

EFFECT OF JACOBSON'S RELAXATION TECHNIQUE ON NERVE CONDUCTION STUDY IN HYPERTENSION PATIENTS - AN EXPERIMENTAL STUDY

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ABSTRACT

Hypertension has been identified as a risk factor associated with neuropathy and micro vascular diseases. Since most of the individuals do not have specific symptoms related to their elevated blood pressure, it is often called as the silent killer disease probably³; today the biggest challenge of the 21st century is hypertension which is a major health issue. One billion individuals are affected with hypertension worldwide. Study aimed to find effect of Jacobson's Relaxation Technique on Nerve Conduction Velocities in hypertensive patients. Patients having BP \geq 140/90mmHg were included and the ones with diabetes with neuropathy, renal insufficiency, alcoholism, vascular diseases, or other conditions known to cause peripheral neuropathy were excluded from the study. Fifty hypertensive patients of 35-55

years were divided in two equal groups. In control group hypertensive patients were on medication only while in experimental group patients were given Jacobson's relaxation technique along with medication for four weeks daily. The mean values of SNCV for Median and Ulnar Nerve pre training in control group were 51.28 ± 3.86 and 49.03 ± 4.53 which

showed significant improvement in post treatment mean values of SNCV for Median and Ulnar Nerve - 51.41 ± 3.85 and 49.16 ± 4.43 . The mean values of MNCV for Median, Ulnar, Tibial and Peroneal Nerves pre training in control group were 51.10 ± 8.79 , 52.77 ± 6.63 , 44.58 ± 4.61 and 47.45 ± 4.78 respectively which showed significant improvement in post treatment mean values of MNCV for Median, Ulnar, Tibial and Peroneal Nerves of 51.33 ± 8.42 , 52.90 ± 6.61 , 44.80 ± 4.56 and 47.60 ± 4.78 . The mean values of SNCV for Median and Ulnar Nerve pre training in experimental group were 52.70 ± 4.91 and 50.89 ± 6.30 which showed significant improvement in post treatment mean values of SNCV for Median and Ulnar Nerve - 52.92 ± 4.86 and 50.97 ± 6.24 . The mean values of MNCV for Median, Ulnar, Tibial and Peroneal Nerves pre training in experimental group were 52.39 ± 4.92 , 53.23 ± 5.86 , 48.24 ± 5.91 and 47.66 ± 5.43 respectively which showed significant improvement in post treatment mean values of MNCV for Median, Ulnar, Tibial and Peroneal Nerves of 52.65 ± 4.78 , 52.90 ± 6.61 , 48.49 ± 5.18 and 47.90 ± 5.31 . Extensive studies will be required considering all grades of hypertension for confirmative analysis.

KEYWORDS: Hypertension, Jacobson's Relaxation Technique, MNCV, SNCV.

INTRODUCTION

The fourth top most disease on the basis of its prevalence is Hypertension.^[1] Since most of the individuals do not have specific symptoms related to their elevated blood pressure, it is often called as the silent killer disease probably^[2]; today the biggest challenge of the 21st century is hypertension which is a major health issue. One billion individuals is affected with hypertension worldwide.^[3] The prevalence of hypertension in India in adult population varies from 3 to 10% and the average of 4.8%. The population at risk above the age of 20 years is 330 million as per 1981 population.^[4] The major risk factor for causing cardiac, cerebral and renal disease is high blood pressure.

It has been identified that hypertension as a risk factor associated with neuropathy and micro vascular diseases.^[5,6] Data on nerve conduction velocity in patients with essential hypertension is inconsistent.^[7] Some studies have observed a reduction in the nerve conduction velocity in essential hypertension but subsequent studies failed to demonstrate such difference.^[8,9] If hypertension alone can indeed induce a reduction of nerve conduction velocity, then it would be prudent to take a new look at previous studies of uremic and diabetic polyneuropathy, since hypertension is frequently but variably associated with both of these conditions and potentially aggravate an underlying neuropathy.^[10]

METHODOLOGY

Study Design: The study was carried out in the Neurophysiotherapy Department, Dr. D. Y. Patil College of Physiotherapy, Pimpri, Pune. Patients of hypertension between the ages of 35-55 years of either sex. 50 patients were divided in two groups of 25 each. Patients with diabetes with neuropathy, renal insufficiency, alcoholism, vascular diseases, or other conditions known to cause peripheral neuropathy were excluded from the study.

