ORIGINAL RESEARCH

Evaluation of Incidence of Prediabetes and Diabetes Mellitus Type II among Hand Nerves Entrapment Neuropathy Patients: An Institutional Based Study

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ABSTRACT
Background: The present study was conducted for assessing the incidence of diabetes mellitus type II and prediabetes among hand nerves entrapment neuropathy patients. **Materials & Methods:** It was a cross-sectional study involving 100 patients who reported with numberless of single side or bilaterally and was suspected of Carpal tunnel syndrome (CTS). Written consent was obtained from all the patients after explaining in detail the entire research protocol. Complete medical history of all the patients was obtained. Anthropometric variables of all the patients were recorded separately. Blood samples were obtained from all the patients and HbA1c levels were recorded. **Results:** A total of 100 patients were enrolled. Mean age of the patients was 43.5 years. Out of 100 patients, 38 percent of the patients were pre-diabetic while 28 percent of the patients were diabetic. **Conclusion:** CTS is a commonly encountered entrapment neuropathy associated with DM. Hence; periodic screening of CTS patients for metabolic derangement should be done.
Key words: Prediabetes, Diabetes, Nerve entrapment, Neuropathy.

INTRODUCTION

Nerve compression syndromes of the hand present with various signs and symptoms that correspond to the nerve involved and its anatomic distribution. There are three nerves and their corresponding branches that provide sensory and motor innervation to the hand that include the median, ulnar, and radial. An understanding of the anatomy and distribution of these nerves is paramount in distinguishing the various signs, and symptoms in nerve compression syndromes.[1-3]

Entrapment neuropathies are caused by compression and/or irritation of peripheral nerves as they travel through narrow anatomical spaces. The most common entrapment neuropathy is carpal tunnel syndrome (CTS) with a lifetime risk of 10%, which increases to a staggering 84% in patients with diabetes. The second most common entrapment neuropathy is cubital tunnel syndrome. Another common condition is "sciatica," with reported prevalence values ranging from 1.6% to 43%. The striking variation in prevalence has been attributed to the varying definitions of "sciatica."[4-6]

Diabetic neuropathy (DN) is the most common form of neuropathy in Western countries, with a wide prevalence in literature, ranging from 5% to 90%. Such a large discrepancy is mainly due to the different methods, i.e., sets of electrophysiological and clinical criteria and demographic data adopted. The EURODIAB IDDM Complication Study reports a 28% prevalence of DN across Europe. Considering that DM affects about 246 million people worldwide, it can be estimated that 20-30 million people have a DN. There are numerous and heterogeneous neuropathic syndromes associated with DM.[5, 6] Hence;

the present study was conducted for assessing the incidence of diabetes mellitus type II and prediabetes among hand nerves entrapment neuropathy patients.

MATERIALS & METHODS

The present study was conducted for assessing the incidence of diabetes mellitus type II and prediabetes among hand nerves entrapment neuropathy patients in Department of Physical Medicine and Rehabilitation (PMR), Government Medical College, Haldwani, Nainital, Uttarakhand, India. It was a cross-sectional study involving 100 patients who reported with numberless of single side or bilaterally and was suspected of Carpal tunnel syndrome (CTS). Written consent was obtained from all the patients after explaining in detail the entire research protocol. Complete medical history of all the patients was obtained. Patients with presence of cervical spine or hand trauma history, nerve injury history etc were excluded from the present study. Anthropometric variables of all the patients were recorded separately. Blood samples were obtained from all the patients and HbA1c levels were recorded. All the results were recorded in Microsoft excel sheet and were subjected to statistically analyses using SPSS software.

RESULTS

A total of 100 patients were enrolled. Mean age of the patients was 43.5 years. Out of 100 patients, 59 were males and 41 were females. Majority of the patients were of urban residence. Out of 100 patients, 38 percent of the patients were pre-diabetic while 28 percent of the patients were diabetic.

