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Correlation between hamstring tightness and generalized laxity in roller skaters

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ABSTRACT

Background: Roller skating is a form of recreational activity as well as a sport, and can also be a form of transportation which is done with Roller skates. Roller skating provides an excellent means of cardiorespiratory exercise. The recent popularity of roller skating among persons of all ages has resulted in an increase in associated musculoskeletal injuries. In the field of figure skating, 50% of injuries are traumatic, while 50% of injuries are due to overuse and are more common in single skaters, whereas acute injuries occur more frequently among pair skaters and ice dancers. The aim is to find the correlation between hamstring tightness and generalized laxity in roller skaters.

Method: 90°-90° SLR test was used in order to assess the hamstring tightness in roller skaters and Beighton scale was used in order to assess the generalized laxity in roller skaters.

Results: In 90°-90° SLR test, for right side, 57% of individuals tested negative and 43% of individual tested positive and in left side 70% of individuals tested negative and 30% of individuals tested positive. In Beighton scale, 6.8% of individuals scored between range 0-3 indicating tightness, 46.6% of individuals scored between range 3-6 indicating normal score, 46.6% of individuals scored between range 6- 9 indicating ligamentous laxity.

Conclusion: This study concludes that there were skaters with hamstrings tightness but had absence of laxity whereas all the skaters with laxity did not have hamstring tightness.

Keywords: Roller Skaters, Hamstring Tightness, Generalized Laxity, 90-90 SLR test, Beighton score.

INTRODUCTION

Roller skating is traveling on surfaces with roller skates and is a form of recreational activity as well as a sport, and can also be a form of transportation. Experimental skate designs throughout the years have included two wheeled (heel and toe) inline skate frames but the vast majority of skates on the market today are either quad or standard inline design. Speed skating originally started on traditional roller skates, quads or four wheels per skate[1]. In-line roller skating is a growing recreational fitness activity. Recreational in-line skating is concentrated in paved public areas and is largely a young adult activity[2]. The recent popularity of roller skating among persons of all ages has resulted in an increase in associated musculoskeletal injuries. Roller skating provides an excellent means of cardiorespiratory exercise as well as recreational activity[3]. At the sports level of skating, the activities comprise figure skating and speed skating, including short track skating, the

features of which differ significantly. In the field of figure skating, 50% of injuries are traumatic, while 50% are due to overuse. Such overuse injuries are more common in single skaters, whereas acute injuries occur more frequently among pair skaters and ice dancers.[4] There was also an association between lower back pain and generalized joint laxity. Approximately 5% of all skaters tested positive for tightness, while 25.8% of figure skaters and 15.2% of speed skaters had generalized ligamentous laxity.[5] Statistical testing showed an association between ankle sprains and muscle tightness, and an association between knee enthesitis and muscle tightness in skating athletes[6]. Muscle tightness results from an increase in tension from active or passive mechanisms. Passively, muscles can become shortened through postural adaptation or scarring; actively, muscles can become shorter due to spasm or contraction. Regardless of the cause, tightness limits range of motion and may create a muscle imbalance and can lead to injuries further.[7] Hamstrings muscle complex (HMC) tightness is one of the major problems that can limit the movement of the knee and make it susceptible to injuries. The tightness could happen when the tension of the muscle is increased either passively or actively. Athletics may suffer from hamstring shortening due to overuse or playing competitively without warming up period. Numerous complications may arise from HMC tightness including muscle tear, loss of curvature of the lumbar spine, sacroiliac joint problems, and plantar fasciitis. These problems mainly arise due to loss of alignment in the body and the force distribution between the joints and the muscles.

