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EFFECTIVENESS OF 6 WEEK HIP MUSCULATURE STRENGTHNING ON PAIN, NAVICULAR DROP & TIBIAL TORSION IN MARATHON RUNNERS WITH SHIN SPLINT

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ABSTRACT Dysfunction of tibialis posterior is common cause for medial tibial stress syndrome & flat foot. Flat foot leads to pronated foot which causes lot of biomechanical changes leading to increased tibial torsion & eventually the femur. Beginners are more prone to injuries due to their lack of proper training & their body is not used to such amount of stresses on it. Shin splint lead to lot of pain & are a very common injury with high prevalence of recurrence. There were 30 participants with shin splint were selected. The subject were assessed with Q-ANGLE, NAVICULAR DROP, MMT,VAS for 6 weeks duration. The pre & post values of control & experimental group were compared, which concluded that Hip musculature strengthening is effective to reduce pain, navicular drop and tibial torsion in marathon runners with shin splint.

KEYWORDS : Shin splint, Pronated feet, Navicular drop, Tibial torsion, Marathon runners, Glutes strengthening.

INTRODUCTION

Exercise induced lower leg pain is common, notably in runner.Standard Shin splints define as "pain and discomfort in leg from repetitive running on hard surfaces, a forcible use of foot flexors.

Various stress Reactions of the tibia and surrounding musculature occur when the body is unable to heal properly in responding in repetitive muscle contractions and tibial strain.Medial shin pain describes specific overuse injury which produces pain along the posteromedial aspect of the distal two-thirds of the tibia. [1]Medial shin pain is common complaint that may stop an athlete from running.

Spectrum of tibial Stress Injuries Is likely involved in MTSS, including tendinopathy, periostitis, periosteal remodelling, and stress reaction of the tibia.Dysfunction of the tibialis posterior, tibialis anterior, and soleus muscles are also commonly implicated. These various tibial stress injuries appear to be caused by alterations in tibial loading, as chronic, repetitive loads cause abnormal strain and bending of the tibia.Although sometimes composed of different etiologies, MTSS and tibial stress fractures maybe considered on continuum of bone–stress reactions.

Pesplanus, commonly known as „flatfoot, "is a common pathomechanical condition characterized by a lowered medial longitudinal arch with rear foot eversion [2,3] and exaggerated pronation [4]. Primarily, two variants of flatfoot have been described: rigid and flexible; the latter is more prevalent [5]. Pronated feet are characterized by adduction with medial rotation of talus, eversion of calcaneus, and supination with abduction of forefoot [14,15].

These biomechanical alterations increase internal rotation of the tibia and femur with excessive anterior titling of the pelvis Several structures, such as bones, ligaments [4], andextrinsic [16] and intrinsic musculature [17,18] of the foot, are responsible for maintaining the MLA. Tibialis posterior muscle plays key role as rearfoot invertor [16] and provides a dynamic support across the midfoot [19,20] and maintains the MLA tightness of iliopsoas and other pelvic girdle muscles has been found to be associated with foot architecture

Reduced IP flexibility may result in anterior pelvic tilting; thus, IP stretching could correct the malalignment at the pelvis and the entire lower extremity and hence may part reverse the potential muscular imbalances due to flatfoot Gluteal muscle strengthening: The gluteal muscles stabilize the hip by counteracting gravity s hip adduction torque and maintain proper leg alignment by eccentrically controlling adduction and internal rotation of the thigh Re-activating the gluteal muscles will re-establish correct muscle recruitment patterns and enhance strength and performance.Muscle strengthening is believed to help to prevent the effect of fatigue on bone and muscle. This usually consists of progressive exercise to the dorsi and plantarflexors of the foot. Stretching may also increase muscle shock absorption. Shin splint pain maybe caused by bony reaction to the stress of overuse.

Bone react to stress by remodelling itself in an attempt to become stronger this involve removal of the part of the bone matrix that was not strong enough and replacing it with bone matrix strong enough to cope with increase demands with it. The bone may successfully adapt to the increase stress.The exact mechanism is unclear, as tibial stress fracture commonly occurs in various tibial sites depending on the type of activity.To understand how the biomechanics plays a role in the development of shin splint, we need to know the role of foot while running.

a. Tibial varum because the foot hits the ground in an exaggerated, inverted position therefore must roll over further to make adequate contact.
b. Fore foot varus because rare foot must roll over further to compensate for theinverted forefoot.
c. Internal femoral torsion because the foot may pronate to increase abduction and therefore walk straight.

