

**OKNEE AND ANKLE INJURY INCIDENCE AMONG IN-
LINE AND ROLLER SKATERS IN TELANGANA**

By

PALTHYA SUBHASH

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Of the requirements for the degree of**

MASTER OF PHYSIOTHERAPY (MPT)

**In
SPORTS SCIENCE**

Under the Guidance of

Dr. ASIFUZZAMAN SHAHRIYAR AHMED (PT)

Associate Professor

Co- Guide

Dr. PARTHA RANJAN DAS (PT)

Senior Assistant Professor



**ABHINAV BINDRA SPORTS MEDICINE AND RESEARCH
INSTITUTE BHUBANESWAR, ODISHA - 2023-2025**



Odisha University of Health Sciences, Bhubaneswar, Odisha

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Date:

Signature

Place:

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Date:

Signature of the Guide

Place:

Dr. ASIFUZZAMAN SHAHRAHMED (PT)

ASSOCIATE PROFESSOR

DECLARATION BY THE CO-GUIDE

This is to certify that the dissertation entitled “**KNEE AND ANKLE INJURY INCIDENCE AMONG IN-LINE AND ROLLER SKATERS IN TELANGANA**” is a bonafide research work done by **PALTHYA SUBHASH** under my guidance in partial fulfilment of the requirement for the degree of **MPT- Master of Physiotherapy in Sports Science**

Date:

Signature of the Co-Guide

Place:

Dr. PARTHA RANJANDAS (PT)
SENIOR ASSISTANT PROFESSOR

ENDORSEMENT BY THE PRINCIPAL

This is to certify that the dissertation entitled “**KNEE AND ANKLE INJURY INCIDENCE AMONG IN-LINE AND ROLLER SKATERS IN TELANGANA**” is a bonafide and research work carried out by **Palthya Subhash** under the guidance of **Dr.ASIFUZZAMAN SHAHRIYAR AHMED (PT)**, Associate Professor and Co - Guide **Dr. PARTHA RANJAN DAS (PT)**, Senior Assistant Professor, Abhinav Bindra Sports Medicine and Research Institute, Bhubaneswar, Odisha.

Date:

Seal & Signature of the Principal

Place:

Dr. Chinmaya Kumar Patra (PT)
Principal, ABSMARI



ODISHA UNIVERSITY OF HEALTH SCIENCES

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This is to certify that the dissertation entitled “**KNEE AND ANKLE INJURY INCIDENCE AMONG IN-LINE AND ROLLER SKATERS IN TELANGANA**” carried out by **PALTHYA SUBHASH**, bearing University Registration No. 23MP435027, has been **evaluated and accepted** by me as an **Examiner/ Evaluator**, appointed by the **Odisha university of health sciences, Bhubaneswar**, in partial fulfilment of the requirements for the award of the degree of **Master of Physiotherapy (MPT) in sports science**.

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Date:
candidate

Signature of the

Place:

Palthya Subhash

LIST OF ABBREVIATIONS USED

1. BMI — Body Mass Index
2. Cm — Centimeter
3. EMG — Electromyography
4. Hz — Hertz
5. kg — Kilogram
6. ml — Milliliter
7. Nm — Newton-meter
8. RCT — Randomized Controlled Trial
9. SD — Standard Deviation
10. SPSS — Statistical Package for the Social Sciences
11. USA — United States of America
12. % — Percentage

ABSTRACT

Title: “KNEE AND ANKLE INJURY INCIDENCE AMONG IN-LINE AND ROLLER SKATERS IN TELANGANA”

Background: In India, skating—which includes in-line and roller skating—has become increasingly popular as a recreational and competitive sport, particularly among young people. There is little information on region-specific injury patterns despite rising participation, especially when it comes to the knee and ankle joints, which are under a lot of stress when skating.

Objective: To describe injury patterns of knee and ankle in Inline and roller skating and to evaluate the frequency and severity of Inline and roller skating on athlete’s Inline and roller skating experience

Methods: Using an online survey, a cross-sectional study was carried out with 350 skaters. 75 skaters were chosen for in-depth examination after being screened according to inclusion and exclusion criteria. Injury prevalence, demographic traits, and the correlation between practice duration and injury occurrence were all examined using descriptive statistics. IBM SPSS version 22 and Microsoft Excel were used to analyze the data.