Generalized joint hypermobility (GJH) is a condition in which most of an individual's synovial joints move beyond the ''normal'' limits, with the age, gender, and ethnic background of the individual taken into account.[8] Generalized joint hypermobility (GJH) is the presence of multiple hypermobile joints; it is most often assessed using the Beighton score, which assesses hypermobility at nine joints. Prevalence of GJH varies based on gender, age, and ethnicity. Furthermore, varying criteria have been used for defining GJH, including Beighton scores of 4/9, 5/9, or 6/9. Although experts assert that GJH is associated with musculoskeletal pain, injuries, and symptoms[5]. Dislocations, subluxations, and sprains are commonly reported in individuals with GJH and it is assumed that the risk of such injuries is magnified during activities that are more physically challenging, particularly where the lower limbs are involved. People with GJH are at significantly greater risk of lower limb joint injury if they participate in sporting activities. Studies of athletes in a variety of sports have shown that more than half of all injuries are sprains or strains. Muscle strains and overuse injuries are most likely to be prevented by improved flexibility, especially when the athlete has adequate strength to control the flexibility. Recurrent sprains are likely to be associated with ligamentous laxity. Restrictions in range of motion may also predispose the athlete to injury by macrotrauma[10]. Generalized ligamentous laxity or tightness is a genetically determined component of overall joint flexibility that cannot be readily altered by stretching.' Macro trauma, repetitive micro trauma, or both may lead to isolated ligament laxity, however. Studies of ligamentous laxity in diverse populations have shown that ligamentous laxity is specific to gender, age, and population [9].

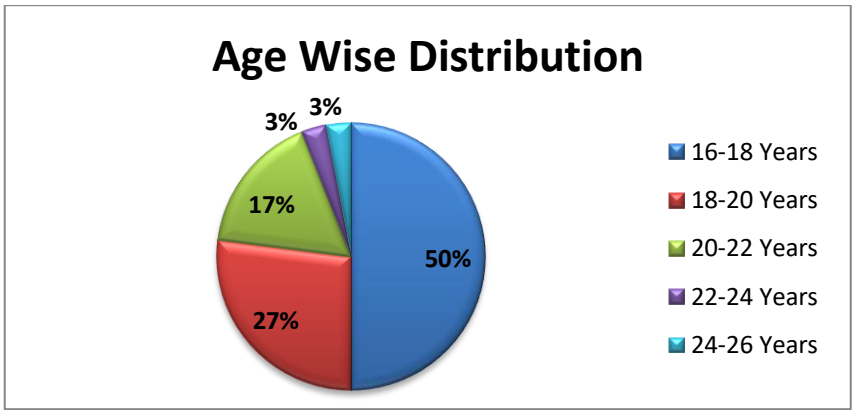
METHODOLOGY

Ethical clearance was obtained from concerned college committee, College of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune. A visit was arranged to skating academy in Pune. Permission was granted to conduct the study by the academy manager. The aim of the study was explained to the participants. Consent forms were given to those who wished to participate in this study. All the participant skaters were screened for inclusion and exclusion criteria. 30 participants were selected. Demographic details of subjects like Age, Gender. The inclusion criteria were participants who were in the age-group of 14-26 years both Male and Female. The exclusion criteria included the participants who were not willing to participate, other sports players and injured roller skater. The entire procedure was explained to the participants. 2 Tests were performed on subjects- 90^0-90^0 Straight leg test and Beighton Score.