Procedure: Written consent was taken from all the voluntary participants. In control group patients with hypertension were on medication only while in experimental group patients were given Jacobson's relaxation technique along with medication for four weeks daily. At the end of 4 weeks of treatment session of both the groups' SNCV of Median and Ulnar Nerve and MNCV of Median, Ulnar, Tibial and Common Peroneal Nerve will be recorded. The data thus obtained were considered for statistical analysis.

Intervention: Jacobson's Relaxation Technique.

1. Right hand and forearm. Make a fist with your right hand.
2. Right upper arm. Bring your right forearm up to your shoulder to "make a muscle".
3. Left hand and forearm.
4. Left upper arm.
5. Forehead. Raise your eyebrows as high as they will go, as though you were surprised by something.
6. Eyes and cheeks. Squeeze your eyes tight shut.
7. Mouth and jaw. Open your mouth as wide as you can, as you might when you're yawning.
8. Neck. !!! Be careful as you tense these muscles. Face forward and then pull your head back slowly, as though you are looking up to the ceiling.
9. Shoulders. Tense the muscles in your shoulders as you bring your shoulders up towards your ears.
10. Shoulder blades/Back. Push your shoulder blades back, trying to almost touch them together, so that your chest is pushed forward.
11. Chest and stomach. Breathe in deeply, filling up your lungs and chest with air.
12. Hips and buttocks. Squeeze your buttock muscles.
13. Right upper leg. Tighten your right thigh.

14. Right lower leg. !!! Do this slowly and carefully to avoid cramps. Pull your toes towards you to stretch the calf muscle.
15. Right foot. Curl your toes downwards.
16. Left upper leg. Repeat as for right upper leg.
17. Left lower leg. Repeat as for right lower leg.
18. Left foot. Repeat as for right foot.

Every subject performed this supervised relaxation for 6 repetitions during a single session on once a day basis for four weeks as shown in figure 1. At the end of 4 weeks of treatment session of both the group's NCV will be recorded. The data thus obtained were considered for statistical analysis.



Figure 1: Jacobson's Relaxation Class.

NERVE CONDUCTION STUDY

MEDIAN MOTOR NERVE CONDUCTION

Position of patient- supine lying

Electrode placement

- Recording electrode- close to motor point of APB
- Reference electrode- 3cm distal at first metacarpophalangeal joint.
- Ground electrode – between recording electrode and stimulating electrode.

Site of stimulation

- Stimulation given at 3cm proximal to distal wrist crease.
- Stimulation given at elbow near volar crease of brachial pulse.

The distance between the two point of stimulation was recorded for calculation of motor

nerve conduction velocity of median nerve as shown in figure 2 and 3.



Figure-2



Figure-3

MEDIAN SENSORY NERVE CONDUCTION

Position of patient- supine lying

Electrode placement

- Recording electrode-ring electrode is placed at first interphalangeal joint of index finger.
- Reference electrode-ring electrode is placed 3 cm distal to the recording electrode
- Ground electrode – between recording electrode and stimulating electrode.

Site of stimulation-

- Stimulation given at 3cm proximal to distal wrist crease.

The distance between the stimulating and recording site was recorded for calculation of sensory nerve conduction velocity of median nerve as shown in figure 4.



Figure-4

ULNAR MOTOR NERVE CONDUCTION

Position of patient- supine lying

Electrode placement-

- Recording electrode- close to motor point of ADM
- Reference electrode- 3cm distal to recording electrode
- Ground electrode – between recording electrode and stimulating electrode.

Site of stimulation

- Stimulation given at 3cm proximal to distal wrist crease.
- Stimulation given below the medial epicondyle with elbow 90 or 135 degree of flexion.

The distance between the two points of stimulation was recorded for calculation of motor nerve conduction velocity of Ulnar nerve as shown in figure 5 and 6.

**Figure-5****Figure-6****ULNAR SENSORY NERVE CONDUCTION**

Position of patient- supine lying

Electrode placement

- Recording electrode-ring electrode is placed at first interphalangeal joint of little finger.
- Reference electrode-ring electrode is placed 3 cm distal to the recording electrode
- Ground electrode – between recording electrode and stimulating electrode.

