"INCIDENCE OF TARSAL TUNNEL SYNDROME AMONGST DISTRICT LEVEL SPRINTERS"

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ABSTRACT: *Tarsal Tunnel Syndrome [TTS] is the most common lower limb focal neuropathy. With TTS, pain originates in the ankle from entrapment of the posterior tibial nerve. The reasons for TTS in runners are hyper-pronation, prior medial ankle sprains, weakness in the lower leg, ankle and foot. Hence Incidence of Tarsal Tunnel Syndrome in Sprinter is necessary. This study included 120 volunteers according to inclusion and exclusion criteria by convenient sampling method. To assess TTS special tests were performed and for further diagnosis of TTS, MNCV was performed for tibial nerve and disability was calculated by using FADI scale score. Positive results for TTS were found in 38 subjects by using special tests. 4.16 % of incidence of TTS found with MNCV testing and 76% subjects had mild disability using FADI. Hence concluded that there is a significant incidence of TTS with mild disability in district level Sprinter.*

Key Words: *Tarsal Tunnel Syndrome (TTS), Motor Nerve Conduction Velocity (MNCV), Foot and Ankle Disability Index (FADI), Sprinters.*

INTRODUCTION:

Tarsal Tunnel Syndrome (TTS) is a type of compression neuropathy where the tibial nerve is compressed within the tarsal tunnel running along the inside of the ankle into the foot. Tarsal Tunnel Syndrome (TTS) is an uncommon condition that can become debilitating as a result of progressive pain. With TTS, pain originates in the ankle from entrapment of the posterior tibial nerve or its medial, lateral or calcaneal branches in the proximal and/or distal tarsal tunnel. (1)

Tarsal Tunnel is a fibro-osseous tunnel located just posterior to the medial malleolus at the ankle joint. It compresses the posterior tibial nerve as it passes through it producing numbness, foot pain and paraesthesia in the foot. It can occur during practicing, training session or during competition. This injury can be traumatic and non-traumatic. Traumatic episodes occur due to direct trauma. Non traumatic cases can occur by overtraining. (1,2)

Overuse injuries occur due to repetitive sub maximal loading of the musculoskeletal system combined with inadequate recovery in conjunction with a biomechanical fault. Human gait is characterized by two main modes of locomotion; walking and running that differ in terms of both biomechanics and coordination. However, the usually considered defining difference is that walking entails a double (i.e., bipedal) support phase, whereas running entails a flight phase. (3,4)

Walking involves an alternating sequence of single and double support phases, while running entails alternating sequences of support phases (during which one foot contacts the ground) and non-support phases (during which both feet are off the ground). The phases for running are similar as walking except in running there is no double support phase.(5,6)

Compared to walking, humans actually move from one leg to the collateral leg while running which expends a tremendous amount of energy opposing gravity and absorbing shock during take-off and landing. During running, toe off take place before 50% of the gait cycle is accomplished. There are no periods when both feet are in contact with the ground. (6)

As an alternative, both feet are above ground twice during the gait cycle, one at the start and one at the last part of swing referred to as double float. The timing of toe off depends on speed. Fewer times is spent in stance as the subject moves faster. Faster runners and elite sprinters spend much less time in stance than that. World class sprinters toe off as early as 22% of the gait cycle. As a result, both gaits differ in the timing of key events in the stride cycle. (7)

Many researchers feel that abnormal foot/ankle biomechanics contribute significantly to the development of the tarsal tunnel syndrome in runners. The repetitive nature of running, when associated with abnormal over excessive pronation, would lace the posterior tibial nerve on stretch' and at risk for injury. In fact, Rask (1978) described a condition he called 'jogger's foot', in which excessive valgus or external rotation of the

foot during running puts excessive stretch on the medial plantar nerve, resulting in tarsal tunnel syndrome.[7,3]

Multiple intrinsic factors exist. The foremost are hyper-pronation, prior medial ankle sprains, poor proprioception and weakness in the lower leg, ankle and foot. Tarsal tunnel syndrome can occur due to traumatic and non-traumatic injuries. Traumatic episodes occur due to a direct trauma. Non traumatic cases can cause by overtraining.[15]

Preventive or ergonomical correcting skills can improvise the incidence and reduce the impact of TTS on sportsman performance at competitive levels. To find out the injuries earliest is important to improve the career in sports and increase the physical capacity for the competitions. So to evaluate the incidence of TTS in sprinters becomes important.

