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REVIEW REPORT

Comparison of medial tibial stress syndrome and its severity in regular runners vs treadmill runners

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ABSTRACT

Medial Tibial Stress Syndrome (MTSS) usually known as shin splints is an exercise related overuse injury of lower extremity. It mostly affects athletes and military recruits. The incidence of MTSS is 16-44% in a variety of sports, such as field events and long-distance running. Contributing factors for MTSS are female gender, increased BMI, increased navicular drop, poor running kinematics and previous history of MTSS. Most common symptom in MTTS is pain across the posteromedial border of the tibia which is increased by activity and relieved through rest. It can be reliably diagnosed with a history and clinical examination. MRI and CT scan are used to rule out other conditions which have similar symptoms. The severity of condition is determined through MTSS score. Management of MTSS includes rest, icing, massage, acupuncture, leg braces and modalities; whereas surgery is reserved for refractory cases.

Key Words: bone mineral density, computer tomography, magnetic resonance imaging , medial tibial stress syndrome, runners.

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Introduction:

Distance running is a sport that is enjoyed by people of all ages. It has known cardiovascular benefits. While running, great amount of strain is placed on lower extremity. Due to the repetitive overloading, distance runners can sustain overuse injuries. One of the most common injuries sustained by distance runners is medial tibial stress syndrome also known as shin splints.(1) Shin splints occur in 13-17% of all sports-related injuries and slightly more in aerobic dancers; its prevalence in runners and in military recruits 13.6-35.(2-4) Gender distribution of MTSS is 10.7% of males and 16.8% of females. Posteriorly, the leg is comprised two compartments, one is superficial, and the other is deep. The muscles of superficial group include the gastrocnemius, plantaris and soleus. They are supplied by the branches of the posterior tibial and peroneal arteries, and they are innervated by tibial nerve. Posteriorly crural fascia and anteriorly the deep transverse fascia contain the superficial posterior compartment.(5) The deep posterior compartment is surrounded by posterior surface of tibia, interosseous membrane, and anteriorly posterior surface of fibula and posteriorly by deep transverse fascia that arches between the medial border of tibia and posterior fibular borders.(6)

The muscles of deep posterior compartment include flexor hallucis longus, flexor digitorum longus and tibialis posterior. These muscles receive blood supply from either the peroneal or posterior tibial arteries and are innervated by tibial nerve.(6) MTTS or shin splints is defined as the pain or sensation of discomfort which arises in leg due to continuous running on tough planes or by extreme use of flexors. It is commonly described as a pain induced by repetitive training or exercise.(7) Several factors cause the medial tibial stress syndrome in which lower extremity alignment, life style, decreased bone mineral density and weak tibialis posterior muscle are prone to develop MTSS.(8,9) Medial Tibial Stress Syndrome has complex mechanism of injury, however; the exact etiology is still unknown. Some studies suggest it is either a crural fasciopathy, overload injury of tibia or combination of

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both. In a retrospective study, biopsies were taken from the painful area of athletes having medial tibial stress syndrome to evaluate the micro-cracks, diffuse micro damage and remodeling, that suggests the collection of unhealed micro damage can be the pathophysiological cause of MTSS. It is characterized by palpable pain and tenderness along the posteromedial border of the tibia.(10)

Generalized symptoms of shin splints include a sudden pinching pain caused by touching the affected area, sometimes followed by swelling of muscle which leads to a difficulty in jogging and occasionally in walking, too.(11) At an early stage, the sensation of ache is usually worst at the beginning of physical activity and gradually decreases during workout and training.