Site of stimulation

- Stimulation given at 3cm proximal to distal wrist crease.

The distance between the stimulating and recording site was recorded for calculation of sensory nerve conduction velocity of ulnar nerve as shown in figure 7



Figure 7.

TIBIAL NERVE CONDUCTION

Position of patient- supine lying.

Electrode placement

- Recording electrode- placed on abductor hallucis
- Reference electrode- 3cm distal to the recording electrode
- Ground electrode – between recording electrode and stimulating electrode.

Site of stimulation

- Stimulation given behind and proximal to medial malleolus
- Stimulation given in the popliteal fossa with slight knee flexion lateral to the midline in popliteal fossa.

The distance between the two point of stimulation was recorded for calculation of motor nerve conduction velocity of tibial nerve as shown in figure 8 and 9.



Figure-8



Figure-9

PERONEAL NERVE CONDUCTION**Position of patient-** supine lying**Electrode placement**

- Recording electrode- placed on EDB
- Reference electrode- 3cm distal to recording electrode
- Ground electrode – between recording electrode and stimulating electrode.

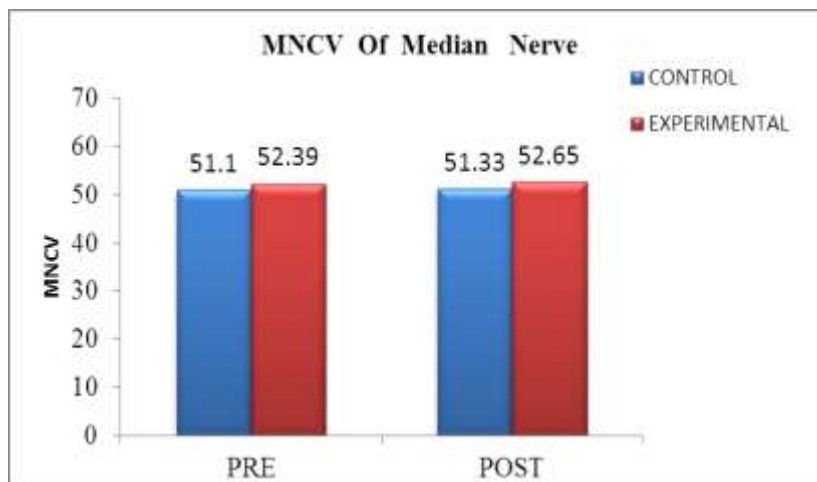
Site of stimulation

- Stimulation given at the ankle
- Stimulation given at 2 cm distal to the fibular neck.

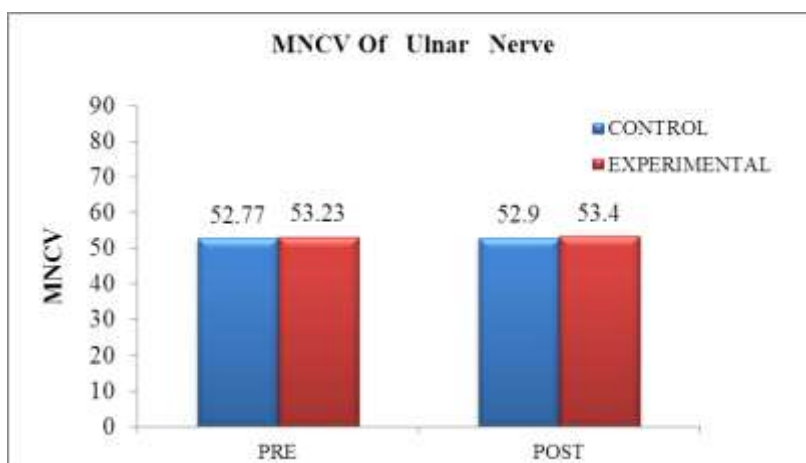
The distance between the two point of stimulation was recorded for calculation of motor nerve conduction velocity of peroneal nerve as shown in figure 10 and 11.

