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Relationship of Heel Pain and Kinesiophobia In Patients with Diabetes

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Abstract
Introduction: The prevalence of diabetes mellitus varies according to studies conducted worldwide. People with persistent plantar heel discomfort may experience longer-term health issues related to decreased mobility, such as weight gain, hypertension, coronary artery disease, and non-insulin Dependent diabetes mellitus. Many individuals suffer from plantar heel discomfort, which is a common issue that severely lowers their quality of life. there is a strong correlation between plantar heel pain and other musculoskeletal disorders, it is unclear how cognitive (such as pain catastrophizing) and behavioural (such as kinesiophobia) factors relate to this condition, even though affective factors (such as depression and anxiety) play a part in the experience of this pain. It has also been demonstrated that higher levels of kinesiophobia affect physical function for disorders affecting the lower extremities.
Materials and Methodology: For this study, 27participants were approached. The study was conducted using TAMPA scale and FFI in the diabetic patients from various physiotherapy OPD of Surat, and 27 responses were collected. Pearson's correlation test was performed to find relationship of heel pain and kinesiophobia in patients with diabetes.
Result - Result showed that there is positive correlation between TAMPA
scale and FFI.
Conclusion: Study concluded that chronic foot pain in diabetic patients is strongly associated with diabetes patient it's significantly impacts ADL.

Keywords: Kinesiophobia, Heel pain, Diabetes, TSK, FFI

Introduction

The chronic metabolic condition known as diabetes mellitus is typified by hyperglycaemia and abnormalities in the metabolism of proteins, fats, and carbohydrates. It is linked to a complete or partial lack of the hormone insulin's secretion and/or activity [1]. Numerous elements of the modern lifestyle, including a decline in physical activity and the prevalence of high-calorie diets, and the ensuing obesity, contribute to this increase. The population ageing process in developing nations is also a significant factor. A rise in the number of cases of diabetes mellitus will be more noticeable in developing nations due to these different variables. Diabetes raises the chance of dying young mostly because it increases the risk of cardiovascular events. People with persistent plantar heel discomfort may experience longer-term health issues related to decreased mobility, such as weight gain, hypertension, coronary artery disease, and non-insulin-dependent diabetes mellitus. [2] Additionally, diabetics are more likely to experience lower-extremity amputations, kidney illness, and vision issues. [3] Type 1 and type 2 diabetes (formerly known as insulin-dependent diabetes mellitus (IDDM) and non-insulin dependent diabetes mellitus (NIDDM) are the two main types of the disease, according to the most recent WHO classification. Insulin treatment is necessary for type 1 diabetes, which primarily affects children and young people and has an abrupt onset. Numerous studies have shown that a large number of persons in most populations have type 2 diabetes that is not diagnosed [4,5]. According to projections, the number of individuals with diabetes is expected to rise from 171 million in 2000 to 300 million by 2025 and 366 million by 2030. Most of these increases in numbers will take place in emerging nations [6, 7]. More than 90% of cases of diabetes are caused by type 2 diabetes mellitus, and this percentage rises when elderly and urban populations are considered [8]. The musculoskeletal system is one of the systems impacted by type 2 diabetes. By affecting the connective tissue in different ways, type 2 diabetes causes a number of issues with the musculoskeletal system, including Dupuytren's contracture, shoulder capsulitis, flexor tenosynovitis, carpal tunnel syndrome, kinesiophobia, Charcot arthropathy, and limitations in joint range of motion. [9]

Kinesiophobia, or the fear of movement, is particularly common in people who have chronic pain. For fear of experiencing pain, patients refrain from moving [10]. Patients with diabetes, for whom physical activity and a good social life are crucial, may experience more severe issues as a result of this circumstance. Avoiding exercise can make it harder for the patient to control their blood sugar, reduce their chances of keeping a healthy weight, and cause psychological distress, all of which will lead to hyperglycaemia. In this regard, kinesiophobia plays a critical role in the management of DM patients and the avoidance of complications [10, 11]. According to TSK data, those with type 2 diabetes exhibited higher levels of kinesiophobia than people without the disease in a case-control study [11].

