CASE REPORT

Need For Early Diabetic Peripheral Neuropathy Screening among Public Transport Professionals – A Case Report

Shashi Kumar 1, Karthik Rao 2, Arun G Maiya 3, H Manjunath Hande 2, Animesh Hazari 1

Introduction

Diabetes mellitus is a metabolic disorder characterized by hyperglycemia, which results from defects in insulin secretion, insulin action, or both. Deficiency in insulin leads to chronic hyperglycemia with disturbances of protein, carbohydrate and fat metabolism. 1) Most of the diabetics belong to developing countries with the age range of 40-60 years at a higher risk of developing complications related to diabetes 2). The changing lifestyle, decreased physical activity and dietary habits clearly signify that there is a shift in the global epidemiology of type 2 diabetes and its complications like neuropathy, retinopathy and nephropathy, myocardial infarction and stroke or even mortality. 3) Diabetic peripheral neuropathy is the most frequently occurring complication in type 2 diabetes. Peripheral neuropathy affects up to 50-70% of the population with diabetes. 3) The presence of autonomic neuropathy dramatically shortens the patients’ longevity and increases the mortality. Loss of sensation in the lower limbs is a high risk for foot ulcers and limb amputation, which occurs in 1–2% of diabetic population. 4) Diabetes mellitus and its complications like peripheral neuropathy does not spare any professionals including doctors, businessmen, teachers, and road transport drivers etc. Road transport drivers are among the professional groups whose activities have a strong impact on public safety. Road transport drivers like passenger transport operations and truck driving are closely associated with the responsibility for other people’s lives. 5) In view of the nature of their professional activity, which involves exposure to stress, a sitting working mode, and a shift and night work, the drivers are at a higher risk for developing diabetic complications as most of the drivers don’t follow appropriate diabetes foot care due to their busy professional schedule. 6) This can increase the risk for traffic accidents due to loss of sensation and proprioception of the feet while driving public vehicles as a result of peripheral neuropathy. Therefore the purpose of this case study is to emphasise the need for early screening for diabetes and its complications among public transport professionals.

Case report: A 47 year male, a public transport driver with known case of type 2 diabetes since 12 years on oral hypoglycaemic agents (Tab. Metformin 100mg twice daily and tab. Glimepiride 2mg twice daily) presented with complains of inability to sense the accelerator and breaks while driving due to gradual progressive loss of sensations in both feet since past 2 years. Blood investigations revealed uncontrolled blood glucose levels with HbA1c 10.2%. Patient’s vital signs were stable with peripheral pulses well appreciated. Clinical examination revealed clinical features of severe diabetic peripheral neuropathy with Michigan neuropathy screening instrument score (MNSI) was 8 with...
complete loss of touch sensation, vibration sensation, loss of proprioception and ankle jerk reflex were absent. Nerve conduction studies showed severe sensory motor axonal neuropathy in upper and lower limbs. Screening for complications of diabetes revealed mild-moderate diabetic retinopathy in both eyes. Urine for protein was negative. Arterial Doppler of bilateral lower limb showed no evidence of peripheral vascular disease. Echocardiography showed normal biventricular systolic function with no regional wall motion abnormalities detected.

Baseline clinical evaluation revealed absence of protective sensation, pain on the Visual analogue scale score was 8, Michigan neuropathy screening score was 7.5, and Vibration perception threshold using Biothesiometer was 47V. Patient was counselled regarding the need for insulin and started on injection Glargine and tab Vildagliptin 50mg added at lunch time for post prandial sugar control and Self-foot care education was given followed by Low level laser therapy (LLLT). LLLT was irradiated with dosage of 3.4J/cm² [EC LASER- wavelength 632.8nm, power output 30mw (Figure 1 and 3), & Thor Laser diode 830nm, 6minutes each site (Figure 2 and 4)] on the plantar and dorsum of foot for 10 days. At the end of 10th day patient was re-evaluated with same clinical evaluation which revealed pain on the Visual analogue scale score was 3, Michigan neuropathy screening score was 3.5, and Vibration perception threshold using Biothesiometer was 24mV.