**Figure-10****Figure-11****RESULTS****Table 1: Comparison Of NCV In Control And Experimental Groups.**

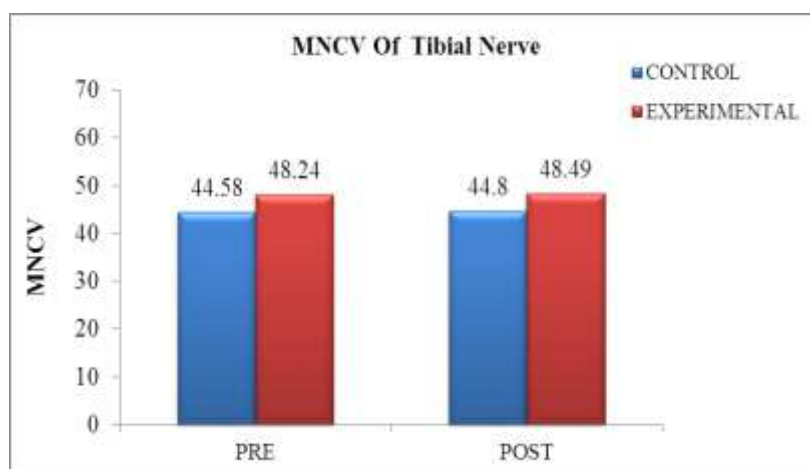
	Category	Mean	SD	p Value
MNCV Median	Experimental	-.2600	.19518	0.37
	Control	-.2276	.47016	
MNCV ulnar	Experimental	-.1690	.17351	0.94
	Control	-.1281	.24159	
MNCV tibial	Experimental	-.2530	.23815	0.94
	Control	-.2129	.25407	
MNCV peroneal	Experimental	-.2425	.16036	0.001
	Control	-.1429	.07302	
SNCV Median	Experimental	-.2175	.19485	0.002
	Control	-.1238	.09452	
SNCV ulnar	Experimental	-.0810	.12238	0.89
	Control	-.1238	.23025	



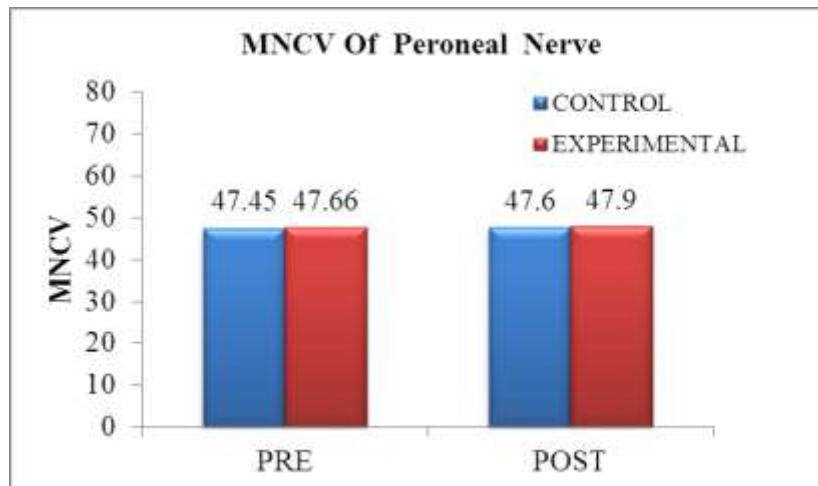
Graph 1: Comparison Of MNCV Of Median Nerve In Control And Experimental Groups.



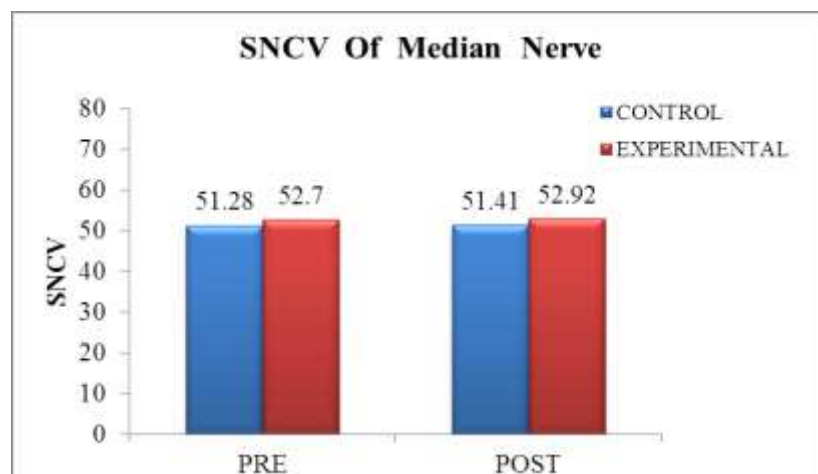
Graph 2: Comparison Of MNCV Of Ulnar Nerve In Control And Experimental Groups.