Many individuals suffer from plantar heel discomfort, which is a common issue that severely lowers their quality of life [12]. Plantar heel pain is common among runners, and when it occurs in top athletes, it can have a substantial effect on their level of function, possibly requiring a prolonged period of rest and having a significant impact on performance all season long [13]. Furthermore, it has long been recognized that plantar heel pain is very common in the elderly,

affecting almost one in three people over 65 [14]. In terms of pathogenicity, metabolic disorders are known to affect the mechanical characteristics and conformation of tendons, particularly in the Achilles tendon, plantar fascia, and metatarsophalangeal joints, by creating intricate biomechanical structures [15]. Additionally, they contribute to the abnormal distribution of plantar pressure on the foot, which is often seen in diabetic patients since they tend to have elevated forefoot pressure and, as a result, develop the associated lesions. [16-19]

Pain in the medial and/or plantar heel regions that worsens with weight bearing after rest intervals, is made worse by extended standing and walking, and frequently occurs in conjunction with a recent increase in weight-bearing activities is known as plantar heel pain [20]. Many individuals suffer from plantar heel discomfort, which is a common issue that seriously lowers their quality of life [13]. Although there is a strong correlation between plantar heel pain and other musculoskeletal disorders, it is unclear how cognitive (such as pain catastrophizing) and behavioural (such as kinesiophobia) factors relate to this condition, even though affective factors (such as depression and anxiety) play a part in the experience of this pain [21-23].

"Kinesiophobia" is defined as "an excessive, irrational, and debilitating fear of movement and activity coming from a feeling of vulnerability to painful injury or re-injury." Kinesiophobia has been linked over time to depression, functional incapacity, avoidance of physical activity, and a decline in physical condition. [24] Kinesiophobia was described as "A condition in which patients had a fear of physical activity in an excessive, unreasonable and debilitating way, or developed a feeling of a painful injury or re-injury after an activity" by Kori and his colleagues in 1990 when they investigated the connection between chronic pain and physical activity. [25]

The 11-item Tampa Scale of Kinesiophobia (TSK-11) was created by eliminating six questions from the TSK-17 that performed poorly psychometrically in order to increase the clinical implementation's viability [26]. The TSK-11 lacks set standards to help interpretation despite its widespread use due to its brevity. As a result, validation is required to ascertain whether, like the original TSK-17, TSK-11 results are linked to task performance. Although the TSK-17 was first validated in the population with low back pain [26,27], it has also been demonstrated that higher levels of kinesiophobia affect physical function for disorders affecting the lower extremities [28-30].

The number of publications on the connection between kinesiophobia and chronic pain has significantly increased in recent years, highlighting the need of looking into and combining the available research data on this subject. Hence, the need of the study is to find relationship of heel pain and kinesiophobia in patients with diabetes.

Materials and Methodology

This 6-month correlation study utilized a conventional sampling design to recruit 27 diabetic patients, aged 45-65 years, from physiotherapy outpatient departments in Surat, with sample size calculated using G-power 3.1.9.2, considering an effect size of 0.150, α=0.05, 35 were calculated samples and with a 20% dropout rate, it was 27. The literature review conducted on databases including PubMed, Google Scholar, and Sci-Hub. Participants diagnosed with diabetes by a physician, willing to participate, had a Visual Analog Scale (VAS) score between 2-6, and were able to understand Gujarati, with both males and females being eligible for inclusion. Individuals were excluded from the study if they had mental instability or any other musculoskeletal or neurological conditions that could impact their participation or outcomes.

Outcome Measures:

Foot Function Index (FFI) Foot Function Index (FFI) questionnaire, which is frequently used in clinics and for research purposes. It was developed to evaluate the impact of foot pathologies on function in terms of pain, disability, and activity limitation. The questionnaire includes 23 questions, which is divided into 3 subscales: pain (9 questions), disability (9 questions), and activity limitation (5 questions).

