ORIGINAL ARTICLE

Effect of Table Tennis as Recreational Sport on Upper Limb Nerve Conduction Velocity

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Abstract

Introduction: *Table tennis is a recreational sport that requires quick reflexes, swift movements and attention. Playing table tennis involves attaining and maintaining a peculiar posture that imposes high strain on the dominant limb particularly at the elbow and wrist. Due to the asymmetric nature of the sport, the elbow and wrist joints of dominant extremity are subjected to repetitive stress and may result into some physiological and pathological changes. Hence, the present study was undertaken to evaluate the effect of playing table tennis on the motor nerve conduction velocities in ulnar and median nerves.* ***Method:*** *The motor and sensory conduction velocities in median and ulnar nerves were determined in 30 young adult males in the age range 20–30 years who were practicing table tennis regularly for more than 6 months and were compared with those of 30 young adult males in the same age range who did not indulge in playing table tennis or any other recreational sport or any kind of regular weight bearing training.* ***Result:*** *The motor nerve conduction velocities in median and ulnar nerves of dominant limb were affected significantly in table tennis playing group when compared to those of control group. There was no significant difference in conduction velocities in same nerves of the non-dominant limbs of both the group.* ***Conclusion:*** *The decrease in conduction velocities of median and ulnar nerves of dominant limbs in young males practicing table tennis regularly is indicative of development of peripheral neuropathy. Playing table tennis involves attaining and maintaining a peculiar posture that imposes high strain on the dominant limb particularly at the elbow and wrist joints. Various factors like high repetition of motions and extreme elbow and wrist positions affect the peripheral nervous system which may remain subclinical or asymptomatic.*

Keywords*: Nerve conduction velocity, Peripheral neuropathy, Table tennis players*

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Introduction

Nerve conduction studies (NCS) are an objective, quantitative and reproducible measure of peripheral nerve function and are widely used in diagnosis of neuropathies[1]. It is a sensitive and reproducible measure of peripheral nerve function. It is used by clinicians to diagnose and differentiate peripheral neuropathy. Motor NCS include the assessment of the compound muscle action potential (CAMP) and sensory NCS include assessment of the sensory nerve action potential (SNAP)[2,3].

In the present time, people indulge in various types of physical activities to keep themselves fit and to reduce the stress. A recreational sport is one such physical activity that is commonly used by most of the people. Among the various recreational sports table tennis and badminton are most common. Though indulging in recreational sports is good as an exercise, it increases the chances of getting some sort of sports injuries.

Table tennis is a recreational sport that requires quick reflexes, swift movements and attention. Though it is not as physically demanding as

lawn tennis or badminton, playing table tennis does imposes a high impact upon on the upper extremity. Playing table tennis involves attaining and maintaining a peculiar posture that imposes high strain on the dominant limb particularly at the elbow and wrist. Due to the asymmetric nature of the sport, the elbow and wrist joints of dominant extremity are subjected to repetitive stress and may result into some physiological and pathological changes[4,5]. Various factors such as high repetition of motions, high muscular forces and extreme elbow positions affect the peripheral nervous system with or without signs and symptoms[6].

The epidemiological data reporting studies related to badminton and lawn tennis injuries have shown that these injuries often are severe in character but of relatively low frequency[7,8]. But there is very sparse literature available on injuries related to playing table tennis. Hence, the present study was undertaken to evaluate the effect of playing table tennis on the motor nerve conduction velocities in ulnar & median nerves.

Materials and Methods

The present study was conducted in the Neurophysiology laboratory of the Department of Physiology at Peoples College of Medical Sciences and Research Centre, Bhopal. The study group comprised of 30 young adult males in the age group of 20 to 30 years who were practicing table tennis for at least one hour daily for at least 4 days in a week for more than 6 months. The control group comprised of 30 young adult males in the same age group of 20 to 30 years who did not indulge in playing table tennis or any other asymmetric recreational sports like badminton or lawn tennis or kind of regular weight bearing training.

All the subjects were recruited amongst the students and staff of the various constituent units of Peoples University campus at Bhopal. Those having any prior history or signs and symptoms of peripheral neuropathy or compression syndrome of upper extremity or any history of surgical intervention on wrist or elbow were excluded from the study. The subjects were recruited for this study on voluntary basis and an informed consent form was obtained from each of them prior to study.

The neurophysiological study consisted of motor and sensory nerve conduction studies of the median and ulnar nerves using the Neuroperfect machine by Medicaid, Chandigarh. All the tests were performed in a quiet room at room temperature with the subjects lying in supine position on a couch. The nerve conduction studies were conducted using methods described by Mishra and Kalita[9].

The median motor nerve was examined by stimulating the median nerve at the wrist (about 3 cm proximal to the distal wrist crease) and at elbow (near volar crease of brachial pulse). The recording electrodes were placed close to motor point of abductor pollicis brevis, while the reference electrode was 3 cm distal at 1st metacarpo-phalangeal joint. For the sensory part, the median nerve was stimulated using a ring electrode at 2nd or 3rd digit & the recording electrode was placed 3cm proximal to the distal crease of the wrist. Reference electrode was 3 cm proximal to the recording electrode.

The ulnar motor nerve was examined by stimulating the ulnar nerve at the wrist and below elbow (about 3 cm below the medial epicondyle). The recording electrodes were placed over the abductor digiti minimi, while the reference electrode was placed over the little finger. For the sensory part, the ulnar nerve was stimulated using a ring electrode at interphalangeal joint of 5th digit and the recording electrode along the course of ulnar nerve. The reference electrode was placed 2 cm proximal to the recording electrode.

Results

From table one, it can be said that both the groups are appropriately matched with relation to their age, height and weight. The subjects in both the group did not show any significant differences in these anthropometric parameters.