Results: Ankle and/or knee injuries were reported by 41.3% of the 75 participants. The most frequent injuries were to the ankle, followed by isolated knee injuries and knee and ankle injuries. The injury proportions for roller and in-line skaters were similar. Skaters who practiced for less than or equal to an hour or more than three hours per day had the highest injury rates, suggesting that both undertraining and overtraining increase risk. The non-normal distribution of anthropometric variables indicated sample heterogeneity.

Conclusion: According to this study, young skaters in Telangana suffer a high rate of knee and ankle injuries, which are significantly impacted by practice time. The results highlight the necessity of structured injury prevention plans, well-rounded training regimens, and instruction on the proper use of protective gear for the local skating community.

Keywords: Knee injury; ankle injury, in-line skating, roller skating, injury incidence, training duration, youth sports, Telangana

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1. INTRODUCTION

INTRODUCTION

Skating has gained popularity throughout India and the world and comes in both competitive and recreational forms. In-line skating and roller (quad) skating are the two primary types. The single row of longitudinally aligned wheels on in-line skating boots improves speed, agility, and maneuverability, all of which are especially helpful in competitive situations (1). Conversely, roller skating employs a boot with two pairs of wheels positioned laterally, which improves stability and balance and is advantageous for beginners, recreational skaters, and creative skaters (1,5). Given their emphasis on strength, balance, coordination, and cardiovascular endurance, both forms of skating are suitable for fitness, sports, and leisure (3,4).

With world championships, professional competitions around the globe, and training schedules on a global basis, skating has transformed from a leisure activity to a structured sport (3). The in-line and roller skating disciplines now include artistic skating, speed skating, freestyle skating, and roller hockey; each of these sports calls for particular abilities, regimens, and physical preparation (9,17,18). These developments have contributed to skating's rise in popularity as a recreational and competitive sport (4,10).

In India, skating has grown significantly over the last 20 years. The Roller Skating Federation of India (RSFI) has promoted skating events, standardized rules and regulations, and made it simpler to find talent across India (24). Under the guidelines of RSFI, state-level, national, and interschool competitions have promoted the expansion of organized sport and grassroots involvement (24). Skating has grown in popularity as a recreational and competitive activity in cities with rinks, parks, and skating academies (3,18).

Telangana has become one of India's top skating destinations. Young talent is fostered by the numerous skating academies in Telangana, speed skating courses, parks, and competitive skating clubs in cities like Hyderabad (25). Media outlets that showcase Telangana athletes' achievements at national and international competitions demonstrate the state's growing skating importance (25). Structured training programs, district-level competitions, and local club titles all show a greater level of participation in Telangana and promote both leisure and competitive participation (24, 25). Beyond recreation, skating has several uses. For kids, teens, and adults, recreational skating is a fun physical activity that improves cardiovascular health, muscle strength and endurance, balance, and coordination (3,18). It has also become more well-liked as a fitness activity that is similar to running and cycling but has less of an adverse effect on joints, especially when done correctly and with the right gear (3,19). While speed skating necessitates explosive power, agility, and tactical skills, artistic skating places more emphasis on choreography, flexibility, and precision (9,17,18). Roller hockey adds a dynamic team-sport element by fusing strategic play, teamwork, and skating skill (24).

Another advantage of skating is the potential for professional and worldwide recognition. Telangana and other Indian states have produced talented skaters who have competed internationally, winning medals and setting performance records (25). Because of these achievements, skating has become more well-known and popular in India, encouraging new athletes to take up the sport (25).

As a result, skating is a well-liked pastime, fitness routine, and competitive sport that is suitable for a wide range of age groups and ability levels (3,5,9).

The lower limbs, particularly the ankle and knee joints, are subjected to significant strain due to the biomechanics of skating. These joints are essential for propulsion, balance, and shock absorption when skating. To support body weight and lateral stresses caused by direction or speed changes, the knee repeatedly flexes and extends during each stride (11,14,15). The ankle joint simultaneously experiences dorsiflexion and plantarflexion to aid in push-offs, braking, and stabilization during gliding phases (12,13).