Tampa scale of kinesiophobia (TSK)

The Tampa Scale for Kinesiophobia (TSK) is a self-report measure developed to assess ‘fear of movement-related pain’ in patients with Musculoskeletal pain. The 17-item TSK total scores range from 17 to 68 where the lowest 17 means no or negligible kinesiophobia, and the higher scores indicate an increasing degree of kinesiophobia.

Procedure

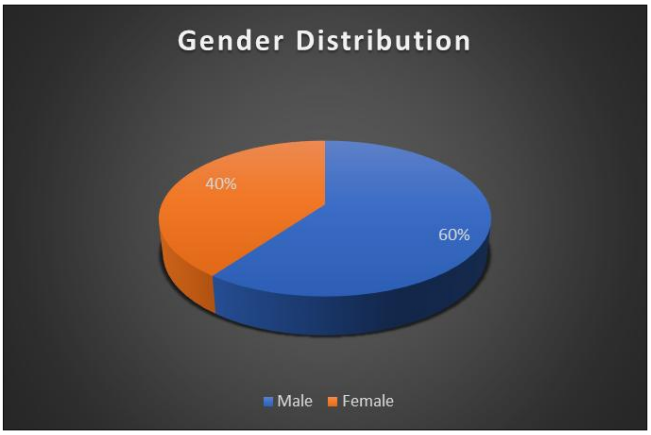
35 participants were approached for the study via assessment form. We received 27 responses. They were screened on the basis of inclusion and exclusion criteria. The questionnaire was explained them via the assessment form in a Gujarat language. The subjects were given a choice whether to agree or disagree with the research in the starting of the assessment form. The forms were made which included TAMPA and FFI scale after which the participants were approached and responses were collected and further evaluated.

Statistical Analysis

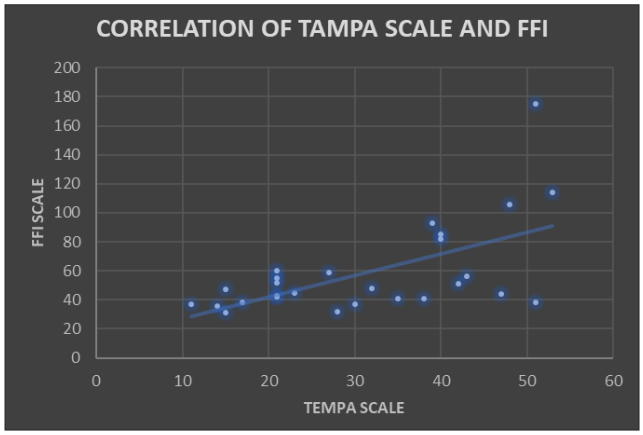
The statistical analysis was performed using SPSS version 22. Descriptive statistics were carried out for FFI, TAMPA. Correlation between Relationship of heel pain and kinesiophobia in patients with diabetes. On the basis of normality Pearson’s correlation test was performed to identify relationship of heel pain and kinesiophobia in patients with diabetes. The level of significance was kept at $p \leq 0.05$.

Results

The study population comprised of 27 normal, healthy individuals of either sex of 45-65 years of age. The distribution of males 60% and females 40% in the study is illustrated in the pie chart 6.1. Graph 6.2 illustrates Mean SD, which was 57.11 7.74 of the age of subjects. Graph 6.3 illustrates Mean SD, which was 25.91 3.53 of the BMI of subjects. Graph 6.4 illustrates Mean SD, which was 5.18 1.64 of the VAS of subjects. Graph 6.5 illustrates Mean SD, which was 31.26 12.97 of TAMPA. Mean SD, which was 58.81 32.20 of FFI scale, is illustrated in graph 6.6. Graph 6.7 illustrates a linear positive correlation between FFI and TAMPA. The correlation was statistically obtained with $p \leq 0.05$.



Graph 1: Illustrates gender ratio via pie chart of the subject.



Graph 2: Illustrates correlation between TAMPA SCALE and FFI

Discussion

The present study was done to find the correlation between heel pain and kinesiophobia in diabetic patients. There was moderately positive correlation found in our study. The main findings of this study show that kinesiophobia is positively related to quality of life and disability.