The problems faced while using accelerator and breaks due to loss of touch and protective sensation was acknowledged and reported to superior authority, which was seriously taken into consideration following which a job modification was suggested. Two months later after his initial presentation, patient had been
Diabetic peripheral neuropathy among drivers

Discussion

The side effects and potential risk superimposed by diabetes and their complications render diabetic subjects a prospective disability with respect to medical fitness to driving profession. Several studies documented the effect of diabetes mellitus causing microangiopathy like retinopathy, nephropathy and peripheral neuropathy. From a driver perspective retinopathy and peripheral neuropathy could be highly dangerous and devastating. Therefore it would be very essential for professionals like public drivers to screen for diabetes and its complication on a regular basis. Presence of diabetic peripheral neuropathy could result in difficulties to gauge pressure on the accelerator, brake or clutch pedals which could ultimately lead to unwanted and dangerous events. In addition impaired vision as a result of diabetic retinopathy could further increase the chances of road traffic accidents. This is a major health and safety concern which should be seriously accounted for. There has been some ignorance regarding the investigations and screening of diabetes and diabetic foot complications in India among various professional groups either due to unawareness or due to lack of specialised screening tools and setup. Health care professionals should be more responsible and careful towards the routine blood investigations of public drivers and similar professions. The drivers need to be educated and made aware of the consequence and complications of diabetes mellitus. They should be motivated for regular monitoring of their blood sugar level especially if they are taking insulin or any hypoglycaemic agent. Pertainning to the context a recent study conducted by Watson et al, documented that only 62% of health care professionals suggested that insulin-treated drivers should test their blood glucose before driving. About 13% of healthcare professionals thought it is safe to drive with blood glucose, 72 mg/dL (4 mmol/L).

The other important point which should be passed onto these professionals is to monitor the level of glucose if they are on any hypoglycaemic agent like insulin. Previous studies have reported the adverse instance of hypoglycaemia in type 2 DM. This is due to increased episodes of hypoglycaemia caused by insulin intake. In type 2 diabetes mellitus, insulin administration is mostly advised in case of uncontrolled diabetes in later stages. However most of the subjects with type 2 diabetes mellitus are associated with complications like peripheral neuropathy should be aware of the amount and dose of insulin intake along with their signs and symptoms of hypoglycaemia.

The presence of sensory neuropathy in drivers is a serious concern which requires higher attention at individual and public level. In our case report, patient himself reported that he was not able to judge the amount of acceleration and break applied while driving due to loss of sensation and proprioception on the foot. Due an advanced medical setup and diabetic foot clinic within our hospital setting we have been able to screen many public health professionals including public transport drivers (this case report) who have been diagnosed with diabetic peripheral neuropathy suggestive of major health and safety concern. Currently, the role of diabetic peripheral neuropathy that may affect driving is not significantly highlighted which in reality requires a serious attention. Therefore the given case report highlights the need for screening of diabetic peripheral neuropathy among road transport drivers and other public health professionals to bring awareness among the mass and draw their serious attention in order to prevent unlikely events like road accidents. This population must also be screened at regular interval and treated so that the safety of the professional as well as the public is not on stake.

The possible reason for reduction of peripheral neuropathic pain could be due to increased microcirculation to the periphery. The possible mechanism is that low level laser therapy induces the release of cytokines and growth factors into the circulation which can lead to vasodilatation of the vessels and formation of new capillaries. In a study by Funk et al documented that exposure to He-Ne laser stimulates the release of cytokines such as IL-1α, IL-2, IFN-γ, and TNF-α which plays a major role in cell signalling, and the possible reason could be the increased release of ATP production by the mitochondria when exposed to low level laser therapy.

Therefore in the present study, we would conclude that, since diabetes is a chronic progressive disease, it is recommended that all the driving professionals with type 2 diabetes mellitus needs to be educated regarding type 2 diabetes mellitus and to report to the health authorities in case any symptoms of diabetic peripheral neuropathy experienced or perceived. Low level laser therapy can be used as a treatment of choice in early diabetic peripheral neuropathy among these public transport professionals.
References