Physical examination and a comprehensive medical history are important for diagnosis of MTSS. Shin Palpation Test (SPT) and Shin Oedema Test (SOT) are the best possible tests that can identify individuals who are at a higher risk of developing MTSS.(12)The main goal for the treatment of MTSS is pain relief and return to daily activities. In an acute stage rest, cryotherapy, electrotherapy and analgesics such as acetaminophen and anti-inflammatory drugs are usually prescribed. This study proposed several conservative means for the treatment of MTSS including extracorporeal shock wave therapy, pneumatic leg braces, heel cord stretching and calf muscles strengthening exercises can be used to treat MTSS.(13) Strengthening of the tibialis anterior muscle and stretching of the calf muscles as well as core stability exercises are often helpful during its sub-acute phase. Hyperbaric Oxygen Therapy is another treatment option, sports compression stockings neuromuscular education including proprioceptive balance training is necessary to prevent the reoccurrence of MTSS.(14)

The prefabricated foot orthoses (left) and flat insole (right) prior to being heat moulded to a participant's foot(15). Facial distortion model is an effective method for pain relief and to restore the exercise tolerance. Other surgical options consist of posterior fasciotomy with and without cauterization of the posteromedial ridge of tibia as it has reduced the pain in athletes by 72% on visual analogue scale. The prognosis of the condition is good. With adequate rest and activity modification, full recovery is expected.(4)

Methods:

The researchers did research on multiple promising articles and studies with regard to various biometric variables and their coalition with the MTSS. Detailed criteria for the diagnosis of MTSS should be illustrated in copious and ample detail in each document to eliminate the causes of stress fracture and ischemia. The articles researched were centered on runners or participants involved in some sports that comprise of and require running. All participants must be asymptomatic at the point of reference. PubMed, Medline and Google Scholar were scoured for articles and literature and only articles and studies from the time period 2000-2020 were considered. Only articles secured with various specified keywords, definitive and satisfactory sample size, sampling technique, and relevance to the MTSS were incorporated.

Discussion:

One of the most common lower leg syndrome that mainly affects runners is medial tibial stress syndrome. Although novice and recreational runners are often affected, this is the narrative review focus on this topic. The researchers have summarized the intrinsic and extrinsic factors for specific preventive strategies include navicular drop, pelvic drop, walking distance and peak hip internal rotation knee flexion. Runners with MTSS have higher values of navicular drop that is a foot indicator comparative to their uninjured peers. Over pronation in running causes compensatory mechanism of abductory twist an early heel lift which increases the load on posterior tibial tendon that promotes overuse injuries.(16) Moreover, during the stance phase of running, higher pelvic drop and lower knee flexion cause the runners to suffer from MTSS that influences other overuse injuries in this group.(3) The muscles responsible for sustaining the arch of the foot cause stress by excessive pronation during motion and increase the maximum voluntary isometric contraction torque of the first metatarsophalangeal joint in plantar flexion, which has been seen among runners with a MTSS history.(17)

Considering the factors analyzed, it should be noted that none of the studies assessed the body mass index despite its high association with the occurrence of injuries in beginner runners. Nielson at all showed that extrinsic factor of MTSS is distance running. Runners were divided into three groups based on their increase or decrease in weekly running distance and found that those expanding their runs had a prevalence rate of >30% for this injury.(18) The fact that a history of previous trauma and injuries and long distance training every week serve as stimulative and affective factors for injuries that collaborate and coincide with these

findings.(19) It was discovered by Loudon and Reiman that the symptoms of MTSS vary in men and woman with higher pelvic drop surveyed and scrutinized in women while running.(20) Because there is an immediate relationship between the biomechanics of running and tendency as well as frequency of injuries, precise and unambiguous training in running routines and techniques should be implemented to cause a decline in the risk factors leading to injuries. There are three consequential points that are considered for recreational and amateur runners, out of which two points are designated to prevention and one for rehabilitation. Biomechanical investigations on running activities can play an important role in ruling out the causes of the injury. By doing particular running activities, running kinematics can be enhanced. To make it more effective, strengthening, and neuromuscular control exercises should be done along with this protocol. The training program must be set in a manner that will slowly recover the patient by managing pain and by inhibit the recurrence of injury.

Conclusion:

Medial Tibial stress syndrome is more common in regular runners as compared to treadmill runners.

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