The nerve conduction velocities in median nerves were compared in both the group and students t-test was applied. It is observed that both the motor as well as sensory nerve conduction velocity in dominant limb showed significant lowering in table tennis playing group as compared to the control group as indicated by p-value. However, that was no statistically significant difference in the values of nerve conduction velocity in non-dominant limbs among the two groups (Table- 2).

Similarly, when the motor and sensory nerve conduction velocities in ulnar nerve were compared using students t-test, it was observed that there was a statistically significant decrease in NCV in dominant limbs in table tennis playing group as compared to that of the control group as indicated by the p-values (Table- 3). The mean values for motor and sensory NCV in non-dominant limbs did not show any significant relationship.

Table- 1: Anthropometric variables in control and study group (N=60)

Variable	Control group (Mean ± SD)	Table Tennis group (Mean ± SD)	p values
Age (years)	23.33 ± 1.90	23.10 ± 1.67	0.615
Height (cm)	163.67 ± 1.92	163.50 ± 1.98	0.742
Weight (kg)	65.37 ± 2.92	63.23 ± 2.64	0.853
BMI (kg/m^2)	24.42 ± 1.30	24.41 ± 1.09	0.985

Table- 2: Motor and Sensory Nerve Conduction Velocity in Median nerve

Nerves	Limbs	Control group (m/sec) (Mean ± SD)	Table Tennis group (m/sec) (Mean ± SD)	p values
Motor	Dominant	58.64 ± 0.35	58.15 ± 0.62	0.000*
	Non-Dominant	57.70 ± 0.45	57.77 ± 0.67	0.623
Sensory	Dominant	53.62 ± 0.30	52.41 ± 1.26	0.000*
	Non-Dominant	54.05 ± 1.43	54.48 ± 1.67	0.288

Table- 3: Motor and Sensory Nerve Conduction Velocity in Ulnar nerve

Nerves	Limbs	Control group (m/sec) (Mean ± SD)	Table Tennis group (m/sec) (Mean ± SD)	p values
Motor	Dominant	57.61 ± 2.14	55.78 ± 1.77	0.001*
	Non-Dominant	58.43 ± 2.14	56.77 ± 2.87	0.114
Sensory	Dominant	52.78 ± 1.80	50.45 ± 1.95	0.000*
	Non-Dominant	54.64 ± 2.10	54.10 ± 2.01	0.315

Discussion

The present study demonstrated that there was a significant decrease in motor and sensory nerve conduction velocities in median and ulnar nerves in the dominant extremity in table tennis playing group when compared with control group subjects. The right hand happens to be the dominant hand in all the study group subjects. It should be observed that there are very few articles regarding study related to table tennis players and NCV in specialized literature.

T Colak in 2003 conducted a study in tennis players and reported that the distal latency, amplitude and conduction velocities were affected in radial and ulnar nerves particularly. They concluded that most of the asymptomatic tennis players with abnormal conduction velocity might be having asymptomatic neuropathy similar to the subclinical entrapment nerve neuropathy[6]. The results of present study are in accordance with these findings as a lowering of motor and sensory nerve conduction velocities is seen in dominant limbs of the table tennis playing group.

Mansour Azarbal et al in 2004 did a survey of elbow injuries in badminton players, a sport of similar nature to table tennis. They found that most of the players had history of medial and lateral elbow pain indicative of epicondylitis or ulnar nerve injury in the form of compression[10]. Table tennis is also an asymmetric sport with consecutive repetitive movements involved and our study also demonstrated a similar result as reflected by significantly lowered motor and sensory conduction velocity in ulnar nerves of dominant limbs in the table tennis playing group.

Luis Paulo Borges et al at Brazil studied motor nerve conduction velocity in three sports viz, middle distance runners, sprint runners and handball players in 2013. They found that regular physical exercise has a beneficial influence on motor nerve conduction velocity (NCV) particularly in the lower extremity nerves. They could also observe that greater use of one upper limb over the other may result in

significant lowering of motor NVC in dominant and non dominant limbs[11]. In table tennis the dominant hand is mostly under high degree of strain and in an awkward position for extended time. Our study could also observe a decline in motor NCV in median and ulnar nerves of dominant arms in table tennis playing group. Bamac Belgin et al in 2014 performed a similar kind of study in basket ball players. They reported that there was a tendency toward developing median, ulnar and radial nerve damage in elbow region[12]. Again basket ball involves repetitive and excess use of one arm similar to table tennis.

Elbow is considered a common site for ulnar nerve compression. Due to superficial location of ulnar nerve excursion of the nerve at elbow with repetitive motions may initiate the injury in table tennis players. There can be entrapment of the ulnar nerve because of hypertrophic medial head of the triceps or flexor carpi ulnaris.

The mechanism for delayed motor and sensory conduction velocities in the median nerve may involve both traction and compression induced by the median nerve stretching across the upper extremity during movements. Regular and intense practice of asymmetric sports even lead to morphological changes in players such as change in bone width and cortical wall thickness & strength. Hypertrophy of muscle is a common observation in regular physical exercise. It is observed in players of asymmetric players such as table tennis that there is increase in perimeters of arm and forearm. All these may lead to entrapment of the nerves while passing through surrounding tissue. In players who are involved in regular high training load the muscles, tendon, bones show signs of adaptation. However, these adaptations are not beneficial to performance and are associated with increased risk of injury.

Conclusion

The motor and sensory nerve conduction velocities in median and ulnar nerves of dominant arms of subjects playing table tennis regularly as a recreational sport are significantly decreased when compared with those in subjects who do not play table tennis or any other asymmetric type of sport or do not exercise regularly. People involved with sports are at risk of getting nerve injuries. Most of the time such neurological injuries remain subclinical and are not detected before damage becomes irreversible.

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