

**Risk factors for shin splints in running sports***Aziz Subhani<sup>a</sup>, Rukhshanda sarwer<sup>a</sup>*<sup>a</sup> The university of FaisalabadCorrespondence: [azizsubhani1@gmail.com](mailto:azizsubhani1@gmail.com)**ABSTRACT**

**Background and Objectives:** Shin splints is pain on anterior side of lower leg below knee and above ankle also called medial Tibial stress syndrome (MTSS). Shin splints are common in players participating in running sports. Risk factors for shin splints in these sports are over activity, playing on hard surface, using inappropriate foot wear, foot deformity in players, no warm up and no stretching. To study risk factors for shin splints in running sports in Lahore.

**METHODOLOGY:** A case control study was conducted in Lahore in 2017 in which 179 players were included and risk factors for shin splints were studied in these players. Data was collected from players, using self-structured questionnaire.

**RESULTS:** Odds ratio for stretching before running was 0.929, and odds ratio for inappropriate foot wear was 0.971, so they were not proved as risk factors for shin splints. Odds ratio for not warming up before running was 1.383, Odds ratio for players playing on hard surfaces was 1.262, Odds ratio for shin splints in players having any foot deformity was 1.048 and odds ratio for players running more than 100km per week was calculated 1.60 so these are proved risk factors. Mean age for players having shin splints was calculated as 22.2 and the range of age for players was 15 to 30.

**CONCLUSION:** Odds ratio for over activity, running on hard surface, foot deformity and players not warming up before running were more than 1, so they are proved as risk factors for shin splints. Two risk factors using inappropriate foot wear and stretching before running were not proved as risk factors for shin splints.

**KEYWORDS:** Shin plates, sports, medial tibial stress syndrome, players

**INTRODUCTION**

As the involvement of people is increasing in sports, rate of acute and Overuse trauma is also increasing. If a sportsman performs over activity Stress will be on bones and muscles of lower limb (1). Now a days there is much more need to study injuries in running sports. 10% cases of injuries caused by over stressing the muscles are frequent in athletes. Pain of shin splints is relieved by resting. Tibial injuries are 75% because of its anatomical importance for runners which may cause leg pain symptoms, medial Tibial stress syndrome MTSS. Shin splints, compartment syndrome, and stress fractures. Feeling of pain is along posteromedial border medially and distally on Tibial surface. On clinical examination tenderness is present at the posterior and medial Tibial borders. Normal pulses on peripheral region and no changes in neurology present (2). Contributing factors for shin splints

includes hard training surface, any deformity in lower extremity, inadequate stretching, inappropriate foot-wear and inadequate strength. If symptoms overlap diagnosis will be difficult. Pain is localized on medial border of distal third of tibia. For diagnosis of shin pain most common test is palpatory test. Shin splints are necessary to diagnosed and rehabilitation is necessary (3). Foot deformities and running style also contributing factors in shin splints. So comparison of players with and without shin pain indicates players with foot deformity and landing on ground with eversion have more shin pain and have abnormal biomechanics. There may be excessive pronation present when causes shin pain. On the other hand training errors, shoe design, surface type decreased flexibility and biomechanics contribute in shin splints (4).

The term shin splints was used for many years for pain

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resulting on Tibial region after over activity in running sports .It is also known as medial Tibial stress syndrome .Shin splints is associated with pain after over activity and is exercise induced pain. There are many theories present which explain occurrence and diagnosis of shin splints. Shin splints is mainly diagnosed by periostitis and inflammation (5).Symptoms include pain. Inflammation, discomfort and increased intra compartmental pressure pain increases with activity and relieves with rest. Treatments includes orthotics NSAI,DS and ultrasound(4, 6). Shin splints is a long lasting chronic pain in an athlete causative factors for shin pain are anatomical ,physiological and environmental factors location of shin pain is medial side of tibia and lateral side of tibia on both upper and lower portions of tibia. Intra compartmental pressure is also increased (7).According to American Medical Association(AMA) definition shin splints is also known medial Tibial distress syndrome type2 its diagnosis can be made by following criteria as after repetitive activity on tough grounds player will have pain and discomfort in the leg , or due to over activity of foot flexors. Shin splints is diagnosed on the base of inflammation in shin region in case of fractures or ischemia it is not shin splints (8).