The study explored the relationship between heel pain and kinesiophobia in diabetic patients, focusing on how chronic pain, particularly in the heel, may contribute to increased fear of movement and activity. Kinesiophobia, defined as the fear of movement due to the anticipation of pain or injury, is common among individuals with chronic conditions like diabetes. Our findings indicate a moderately positive correlation between heel pain and kinesiophobia, suggesting that as heel pain intensifies, patients' fear of movement increases, potentially leading to decreased physical activity and further exacerbation of their condition. This relationship highlights the importance of addressing both pain management and psychological factors, such as kinesiophobia.

In our study examined the relationship between heel pain and kinesiophobia in diabetic patients, yielding a moderately positive correlation ($r = 0.59$) between the two variables. The findings suggest that diabetic patients experiencing heel pain tend to exhibit increased levels of kinesiophobia, as measured by the Tampa Scale of Kinesiophobia (TSK). Although the relationship was not extremely strong, the results imply that kinesiophobia may play a role in the pain experience and disability associated with heel pain in diabetic patients. These findings highlight the importance of considering psychological factors, such as fear-avoidance beliefs, when managing heel pain in diabetic patients, and suggest that physiotherapists may need to incorporate strategies to address kinesiophobia into their treatment plans.

Our findings also suggest that kinesiophobia may play a role in the experience of heel pain in diabetic patients, but other factors may also contribute to this complex relationship. For instance, diabetic patients with heel pain may experience increased anxiety and fear, which can exacerbate kinesiophobia. Additionally, the presence of neuropathy, a common complication of diabetes, may affect pain perception and contribute to kinesiophobia.

Research has shown that kinesiophobia can lead to reduced mobility, decreased physical activity, and increased risk of developing secondary complications. The relationship between the development of T2DM and environmental factors, metabolic parameters, nutritional habits and physical activity has been demonstrated by many studies [3]1-3[4].

In a case-control study of Okur I., et al., it was observed that individuals with T2DM had higher levels of kinesiophobia than non-diabetic participants, as determined by TSK results [35] that supports our study. In the analyses of another study by Geelen C., et al. that included 154 patients with neuropathic pain, it was shown that diabetic neuropathy pain and fear of movement had a close relationship. It has been stated that the intensity and duration of pain and the presence of fear of falling reduce quality of life in patients with diabetic neuropathy. It was also found that pain intensity, male sex, and fear of falling were positively correlated with inactivity. As a result, it was emphasized that patients with diabetic neuropathy may have fears concerning movement, falls and pain, and that the quality of life of patients may decrease due to these fears; interestingly, the study reported no significant relationship between age and kinesiophobia [36] that supports our study.

Turhan A also found TSK scores to be significantly higher in the T2DM group, which supports previous studies in this regard; however, regression revealed that the presence of T2DM was not a factor that increased TSK scores. It was seen that TSK scores showed a positive correlation with age and BMI. Therefore, the management approach to older T2DM patients with obesity should include evaluation of kinesiophobia, especially when painful comorbidities are present [37]. That supports our study.

Hence this study found moderate positive correlation of foot pain with kinesiophobia in patients with diabetes.

Conclusion

Our study concluded that chronic foot pain in diabetic patients is closely associated with kinesiophobia, the fear of movement, which significantly impacts their daily functioning. This fear often leads to a reduction in physical activity, as individuals avoid movement due to concerns about exacerbating their pain. Over time, this lack of activity can contribute to musculoskeletal problems, further impairing mobility. As a result, the overall quality of life declines, with increased risks of falls and injury. These interconnected factors highlight the importance of addressing both the physical and psychological aspects of chronic foot pain in diabetic patients to prevent further deterioration in health and well-being. Early detection and early screening to be done by healthcare providers to preventing complication and improve QOL.

Here sample size is very small. This study is limited only among young adults of 45-65 age group people. The sampling method was convenient so the affected population was not able to be excess properly. Future research can include a large sample size and can be conducted in wide range of area.

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