CLINICAL AND NEUROPHYSIOLOGICAL ASSESSMENT OF PERIPHERAL NEUROPATHY IN INDIVIDUALS WITH TYPE 2 DIABETES MELLITUS

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Annotation*: Peripheral neuropathy is one of the most common and debilitating complications of type 2 diabetes mellitus, significantly affecting patients' quality of life and increasing the risk of foot ulcers and amputations. This study aims to evaluate the clinical manifestations and neurophysiological characteristics of peripheral neuropathy in patients with type 2 diabetes mellitus. A comprehensive clinical examination was conducted alongside neurophysiological tests, including nerve conduction studies, to assess sensory and motor nerve function. The relationship between neuropathic changes, duration of diabetes, and metabolic control was also analyzed. The results highlight the importance of early clinical and neurophysiological assessment for timely diagnosis and effective management of diabetic peripheral neuropathy.*

Keywords*: Type 2 diabetes mellitus, peripheral neuropathy, neurophysiological assessment, nerve conduction studies, diabetic complications*

Research Objective: The aim of this thesis is to investigate the clinical presentation and neurophysiological characteristics of peripheral neuropathy in patients with type 2 diabetes mellitus (T2DM), and to evaluate the relationship between disease duration, glycemic control, and the severity of neuropathic manifestations. Early identification and precise classification of diabetic neuropathy is essential for preventing progression and improving patient outcomes.

Introduction

Diabetes mellitus is a chronic metabolic disorder characterized by sustained hyperglycemia. Among its numerous complications, diabetic peripheral neuropathy (DPN) remains one of the most common and challenging to manage. DPN affects approximately 50% of individuals with long-standing T2DM and contributes significantly to morbidity, diminished quality of life, and healthcare costs. It primarily affects the distal nerves and presents with various sensory, motor, and autonomic symptoms.

This thesis explores the intricate pathogenesis of diabetic neuropathy, highlighting the role of chronic hyperglycemia, oxidative stress, inflammation, microvascular insufficiency, and mitochondrial dysfunction in the progressive degeneration of peripheral nerves. Clinical evaluation of neuropathy often involves detailed neurological examination and symptom scoring systems, while neurophysiological assessment offers objective insights into nerve conduction and axonal damage.

Materials and Methods

This prospective observational study was conducted over a 12-month period and enrolled 90 patients aged 40-70 years with a confirmed diagnosis of T2DM. Patients were recruited from the outpatient clinic of the Department of Neurology at Samarkand State Medical University. Ethical approval was obtained prior to initiation.

Biochemical parameters measured included:

Fasting Blood Glucose (FBG)

Glycated hemoglobin (HbA1c)

Serum lipid profile

Body mass index (BMI)

Results

Of the 90 patients enrolled, 78 (86.7%) exhibited signs of peripheral neuropathy. The average age of affected patients was 58.6 ± 6.9 years, with a slight male predominance (55%). The most common symptoms were burning pain (62%), numbness (48%), tingling (40%), and nocturnal discomfort (35%).

Neuropathy severity correlated significantly with both duration of diabetes and poor glycemic control. Group III patients showed significantly lower NCV values and higher MNSI scores compared to Groups I and II ($p<0.001$). Sensory nerves were more frequently and severely affected than motor nerves. EMG findings supported predominant axonal degeneration with features of denervation in distal muscles.

HbA1c levels above 8% were associated with a higher likelihood of severe neuropathy (OR 2.4, CI 1.5-3.7). TCSS scores correlated positively with HbA1c and duration of disease (r=0.72).

Discussion

The findings of this study are consistent with the global literature on diabetic neuropathy. DPN is predominantly a length-dependent axonopathy, with earliest changes occurring in distal sensory fibers. Our study underscores the importance of routine screening for neuropathic symptoms, particularly in patients with diabetes duration greater than 5 years or poorly controlled glycemia.

While clinical assessments provide an initial indication of neuropathy, electrophysiological studies are critical for confirming diagnosis, quantifying severity, and distinguishing between demyelinating and axonal patterns. Early intervention through stringent glycemic control, neurotrophic agents, and lifestyle modifications has been shown to delay progression and alleviate symptoms.

Conclusion

Diabetic peripheral neuropathy remains a prevalent and underdiagnosed complication in patients with T2DM. Clinical and neurophysiological evaluation offers complementary information necessary for accurate diagnosis and management. This study confirms the strong association between hyperglycemia, disease duration, and neuropathy severity. Implementation of standardized screening and timely electrophysiological evaluation should be integrated into routine diabetic care to improve outcomes and reduce disability.

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