Tearing of muscle fibers at interface of bone and muscle at the muscle-bone interface is a cause inflammation and pain. Therapeutically treatment protocol includes biomechanical interventions (orthotics), NSAID's and ultrasound (9). Shin splints are localized pain in leg and Tibial bone. Shin splints can also mixed with other pathological conditions which cause lack of positive identification of shin splints. A study conducted on multiple aspects of injury of shin splints which included the factors and causes which could lead to shin splints. Investigation of risk factors of shin splints in females is also studied (10).Shin splints are characterized by pain on posteromedial border of tibia.it increases with activity and decreases with rest and on diffused area. On examination there is tenderness all other neurological conditions are normal (11). During running three types of forces act on muscles and these forces are compressive, tensile and shearing. These forces push muscles and deform them (12).

Shin splint is an injury which is very painful and constrains the performance of athlete. Both intrinsic and extrinsic factors causes shin splints. studies indicate that shin splints is not a compartment syndrome so it will not be mixed with compartment syndrome but periostitis is a etiology and it is a medical condition caused by inflammation of the periosteum, a layer of

connective tissue that surrounds bone. Some studies indicate changes in bone anatomy can be a cause for chronic shin pain. Shin pain may be felt on tibialis posterior and osseous .Shin splints that are caused by muscle weakness involved muscle may be flexor digitorum muscle. Shin splints may be acute and chronic, acute shin splints may include periostitis and sever pain while chronic shin splints may include minor fracture, muscle tear by compressive forces, and compartmental syndrome (8).

## METHODOLOGY

### STUDY DESIGN:

Case control study design was used.

### STUDY SETTINGS:

In Lahore:

- Football clubs of Lahore registered with Pakistan Football Federation Lahore:

1. Fame football club Lahore.
2. Choung football club Lahore.
3. Township Football club Lahore.

- Hockey clubs of Lahore registered with Pakistan Hockey Federation Lahore:

1. Pakistan national hockey team
2. Quaid -e-Azam hockey club
3. Nobel hockey club
4. Youngster hockey club
5. Johar town hockey club

- Rugby clubs of Lahore registered with Pakistan Rugby union.

1. Pakistan National Rugby team.
2. Rugby Union players

### DURATION OF STUDY:

This study was completed in 3months after approval of synopsis.

### SAMPLE SELECTION CRITERIA:

Inclusion criteria for cases:

- Players with shin splints.
- Both genders equally included.
- Players' ages should be 15 to 30.

Exclusion criteria for cases:

- Previous history of fracture of tibia.
- Presence of any other neurological or vascular pathology of lower limb.

Inclusion criteria for controls:

- Players without history of shin splints.
- Both genders equally included.
- Age should be 15 to 30.

Exclusion criteria for controls:

- Previous history of fracture of tibia.
- Presence of any other neurological or vascular pathology of lower limb.

## METHODOLOGY / DATA COLLECTION PROCEDURE:

A case control study was conducted in Lahore in 2017 in which 179 players were included and risk factors for shin splints were studied in these players. An informed consent was taken from the subjects included in study. Data was collected from players, using self-structured questionnaires.

### SAMPLE SIZE:

Sample size was 179 USING RAO SOFT with 95% confidence interval and 5% margin of error response distribution is 70% and population will be 400.

Formula is:

$$\begin{aligned} x &= Z(c/100)2r(100-r). \\ n &= N x / ((N-1) E^2 + x). \\ E &= \text{Sqrt} [(N - n) x / n (N-1)]. \end{aligned}$$

n= the sample size.

E= margin of error.

r = the fraction of responses that you are interested in. Z(c/100) is the critical value for the confidence level c.

### SAMPLING. TECHNIQUE

Non probability convenient sampling technique was used.

## RESULTS

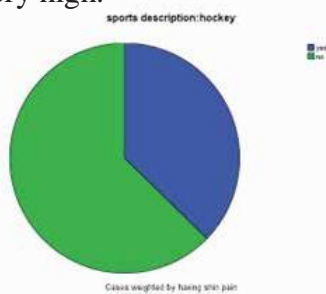
Mean age of players having shin pain 22.6 and mean age not having shin pain 23.7.

Total 179 players from Hockey, Soccer and rugby. Female players were 17 and 162 were male players.