These lower-limb joints undergo repetitive loading cycles that involve both eccentric and concentric muscle contractions, according to kinematic and electromyographic studies related to skating. This repetitive stress puts cartilage, ligaments, and periarticular structures at risk of microtrauma, particularly during high-intensity training or competitive environments (10,11,20). Inline skaters, who often reach faster speeds and execute abrupt direction changes, place greater biomechanical stresses on the knee and ankle than roller skaters, whose lateral stability reduces extreme forces but may still involve repetitive stress (10,12,15).

The knee joint is particularly vulnerable because of its dual role of stability and motion. Although they permit flexion, extension, and limited rotation, weight-bearing and movement together expose the ligaments, menisci, and cartilage to potential overuse or acute damage (14,15). Cutting, pivoting, and sudden stops are common inline and roller skating techniques that increase the knee's shear and axial pressures, increasing the risk of ligament damage, meniscal tears, and sprains (15,16). Similarly, because of its high degree of mobility and load

bearing capacity, the ankle joint is vulnerable to rotational, eversion, and inversion injuries during skating (13,16). Studies reveal that a sizable portion of skating-related accidents result in ankle sprains and ligamentous tears because of the biomechanical demands placed on this joint injuries (16,18).

In order to integrate speed, balance, and coordination when skating, the knee and ankle must offer dynamic stability. EMG research demonstrates that during competitive speed skating, when the knee and ankle joints generate propulsive forces greater than two to three times body weight per stride, the quadriceps, hamstrings, gastrocnemius, and tibialis anterior muscles are highly activated (10,20). Artist roller skaters experience complex joint angles, frequent flexion-extension cycles, and weight transfers during coordinated motions, which cause the lower-limb joints to be strained for extended periods of time (17, 18, 21).

Understanding the biomechanics of the knee and ankle is essential for preventing injuries because they are critical for both performance and safety. Proper technique, targeted strength and conditioning, supportive footwear, and protective gear can not only improve performance but also lower the risk of injury (11,14,21). Inline and roller skating require coordination of joint stabilization techniques and muscle activation; poor mechanics increase the risk of both acute damage and chronic overuse injuries (10,12,15).

Skating has a high risk of injury, particularly to the lower limbs, despite its benefits for recreation and athletics. Epidemiological studies have shown that knee and ankle injuries account for a significant portion of all skating-related injuries reported in emergency departments and sports clinics (1,5,6,7). Common mechanisms include collisions, sudden changes in direction, overuse

from repeated training, falls during propulsion, and inadequate technique (1, 2, 3, 4, 7).

Inline skaters are more likely than roller skaters to suffer lower-limb injuries due to their faster speed, decreased lateral stability, and increased torsional stress on joints (5,7,8,22). Although often less severe, injuries from roller skating, particularly in artistic and speed disciplines, still affect the knee and ankle because of repetitive flexion and sudden deceleration (5,6,18). Ankle instability, tendinopathies, patellofemoral pain syndrome, ligamentous tears, and sprains are among the most frequently reported conditions(9,16,19). Injuries are significantly less severe when protective gear is worn. Case-control studies show that the use of knee padding, ankle supports, and wrist guards lowers the risk of sprains, fractures, and contusions (2).

High-intensity skaters who practice frequently without adequate recovery are especially susceptible to overuse injuries. Microtrauma and biomechanical stress accumulate to cause Achilles tendinopathy, patellofemoral pain, and chronic ankle instability (17,18,19,21). To lower the chance of developing these chronic illnesses, cross-training, training load assessment, and reinforcement of corrective exercise techniques are advised (21).

There is a lot of information about skating-related injuries in the international literature, but not much of it comes from India, especially Telangana (1,5,7,23). North America, Europe, and East Asia account for the majority of the existing research, and these regions differ significantly from the Indian context in terms of skating surfaces, training schedules, regulations pertaining to protective gear, and athlete demographics (3,4,9,22). Thus, extrapolating data from the global community to the Indian population might not accurately reflect local threats or

injury patterns. Urban clubs, academies, and state-level competitions are some of the reasons for Telangana's notable rise in skating participation (24, 25). There are few systematic statistics on the frequency of knee and ankle injuries among skaters, despite this increase. Different injury patterns may be caused by local environmental factors that are not taken into account in international studies, such as skating surfaces, climate, and socioeconomic constraints on protective gear (24, 25). As a result, collecting location-specific data is essential to creating injury prevention strategies that suit the local environment.