Table 1: Demographic data

Variable		Number	Percentage
Age group (years)	Less than 40	39	39
	More than 40	61	61
Gender	Males	59	59
	Females	41	41
Residence	Rural	28	28
	Urban	72	72

Table 2: Incidence of diabetes

Diabetes	Number	Percentage
Present	28	28
Absent	72	72
Total	100	100

Table 3: Incidence of Pre-diabetes

Pre-diabetes	Number	Percentage
Present	38	38
Absent	62	62
Total	100	100

DISCUSSION

Compressive neuropathy is one of the most fascinating yet most complex aspects of Hand Surgery. It is also quite often the most rewarding surgery in terms of clinical outcomes with some exceptions. Compressive or entrapment neuropathy results from compression on a nerve at some point over its course in the upper limb. It can result in altered function and if left untreated leads to considerable morbidity—some of which can be difficult to reverse, if left too late. It is therefore worthwhile to be able to diagnose and treat these conditions early.[7, 8]

Diabetes mellitus has large number of complications; some of them are well known such as nephropathy, and retinopathy, and neuropathy. Diabetic foot has always been a point of worry for treating physicians but complications like diabetic hand syndrome might not have gained enough recognition. Diabetes is complicated by musculoskeletal problems of upper extremity and particularly the hand, collectively referred as “the diabetic hand.” The entity includes not only more specific diabetic-related conditions like limited joint mobility (LJM) but also conditions related to the nondiabetic hand, such as trigger finger, Dupuytren's contracture, and peripheral nerve compression lesions.[9,10] Hence; the present study was conducted for assessing the incidence of diabetes mellitus type II and prediabetes among hand nerves entrapment neuropathy patients.

A total of 100 patients were enrolled. Mean age of the patients was 43.5 years. Out of 100 patients, 59 were males and 41 were females. Majority of the patients were of urban residence. Out of 100 patients, 38 percent of the patients were pre-diabetic while 28 percent of the patients were diabetic. Hussein N et al assessed the incidence of Diabetes Mellitus (DM)/pre-diabetes among patients with hand nerves entrapment syndromes. 412 patients presented with unilateral or bilateral hand numbness suspecting Carpal Tunnel Syndrome (CTS). Mean age 59.4 ± 11.123. All patients were right-handed, Male 37.1%, female 62.9%, Mean body mass index (BMI) 32.2 ± 8.2. Majority were manual workers (55.1%). HgA1c <5.5 has the fewest patients (7.3%), highest number of patients with HgA1c 5.5-6.0. significant relation between HgA1c categories and sensory CTS p=0.001 and sensory motor CTS p=0.001. No significant relation between HgA1c categories and demyelinating pathology p=0.123 but significant with demyelinating axonal pathology p=0.017. Significant relation between HgA1c and Guyon canal syndrome p=0.001 and polyneuropathy p=0.001. No significance between HgA1c and cervical radiculopathy p=0321. High incidence of DM and pre-diabetes among patients with hand nerve entrapment: CTS, Guyon syndrome together with polyneuropathy.[11] Compression neuropathies (CN) in the upper extremity, the most common being carpal tunnel syndrome (CTS) and ulnar nerve entrapment (UNE), are frequent among patients with diabetes mellitus (DM). Earlier studies

have shown contradicting results regarding DM as a risk factor for CN.[10-12]

Rydberg M et al explored potential associations between DM, carpal tunnel syndrome (CTS), and ulnar nerve entrapment (UNE) during long-term follow-up. HbA1c and fasting plasma glucose levels had been measured at baseline in a subgroup of 5508 participants and were related to incident CTS and UNE in age and sex-adjusted binary logistic regression models. A total of 1081 participants developed CTS and 223 participants developed UNE during a median follow-up of 21 years. Participants with incident CTS or UNE had higher prevalence of DM and higher BMI at baseline. Using multivariate Cox regression models, prevalent DM at baseline was independently associated with both incident CTS (HR 2.10; 95% CI 1.65 to 2.70, $p<0.0001$) and incident UNE (HR 2.20; 95% CI 1.30 to 3.74, $p=0.003$). Higher levels of HbA1c and plasma glucose were associated with an increased risk for CTS, but not for UNE. Their study established DM as a major risk factor in the development of both CTS and UNE.[12]

CONCLUSION

CTS is a commonly encountered entrapment neuropathy associated with DM. Hence; periodic screening of CTS patients for metabolic derangement should be done.

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