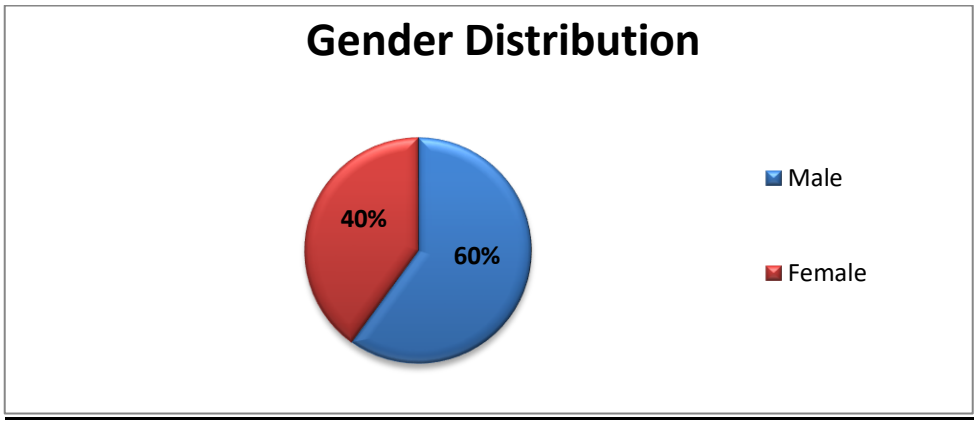
- **90°-90° Straight Leg Test:** In this test the patient is in supine lying with hip flexed in 90° with knees bent. The Patient is asked to actively extend the knee as much as possible. Normal flexibility in hamstring, extension should be within 20°.[11]
- **Beighton score:** It assesses generalized laxity. The Beighton score is a popular screening technique for hypermobility. It is a nine – point scale and requires the performance of 5 maneuvers, four passive bilateral and one active unilateral performance. Goniometer is used to measure the hypermobility of the joints, if a ROM of a joint is more than a normal range, it's considered to be increase in laxity, and accordingly the score is measured. The first four elements can be given a maximum score of 2, because these are performed bilateral. The last element is scored with 0 or 1. The maximum score for ligament laxity is 9. A score of 9 means hyper laxity. A score of zero is tight. Several researchers appoint a score of 0-3 as normal and a score of 4-9 as representing ligamentous laxity. Components of the Beighton scale. Passive dorsiflexion and hyperextension of the fifth MCP joint beyond 90˚, Passive apposition of the thumb to the flexor aspect of the forearm, Passive hyperextension of the elbow beyond 10°, Passive hyperextension of the knee

beyond 10°, Active forward flexion of the trunk with the knees fully extended so that the palms of the hands rest flat on the floor.[12]