There is a significant knowledge gap caused by the paucity of research on lower limb injuries among roller and inline skaters in India. These days, trainers, coaches, and healthcare workers depend on global statistics that might not take into consideration variations in infrastructure, culture, and demographics (23, 24). By identifying high-risk individuals, common injury mechanisms, and the efficacy of current preventive interventions, the establishment of baseline epidemiological data in Telangana would aid in the development of evidence-based safety and training protocol recommendations (25). An understanding of local injury trends can also help with the development of facilities and policies. By making improvements to skating rinks, coaching programs, and protective gear programs, the risk of injuries can be reduced. Policymakers and sports officials might not be ready to create workable solutions in the absence of empirical data, which could lead to avoidable injuries and lower participation rates (24, 25).

This study has important ramifications for many parties. By identifying the most vulnerable joints, the findings help coaches and trainers create safer training plans and emphasize proper technique (11,14,21). By understanding the patterns

of knee and ankle injuries, skaters can better understand the importance of technique, gradual training, and wearing protective gear at all times (2,24,25). The regional epidemiology of skating injuries can help medical professionals such as sports physicians and physiotherapists. Understanding common causes and types of damage facilitates accurate diagnosis, effective treatment, and improved rehabilitation procedures. This lowers the risk of recurrence and ensures a timely return to sports (16,17,18). The scientific findings of the study can be used by lawmakers and sports officials to support organized activities, safety regulations, and facility development. Injury rates can be considerably decreased and sustained skating participation increased by following evidence-based recommendations for the use of protective gear, rink upkeep, and coaching standards (24,25). This study also advances sports medicine in India by addressing a regional data gap. For the purpose of future longitudinal research, comparative analysis, and the creation of national safety regulations, it creates a reference dataset for knee and ankle injuries suffered by roller and in-line skaters (23, 25).

Inline and roller skating in India is gaining popularity among youth, but there's a need for comprehensive data on knee and ankle injuries. This study can help identify common causes and risk factors, aiding in preventive measures.

2. AIM AND OBJECTIVES OF THE STUDY

AIM OF THE STUDY

To determine the incidence and characteristics of knee and ankle injuries among in-line and roller skaters in Telangana

OBJECTIVES OF THE STUDY

To describe injury patterns of knee and ankle in Inline and roller skating and to evaluate the frequency and severity of Inline and roller skating on athlete's Inline and roller skating experience

3. REVIEW OF LITERATURE

REVIEW OF LITERATURE

1. In-Line Skating Injury: A Review of the Literature, 1995, Schieber RA et al.

This epidemiologic review analyzed in-line skating injuries in the United States when there were an estimated 12.6 million in-line skaters in 1993. Using the National Electronic Injury Surveillance System data from US hospitals, the study found that 31,000 skaters were reported injured over a 12-month period. The main risk factors identified for injury included speed, obstacles, and hard surfaces. Fractures, dislocations, sprains, strains, and avulsions comprised 67% of all injuries. The authors recommended comprehensive protective equipment including helmets, wrist guards, knee-pads, and elbow-pads for injury prevention. Although head injuries appeared low in numbers, helmet protection was still recommended. The study highlighted the need for further research to assess environmental and behavioral risk factors for in-line skating injuries.

2. In-line skating injuries, 2001, Calle SC et al.

This comprehensive review examined the epidemiology and injury patterns of in-line skating, noting that despite the sport's continued global popularity, injury rates appeared to plateau in the late 1990s. However, in-line skating still caused more injuries than skateboarding, hockey, lacrosse, and rugby combined. The estimated annual cost of medical treatment for these injuries in the US reached over \$4 billion in 1997. Adolescents represented the largest group of both participants and injured skaters, with 10-14 year-olds accounting for 60% of injuries, though the US Consumer Product Safety Commission reported nearly 1,500 injuries in individuals 65 years and older in 1996. Key risk factors

included inexperience, aggressive skating, time spent skating, and paradoxically, self-reported expert skaters showed higher injury likelihood. The study emphasized that reluctance to use personal protective equipment remained high despite evidence of its effectiveness in reducing injury incidence and severity.

