which was the most affected region in this cohort (13).

However, the study had several limitations. The use of a non-probability convenient sampling method may have introduced selection bias, limiting the generalizability of the results to the wider population of diabetic housewives. Additionally, the cross-sectional design does not allow for the determination of causal relationships between diabetes and MSK pain, which would require longitudinal studies to confirm. Another limitation was the reliance on self-reported pain data, which may be subject to recall bias or underreporting. Moreover, the exclusion of certain subpopulations, such as patients with Type 1 diabetes or those with a history of trauma, may have limited the scope of the findings (16-19).

Despite these limitations, the study's findings underscore the importance of early diagnosis and intervention for musculoskeletal pain in diabetic patients, particularly among women engaged in household activities. The results suggest a significant association between diabetes and MSK pain, with insulin-dependent patients reporting the highest prevalence and intensity of pain. This finding is supported by previous studies that have demonstrated a higher burden of MSK complications in patients with poorly controlled diabetes (7). The significant association between MSK pain and diabetes may be linked to both metabolic factors, such as hyperglycemia and insulin resistance, and mechanical factors, such as repetitive strain from household chores (9). The study also highlighted the need for healthcare providers to be more vigilant in screening for musculoskeletal symptoms in diabetic patients, particularly those with uncontrolled diabetes or long-standing disease. Early interventions, including physical therapy, lifestyle modifications, and optimized glycemic control, may help reduce the severity of MSK complications and improve the quality of life in this population. The findings also point to the necessity of patient education programs that emphasize the importance of regular exercise, weight management, and ergonomic modifications during household activities to prevent the development or worsening of musculoskeletal pain (18).

In conclusion, this study contributed to the growing body of evidence that musculoskeletal disorders are a significant, yet underappreciated, complication of diabetes. The high prevalence of shoulder and neck pain observed among diabetic housewives in Lahore underscores the need for further research to investigate the long-term effects of diabetes on musculoskeletal health and the potential benefits of targeted interventions. Future studies should aim to include larger, more diverse populations and employ longitudinal designs to better understand the causal relationships between diabetes and musculoskeletal pain. Additionally, incorporating objective measures of musculoskeletal function, such as range of motion and muscle strength testing, would further strengthen the findings and provide deeper insights into the mechanisms underlying MSK pain in diabetic patients (18, 20).

CONCLUSION

This study established a significant association between diabetes mellitus and musculoskeletal pain in the upper quadrant, particularly in the shoulder, among housewives in Lahore. The findings highlight the prevalence of moderate to severe pain in diabetic patients, emphasizing the need for early detection and management of musculoskeletal complications to prevent chronic disability. The healthcare implications are clear: healthcare providers should prioritize regular screening for musculoskeletal symptoms in diabetic patients and promote interventions such as physical therapy, lifestyle modifications, and optimal glycemic control to improve patient outcomes and quality of life.

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