**Table 1: Socio-demographic profile of players having Shin Splints:**

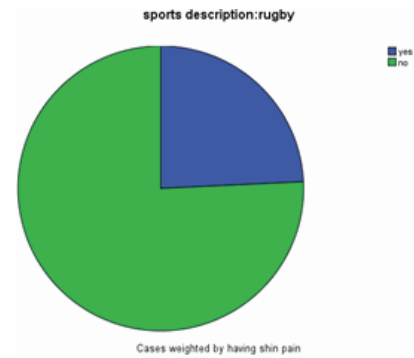
Socio-demographic profile:		Shin pain	
		Yes(cases)	No(controls)
Age( mean±Sd) (15-30)		22.2±3.581	23.7±2.8
Gender	Male	83	79
	female	7	10

This pie chart shows in hockey player's incidence of shin splints very high.



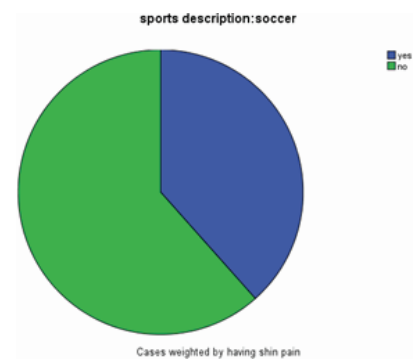
**Pie chart1: Incidence of shin splints in hockey players**

This pie chart shows in rugby players incidence of shin splints was low.



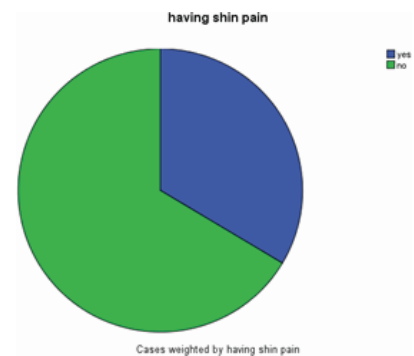
**Pie chart2: Incidence of shin splints in Rugby players:**

This pie chart shows in soccer players incidence of shin splints is high as hockey players.



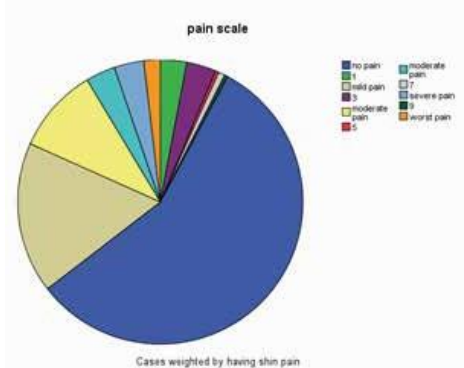
**Pie chart3: Incidence of shin splints in soccer players**

Large number of Players having shin splints.



**Pie chart4.Cases and controls**

Pain scale indicates incidence of shin splints pain high percentage of players having mild pain.



**Pie Chart5.VAS**

**Table2. Odds Ratio for relative risk factors**

Risk Factors		Shin Having splints		Odd's ratio value
		Yes	No	
1. No warm up	Yes	84	6	1.383(0.460-4.16)
	No	81	8	
2. No Stretching before running	Yes	76	14	0.929(0.409-2.410)
	No	76	13	
3.Hard training surface	Yes	66	24	1.262(0.661-2.410)
	No	61	28	
4.Inappropriate footwear	Yes	74	16	0.791(0.356-1.759)
	No	76	13	

## DISCUSSION

Stephen B Thacker in his study in 2002 about risk factors for shin splints found intrinsic and extrinsic risk factors for shin splint, intrinsic risk factors include age, gender, conditioning, physical defects and psychological defects. Extrinsic risk factors include type of sports played, equipment used by the players e.g. shoes, other extrinsic factors are playing surface and type of sports (8). In accordance with my study following risk factors, foot deformity 1.098, no warm up before running 1.383, and training on hard surface 1.262 have odds ratio more than one and were proved as risk factors for shin splints. Using inappropriate foot wear have Odds ratio 0.791 was not proved in my study. On the other hand in hockey players all of them use appropriate footwear while training but there training surface is hard, they train on ground with thin green carpet.

In another study in 2014 on 15 years old lifesaving competitor risk factors identified for shin splints are Foot posture is considered as main risk factor for shin splints. For checking foot deformity foot posture index (FPI) was used in this study (17). Odds ratio calculated for players having foot deformity was 1.04. Foot deformity was proved as Risk factor for shin splints in my study. It was proved if a player having any foot deformity including varus valgus or flat foot he will have shin splints. Those players having any foot deformity shin splints may become chronic.