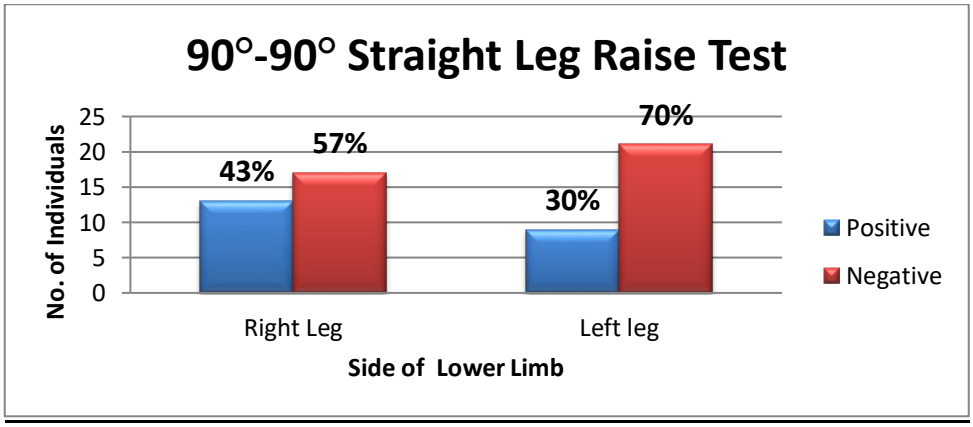
RESULTS



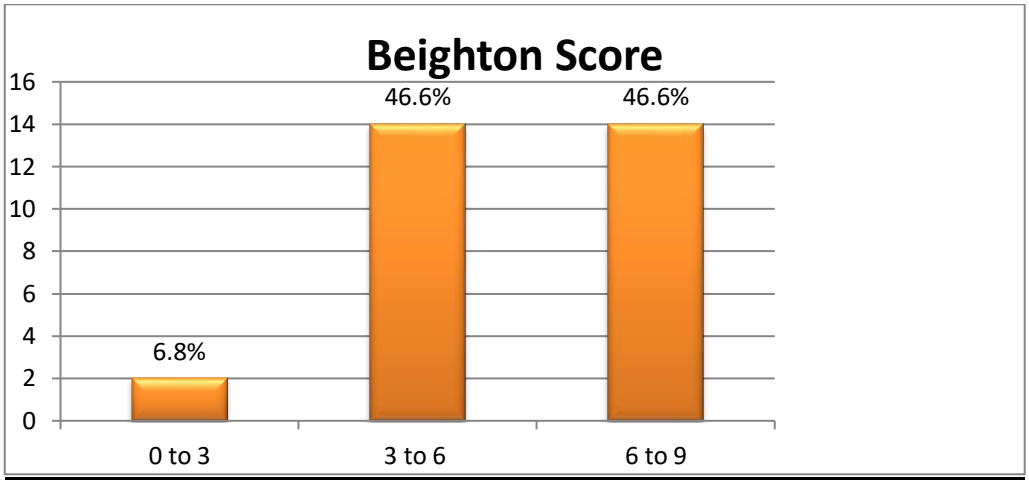
Graph 1: Age wise Distribution



Graph 2: Gender Distribution



Graph 3: 90°-90° Straight Leg Raise Test



Graph 4: Beighton Score of Participants in our Study

DISCUSSION

According to Graph no. 1, Out of 30 participants, 50% belonged to the age group of 16-18 years, 27% were in the age group of 18-20 years, 17% in the age group of 20-22 years whereas 3% of participants were in the age group of 22-24years and 24-26years each respectively. The average value of the Age group was 18.8 and with a SD of ±2.35. Graph no. 2 shows that in our study, 60 % were Males and 40% were Female's participant. Graph no. 3 shows the results of SLR 90°-90° test, in which 43% of participants tested positive for right side and 30% participants tested positive for left side. Whereas participants testing negative for this 90^0-90^0 SLR test were quite high comparatively. The percentage for participants testing negative were 57% for right leg and 70% for the left leg respectively. Hamstrings muscle complex (HMC) tightness is one of the major problems that can limit the movement of the knee and make it susceptible to injuries. The tightness could happen when the tension of the muscle is increased either passively or actively. Numerous complications may arise from HMC tightness including muscle tear, loss of curvature of the lumbar spine, sacroiliac joint problems, and plantar fasciitis. These problems mainly arise due to loss of alignment in the body and the force distribution between the joints and the muscles[8]. Graph no. 4 shows that while statistically analyzing Beighton score 46.6% of total 30 participants scored between the range of 6-9 indicating ligamentous laxity. Whereas 46.6% individuals scored in the range of 3-6 which is normal score. And only 6.8% of individuals scored in the range of 0-3 indicating tightness. Referring to above data and results we can comment that hamstring tightness was not more prevalent in the skaters. But joint laxity and hypermobility was found dominantly in roller skaters. Roller skating is a sport where the player needs to have good muscular strength, muscular endurance, good flexibility, appropriate body composition and a high cardiorespiratory endurance. In a study done by Okamura S, Wada N, Tazawa M, Sohmiya M et all stated that 25.8% of figure skaters and 15.2% of speed skaters had generalized ligamentous laxity [6].

CONCLUSION

This study concludes that there were skaters with hamstrings tightness but absence of laxity whereas all the skaters with laxity did not have hamstring tightness.

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Tejas Pardeshi and Dr. Divya Jethwani (PT) have equally contributed to the formation of the manuscript and the study process. Dr. Vaibhavi Mahendrakar (PT) have contributed in the manuscript writing, and editing and submission of the paper.

FUTURE SCOPE

- Study can be done on players practicing different sports.
- Study can be done to find out effective physiotherapy intervention to correct and prevent tightness and ligamentous laxity in roller skaters.
- A study should be taken to further study the correlation of muscle tightness and joint laxity.

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