MATERIALS AND METHODS:

Subjects**:** District level sprinters age group 18 -36years.
Study design: Analytical
Sampling method: Convenient sampling
Sample size: 120
Study setup: Sports Clubs in and around the cities

Materials:

1. MNCV set up
2. FADI scale sheet

Procedure:

The sports academies across the cities approached for sprinters. The district level sprinters were approached for evaluation of symptoms related to TTS. The players were explained about the study. 120 participants fulfilling inclusion criteria that are both the genders, age group 18-35 years, 100 meters district level sprinters, practicing since 4-5 years was included.

Participants who were non runners, with any recent musculoskeletal injuries or lower limb surgeries and more than 5 years of experiences were excluded. Informed Consent was taken from all the participants. Procedure was explained to all the participants.

All 120 Sprinter Runners were evaluated for signs of TTS using special tests those included Tinel's sign, Dorsiflexion eversion test and Triple compression stress test in sequential manner.

And players showing the signs on minimum 2 tests were considered to be positive for TTS. The players showing positive signs for special tests for TTS undergone MNCV testing and were evaluated for Foot and Ankle Disability Index (FADI). Data was collected and subjected to statistical analysis.

RESULTS:

Amongst 120 sprinters evaluated for TTS (68 Males; 52 females); total 38 players showed positive signs for TTS on minimum 2 of the special tests.

Table 1: Evaluation for TTS amongst sprinters

Age Groups Mean ± SD	Years of experience Mean ± SD	Positive	Negative	Total
18-26	3.02 ± 1.34	25	60	85
27-35	4.22 ± 0.84	13	22	35
% for special tests		31.6%	68.33%	120

Table 2: Motor Nerve Conduction Velocity (MNCV) for tibial nerve:

MNCV	No. Of Subjects	MNCV Mean ± SD (Normal range- 48 ± 4.5 m/s)	Proximal Latency Mean ± SD	Distal Latency Mean ± SD
Impaired NCV	29	39 ± 3.05	9.21 ± 1.01	3.74 ± 1.22
Normal NCV	9	46.4 ± 2.01	9.33 ± 2.21	4.49 ± 2.49
Total	38			

Graph 2: MNCV (Motor Nerve Conduction Velocity) for tibial nerve

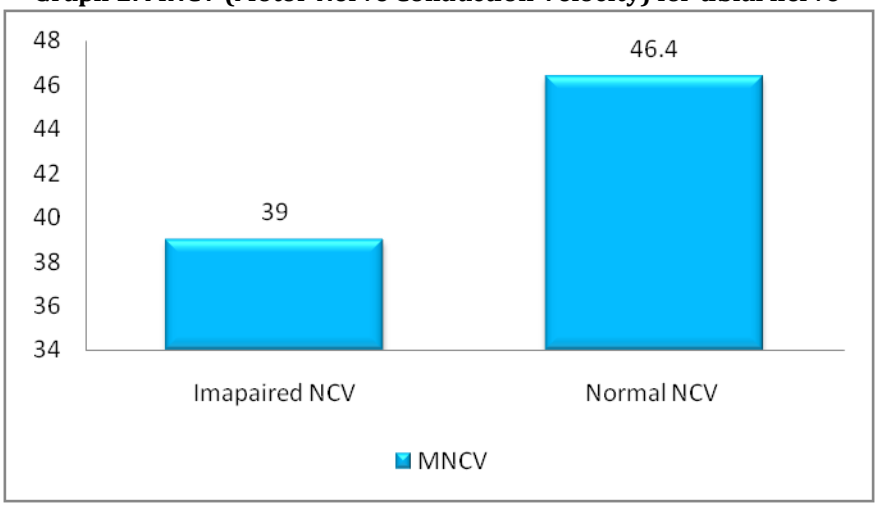

Table 3: Interpretation of FADI in subjects diagnosed with TTS:

