Nerve Conduction Study of Median Nerve in Type 2 Diabetes Mellitus

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ABSTRACT

Background: The prevalence of chronic disease diabetes mellitus is rapidly rising all over the globe. The number of diabetic mellitus patients with diabetic neuropathy is increasing as estimated as 45% of patients develop diabetic polyneuropathy.

Objectives: To evaluate latency, amplitude and NCV of median nerve in type 2 DM.

Methods: The study was done in 60 (M=35, F=25) consenting diabetic patients. Anthropometric variables were recorded. Motor and sensory nerve conduction parameters of bilateral median nerves were recorded using standard technique. Values obtained were compared with normal values. Independent t test was applied to compare the anthropometric and nerve conduction variables between male and female diabetic subjects.

Results: Anthropometric variables were comparable between diabetic male and females. Also, most of the nerve conduction variables were comparable between diabetic males and females. However, these values were less as compared to given standard values. Distal amplitude of left median motor nerve was significantly higher in males (p=0.04) while onset latency of left median sensory nerve is significantly prolonged as compared to females (p=0.008).

Conclusion: Median nerves are affected in type 2 diabetes suggesting of diabetic neuropathy.

Key words: type 2 diabetes, nerve conduction study

INTRODUCTION

Diabetes mellitus (DM) is one of the chronic diseases all over the world. The prevalence of diabetes is rapidly rising all over the globe at an alarming rate. It is estimated 45% of patients with DM develop diabetic polyneuropathy. Diabetes can be treated and its consequences can be avoided or delayed with diet, physical activity, medication, regular screening and treatment for complication. Neuropathy is one of the commonest long term complications. 15% of patients have both symptoms and signs of neuropathy but nearly 50% have either neuropathic symptoms or slowing of nerve conduction velocity, before patient develops any sign. Nerve conduction studies (NCS) are considered to be the most sensitive reliable noninvasive and objectives means of investigations of diabetic polyneuropathy. It helps in evaluating the type and degree of abnormalities of the peripheral nerves. Slowing of conduction velocity is suggestive of peripheral nerve demyelination.

Diabetic sensorimotor polyneuropathy is the most common clinical sub type seen in clinical practice. Sensory nerves are affected earlier than motor nerves. Most common nerve affected in upper limb is median nerve while in the lower limb is sural nerve. Nerve conduction abnormalities exist in the subclinical stages of neuropathy that can be detected in early asymptomatic stage by various electrodiagnostic test. Because peripheral nerve have the capacity to regenerate, therefore, early diagnosis and timely therapeutic intervention will reduce the...
morbidity and mortality in diabetes mellitus. It has been shown by Zahed Ali et al that median nerve has the highest electrodiagnostic abnormalities in diabetic patients with early neuropathy. It has been shown by various studies that upper limb sensory nerve conduction studies are more sensitive in detecting than lower limb nerve conduction studies. As electrodiagnostic abnormalities are most commonly found in the median nerve (59%) as compared to ulnar nerve (28%), peritoneal nerve (28%) and sural nerve (8%). Many previous studies have also found that NCS alteration of median nerve suggestive of neuropathy in diabetics. Thus our objective was to study the nerve conduction parameters of median nerve in type 2 diabetes mellitus. It has been shown that following diagnosis of DM, slowing of median NCV usually progresses at a steady rate by approximately 1m/s/yr and that there is positive correlation between the level of impairment and duration of DM. Thus the present study was aimed to study of median nerve in type 2 diabetes mellitus.

MATERIALS AND METHODS
Type of study: Comparative Cross sectional study
Inclusion criteria: Clinically diagnosed diabetic mellitus patients both male and female of age 40-60 yrs.
Referred from Diabetic clinic, Department of Internal medicine, BPKIHS
Exclusion criteria: Type I diabetic patients
Diabetic patients with hypertension, history of smoking or alcohol intake
Age more than 60 yrs
Sample size: N= 60

Sample size was calculated by a power sample size formula. A total of 60 diabetic patients were taken and 35 were male and 25 were female in group. Informed written consent was taken prior to the study. Ethical clearance was taken prior to study from Institutional Ethical Review Board (IERB) BP Koirala Institute of Health Sciences, Dharan, Nepal.

Duration of study: Jan 2016 – Dec 2016
Recording procedure: Anthropometric data were first recorded. Motor and sensory nerve conduction parameters of bilateral median nerves were recorded in Neurophysiology Lab at BPKIHS, Dharan using standard techniques. Proximal and distal amplitude of CMAP (compound motor action potential), proximal & distal latencies & conduction velocities of bilateral median nerves were recorded. Minimum F wave latency of bilateral median nerves was also recorded.

Statistical Methods: The data were entered into MS Excel and descriptive analyzing was done for anthropometric & nerve conduction variables. Unpaired t test was used to compare the anthropometric & nerve conduction variables between male and female diabetic patients.

Recording data were analyzed by using SPSS 17.

RESULTS
There were no statistically significant in all anthropometric variables between male and female diabetic group. Most of the nerve conduction variables were comparable between male & female diabetic groups. Onset latencies, SNAP (sensory nerve action potential) amplitude and conduction velocity of bilateral median sensory nerves were recorded. However, the values were less as compared to given standard values. However, distal amplitude of left median nerve was higher in diabetic males as compared to females. (p= 0.005) and onset latency of left median sensory nerve was significantly prolonged in males (p=0.008) as compared to females. (as shown in table 5)

### Table 1: Comparison of anthropometric variables between male and female diabetic variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Diabetic male (Mean ± SD)</th>
<th>Diabetic female (Mean ± SD)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in years)</td>
<td>52.23±11.59</td>
<td>50.80±13.10</td>
<td>0.574</td>
</tr>
<tr>
<td>Height (in cm)</td>
<td>162.33±7.31</td>
<td>160.83±6.36</td>
<td>0.128</td>
</tr>
<tr>
<td>Weight(kg)</td>
<td>59.0±14.17</td>
<td>64.33±5.50</td>
<td>0.757</td>
</tr>
</tbody>
</table>
Hrishikesh Bagchi et al in 2014 showed that significant reduction in both NCV and amplitude with increasing values of duration of diabetes. The commonest abnormality in diabetics is reduction of amplitude of motor or sensory nerve action potential because of axonopathy. Hennessey & Others (1994) observed that women, in comparison to men have significantly larger distal amplitudes for median nerve. Similar study was done by Lawrence et al in 1993 observed that sensory amplitude of Lt. median nerves were larger in women. Our study is contrary to this study in which male larger distal amplitudes for median nerves than female diabetic groups have.

Distal amplitude of median motor nerve is higher in male than female and NCV of motor nerve in median nerve is higher in male than female which are opposed by Gakhar et al which showed that distal amplitude of median nerve in female is higher than males. Onset latency of motor of median nerves in both right and left side were comparable which is contrary to study done by Gakhar et al in 2014. A study done by Zahed Ali et al in which Conduction velocities were decreased in both male and females in left median sensory which is statistically significant and our study showed that there is significant difference in onset latency of left median sensory in male and female diabetic group, which is different statistically. Our study showed that male patients had significantly longer latencies and female demonstrate faster conduction velocity. The similar result has been shown by Gakhar et al. Thus, our results showed that males have larger distal amplitudes of Left Median motor nerve as compared to females. However, onset latency is prolonged of left median sensory nerve as compared to females.

**DISCUSSION**

Most of the previous literatures suggest on early involvement of median nerve in diabetic neuropathy. [8,10-12]

**CONCLUSION**

Median nerves are affected in type 2 diabetic mellitus patients.
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