When the foot hits the ground, it is in supinated position which is stiff and rigid position.The foot must adapt to the surface and dissipate some of the impact of the shock, thus it must change from a high arch stiff lever(supination) to a low arch.The pronated position is maintained throughout contact and midstance but at pushoff, the foot must once again become a stiff lever while moving into supination.

PROTOCOL

- Warm up – 10 to 15 mins
- 1600-meter slow jog
- Dynamic stretching exercises of whole body mainly of LE
- 80mtr slow strides×3
- Hip muscle strengthening (performed with TheraBand)

Sr. No.	Exercise
1.	Side lying hip abduction
2.	Pelvic drop, hike followed by hip abduction
3.	Clamshell
4.	Back kicks
5.	Sitting calf raises
6.	Toe curls
7.	Iliopsoas stretching
8.	Abdominal crunches
9.	Russian twists
10.	Leg raises
11.	Plank hold

SHIN SPLINT TREATMENT

- Icing the tender area for 5 to 10 minutes, 1 to 3 times a day.
- Exercises to gently stretch the muscles around the shin.
- Cool Down – 10 mins
- 1600-meter slow jog
- Stretching exercise hold 30 sec mainly of LE

PROGRESSION

- Green TheraBand (Week 1-2)

- Blue TheraBand (Week 3-4)
- Black TheraBand (Week 5-6)

RESULT AND TABLE

		MEAN COMPARISON	SD
Q ANGLE MEAN EXPERIMENTAL AND CONTROL GROUP			
EXPERIMENTAL	PRE	15.74	1.28
	POST	14.6	0.98
CONTROL	PRE	16.06	1.11
	POST	15.67	1.11
NAVICULAR DROP			
EXPERIMENTAL	PRE	11.47	1.137
	POST	9.73	0.88
CONTROL	PRE	11.54	1.065
	POST	10.6	0.99
VAS			
EXPERIMENTAL	PRE	5.22	0.601
	POST	3.37	0.682
CONTROL	PRE	5.39	0.772
	POST	4.07	0.751
MMT			
EXPERIMENTAL	PRE	4.4	0.51
	POST	5	0.2
CONTROL	PRE	4.4	0.51
	POST	4.6	0.51

DISCUSSION

Current study was conducted to find the effect of hip musculature strengthening on pain, navicular drop and tibial torsion in marathon runners with shin splint. The study was held over a period of 6 weeks on 30 individuals. The result of this study demonstrated that gluteal muscle strengthening helps improve pain, navicular drop and tibial torsion in marathon runners with shin splint. The study included a total of 30 individuals, both male and female (age 18 to 24), who were recently diagnosed with shin splint. The runners had a normal BMI between 18.9 to 24.9. They had running experience of atleast one year ran a minimum of 5km. A navicular drop of more than 10 mm, a maximum Q- angle of 12- 14 degrees for males and 15 to 17 for females were part of the study. A gluteal muscle strength of grade 4 was considered.

When there is weakness of gluteal muscles there is increased femoral internal rotation & excessive anterior tilting of the pelvis. Increased internal rotation of the tibia increases stress on tibia thus O-angle increases. With gluteal muscle strengthening femur internal rotation decreases leading to a relatively normal Q angle.Navicular Drop is seen with pronated feet because of tibial torsion, adduction with medial rotation of the talus, eversion of the calcaneus and supination with abduction of forefoot. Due to strengthening of tibialis anterior, tibialis posterior, soleus, gastrocnemius and intrinsic muscles, the medial arch increases leading to reduced Navicular Drop.

Farhan Alam et al conducted a study on effect of selective strengthening of tibialis posterior and stretching of iliopsoas on navicular drop, dynamic balance, and lower limb muscle activity in pronated feet. In study it was found that pronated feet, adduction of talus and medial rotation result in internally rotated tibia and femur and anteriorly tilted pelvis. This leads in compromised length of Iliopsoas muscle. The flexibility of iliopsoas plays role in correcting foot alignment and MLA in patients with pronated feet. The biomechanical changes lead to overloading of tibialis posterior which plays role in rearfoot invertor and provides dynamic support to maintain medial longitudinal arch. Thus, shin splint is seen in these runners.As the gluteal muscle strength is increased and the flexibility of iliopsoas muscle is improved, the loading of the medial longitudinal arch is markedly reduced. Owing to the reduced eversion and adduction, tibialis posterior can now work normally without much overload. As this load decreases, there is reduction in pain. When the strength of gluteal muscles increases, the increased femoral internal rotation reduces and in turn corrects the increased tibial internal rotation. Along the line, as the tibial rotation decreases, there is greater supination of foot than before and thus the navicular drop previously seen is also corrected.

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