Category	No. Of subjects	MNCV Mean ± SD
Mild	29	42 ± 2.05
Moderate	6	37.38 ± 1.21
Severe	3	31.99 ± 1.05

DISCUSSION:

This study was done to evaluate the incidence of Tarsal Tunnel Syndrome in 100 meters sprinter. This study found that there is 4.16% incidence of TTS is present when assessed by using Motor nerve conduction velocity studies in district level sprint runners. The Incidence of the TTS in sprinter runners is probably due to over training, practicing a lot and competitions.[1]

The foremost intrinsic factors responsible for TTS are hyper-pronation, prior medial ankle sprains, poor proprioception and weakness in the lower leg, ankle and foot.[1] at initial stage patient experience only numbness at heel or arch region later on patient starts feeling tingling sensation paraesthesia and burning sensation[1].

The TTS was confirmed by using 3 special tests. Participants having 2 or 3 special test result positive were further undergone for Motor Nerve Conduction Velocity (MNCV) to confirm the diagnosis of TTS [2]. Tinel's Sign, Dorsiflexion Eversion Test and Triple Compression Stress Test were performed on 120 individuals. Tinel's sign is a way to detect irritated nerves. Triple Compression Stress Test This distal sign of regeneration can be expected during different stage of somatosensory recovery.[2]

FADI (Foot and Ankle Disability Index) is considering the most appropriate patient assessed tools to quantify function disability. The FADI sport scale appears to be more sensitive at detecting deficits and may be more practical for use among high-functioning individuals.[6] In this study FADI shows mild disability in 76% sprint runners.

FADI being a more subjective scale which used to detect the symptoms. But MNCV testing is an objective measurement for testing of signs. So, MNCV is more reliable than the special tests which is also objective but less reliable than MNCV testing and as FADI is a subjective measure so it's less reliable than Special tests and MNCV testing.

Though, the signs were positive for TTS, 76% of people mentioned mild to moderate disability as most of the players ignore their symptoms during their practice and competitions.

This study concurred with the Mitsuo Kinoshita et al. who concluded that activities which triggered tarsal tunnel syndrome were those that applied a heavy burden on the ankle joint such as sprinting, jumping, and performing ashibarai in judo under specific physical conditions. Predisposing underlying physical factors were flatfoot deformity and an existence of talocalcaneal coalition, accessory muscles, and bony fragments around the tarsal tunnel. The majority of patients were able to return to the same sport after treatment.[6,7]

Mohd Yusof Baharuddin et al. as contributed a study on biomechanics in runners. As biomechanics plays an important role in runners to occurrence of tarsal tunnel syndrome. Running is a complex coordination

process that involves the movement of the entire body. Although human runs differently, but certain general features of running motion are common. The phases for running are similar as walking except in running there is no double support phase.[7]

When running is compared to walking, humans actually moves from one leg to the collateral leg while running which expends a tremendous amount of energy opposing gravity and absorbing shock during take-off and landing study the current literature regarding walking and applied to the analysis of running gait comparing between shoe wear and bare foot point of view.[7]

It has been already proven that Tarsal tunnel syndrome certainly occurs in athletes performing strenuous sporting activity. To prevent recurrence and to ensure a safe return to the sports concerned, it is essential to thoroughly remove the factors that predispose patients to TTS and to regulate their exercise, as recurrent TTS is extremely difficult to treat.[7] Underlying physical factors such as foot deformities can be further evaluated which is associated with TTS.

CONCLUSION:

The present study concluded that there is a significant incidence of Tarsal Tunnel syndrome with mild disability in district level Sprinters.

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