Other studies in 1985 by Huges et.al and in 2003 by Kvale et.al on risk factors for shin splints identifies symptoms as pain on anterior two third of tibia and Medio lateral region of tibia. In these studies risk factors and etiology of shin splints was studied. Main risk factors identified in this study are excessive running, hard training surface, and gender and foot deformity (10, 12). In accordance with my study following risk factors, foot deformity 1.098, hard training surface 1.262 and players over training running more than 100 km per week odds ratio 1.86 over training was proved as a strong risk factor in my study. Risk factors identified in this study are approved risk factors and odds ratio calculated was more than one.

Another study in 1994 on incidence of shin splints in contact running sports risk factors were identified. Shin splints incidence increases by forceful contact to ground of players while running and jumping on hard surface (18). Odds ratio of players running on hard surfaces 1.2 so in accordance with my study this risk factor proved.

A study in 2001 conducted on high school runners in America defines etiology of shin splints as stress injury and it occurs in runners running long distances. In this study etiology for shin splints is based on three categories as training errors, interactions between inappropriate shoes and ground and anatomical deformities (4, 19). Odds ratio calculated for inappropriate footwear was 0.791 this risk factor not proved in accordance with my study. Foot deformity has odds ratio 1.04 was proved. For players running long distances more than 100 km per week odds ratio was 1.6 this risk factor proved. Training errors include training on hard surfaces, no stretching and no warm up. Odds ratio of players running on hard surfaces 1.2 so in accordance with my study this risk factor proved. Odds ratio for no warm up was 1.383 was proved and no stretching has odds ratio 0.929 was not proved in my study.

According to a study in 2014 by JP Difiori it was difficult to set a limit for over use of muscles. Studies indicate that players running more than 16 hours per week having more shin pain average half of a soccer match of equals running 12 km. Average range for overuse of muscles is 100 km per week (20). This risk factor approved strongly as a risk factor in accordance with my study. Odds ratio of players running more than 100 km per week was 1.6.

According to study in 2008 shin splints are caused by



over activity and diagnosed by pain at shin bone. Due to stress periostitis may be present a medical condition caused by inflammation of the periosteal, a layer of connective tissue that surrounds bone (3). Over activity is a proved risk factor in my study having odds ratio 1.6.

Study published by ministry of defense in 2008 in London. According to this study shin splints accounts for 6-16% injuries that occur in running sports. Main risk factors are as following over activity, foot deformity, no warm up, training on hard surfaces and no stretching (5). In my study odds ratio calculated for over activity running above 100 km per week was 1.6 which indicates that this is a strong risk factor anatomical foot deformities have odds ratio 1.098, no warm up 1.383, hard training surface 1.262 are proved risk factors and no stretching have odds ratio 0.929 was not proved in my study.

### CONCLUSION

This study was conducted to study risk factors for shin splints (MTSS) results shows incidence of shin splints in different age groups and also proves risk factors for shin splints. Mean age for players having shin splints was calculated 22.3 years. Players included in study having age range from 15 to 30. Relative risk factors for shin splints were studied in running sports like Hockey, Rugby and Soccer. There were six risk factors included in my study which are following any foot deformity 1.098, over activity running more than 100 km per week 1.6, warm-up 1.382, and running on hard surfaces 1.262, inappropriate foot wear 0.791 and no stretching 0.929 four of these risk factors having odds ratio more than one and were proved as risk factors two risk factors stretching before running and foot wear have odds ratio less than one and were not proved. If a player runs on a hard surface ground reactional forces were increased and caused shin splints. Foot deformity may contribute to chronic shin splints. Limitations:

Since shin splints can resemble other disorders, such as stress fractures, diagnosing them can be challenging. Furthermore, psychological issues like the anxiety of losing fitness could keep athletes from completely following rest schedules. Since there is no one-size-fits-all answer, a customized strategy is required. Economical or practical considerations may also restrict access to resources and expert care, such as physical therapy or custom orthotics.

Recommendation:

Athletes should wear suitable footwear, raise their exercise intensity gradually, and frequently stretch and

strengthen their lower leg muscles, especially the tibialis anterior and calves, to prevent and manage shin splints. Risk can also be decreased by choosing softer running surfaces, enhancing running form, and implementing cross-training. It's also crucial to treat any muscular imbalances and recuperate properly with rest days.

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#### Authors Contributions:

**Aziz Subhani:** Substantial contributions to the conception and design of the work.

**Rukhshanda Sarwer:** Design of the work and the acquisition. Drafting the work. Final approval of the version to be published.

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