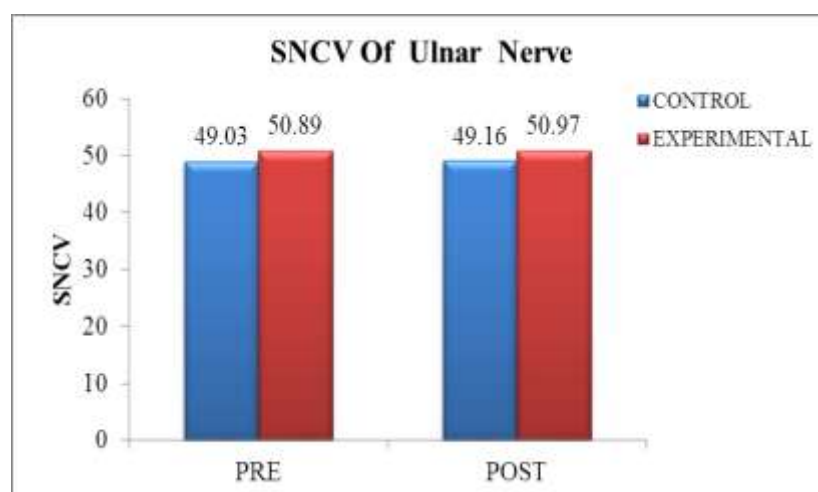
Graph 3: Comparison Of MNCV Of Tibial Nerve In Control And Experimental Groups.



Graph 4: Comparison Of MNCV Of Peroneal Nerve In Control And Experimental Groups.



Graph 5: Comparison Of SNCV Of Median Nerve In Control And Experimental Groups.



Graph 6: Comparison Of SNCV Of Ulnar Nerve In Control And Experimental Groups.

DISCUSSION

The present study evaluates the effect of Jacobson's Relaxation technique on blood pressure and pulse rate among hypertension patients. Patients in control group were on antihypertensive medication while the patients in experimental group were given Jacobson's Relaxation Technique along with antihypertensive medication, for five times/ week for a period of 4 weeks. SNCV of Median and Ulnar Nerve and MNCV of Median, Ulnar, Tibial and Common Peroneal Nerve was assessed before and after 4 weeks of treatment and NCV was assessed manual using NCV Machine, which showed significant improvement in MNCV of Common Peroneal and SNCV of Median Nerve in both the groups.

Viskoper et al 3 have claimed a reduction in nerve conduction velocity in patients with essential hypertension. They postulated that hypertension could cause vasospasm of blood vessels supplying the nerves and that this alone could decrease nerve conduction velocity.^[7] Motor conduction velocity in the upper limb and lower limb was found to be decreased in hypertensives as compared to normotensives. In one study done by Forrest et al in 1997 in which he has concluded that hypertension alone has a great impact on developing distal symmetrical sensory polyneuropathy.

Median nerve is the most frequently involved nerve of the upper extremity in neuropathy due to axonal loss not because of demyelination as claimed by a study done by Negler W et al in 1972. Neurophysiological studies suggested axonal involvement in 64 patients, conduction block in 23 patients and combination of two in 29 patients in a study of common peroneal neuropathy comprising of 103 patients. Contrary to the common belief of focal demyelination, the pathophysiology was found to be frequently axonal loss regardless of etiology of common peroneal neuropathy. In the present study, we examined the NCV in patients with hypertension. Statistical significant differences were found in MNCV of peroneal and SNCV of median nerve in hypertensive patient after the intervention.

CONCLUSION

From the present study we can conclude that Jacobson's relaxation technique can be used as an adjunct to antihypertensive medication for patients with hypertension to improve nerve conduction velocity of upper and lower extremity. As the study shows significant improvement in MNCV of peroneal and SNCV of median nerve in hypertension patients.

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