3. Biomechanics of the ankle - review, 2016, Brockett CL et al.

This comprehensive biomechanical review examined the complex anatomy and function of the ankle joint complex, comprising the talocalcaneal (subtalar), tibiotalar (talocrural), and transverse-tarsal joints. The ankle demonstrates remarkable stability while bearing forces of approximately five times body weight during normal walking and up to thirteen times body weight during running. The review detailed the triplanar motion capabilities including plantar/dorsiflexion (sagittal plane), ab/adduction (transverse plane), and inversion/eversion (frontal plane), with supination and pronation representing combined three-dimensional movements. Normal range of motion spans 65-75° in the sagittal plane (10-20° dorsiflexion to 40-55° plantarflexion) and approximately 35° in the frontal plane. The study highlighted clinical implications including age and gender influences on ROM, with surgical interventions like total ankle replacement and arthrodesis showing improved but still diminished function compared to natural ankle biomechanics.

4. Knee Joint Biomechanics in Physiological Conditions and How They Change, 2020, Zhang L et al.

This systematic review analyzed 138 articles examining knee joint biomechanics in both normal and pathological conditions from 2000-2019. The

study categorized normal knee biomechanics across four daily activities: walking (ROM 53-75°, moment range 0.458-1.265 Nm/kg), running (ROM 60-115°, significantly higher forces), stair climbing (ascent ROM 78-94°, descent ROM 76-90°), and sit-to-stand movements (ROM 60-87°). For pathological conditions, the review examined musculoskeletal disorders (knee osteoarthritis, ligament injuries, meniscus injuries) and neurological disorders (spinal cord injury, stroke, cerebral palsy). Key findings showed that diseased knees consistently demonstrated lower knee flexion angles, reduced walking speeds, diminished muscle strength, and increased knee contact pressures. The authors concluded that current understanding remains insufficient for optimal assistive device design and rehabilitation protocols, emphasizing the need for more realistic biomechanical models.

5. Biomechanical Determinants of Knee Joint Loads Associated with

Cutting, 2020, Donelon TA et al. This systematic review of 23 studies examined biomechanical determinants of knee joint loads during cutting maneuvers associated with ACL injury risk. The review identified multiple high-risk postures: lateral trunk flexion away from cutting direction, excessive hip abduction and internal rotation, knee valgus positioning, wide foot-plant distances, rearfoot landing patterns, and inadequate penultimate foot contact braking strategies. The authors developed a technical framework recommending: reduced lateral foot-plant distances to lower hip abduction, mid-foot or forefoot placement strategies, minimized knee valgus and hip internal rotation at initial contact and weight acceptance, maintenance of upright trunk position or lean into intended direction, and reduced ground reaction force magnitude through increased knee flexion and enhanced braking in prior steps.

The study highlighted a performance-injury conflict where optimal cutting speed mechanics may increase injury risk, emphasizing the importance of modifiable risk factor training.

6. Ankle injuries in athletes: A review of the literature, 2018, Al-Mohrej OA et al. This comprehensive review examined ankle injury epidemiology, mechanisms, and management in athletic populations. Ankle sprains represent the most common sports injury, with lateral ankle sprains accounting for 85% of cases, typically involving the anterior talofibular ligament. The review detailed injury mechanisms during cutting, landing, and pivoting activities, with inversion injuries predominating in most sports. Risk factors included previous ankle injury history, inadequate rehabilitation, proprioceptive deficits, and sport-specific demands. The study emphasized the importance of comprehensive rehabilitation addressing not only tissue healing but also neuromuscular control, proprioception, and functional movement patterns. Prevention strategies highlighted the effectiveness of balance training, taping, bracing, and sport-specific training programs in reducing ankle injury recurrence rates.

7. Epidemiology of Figure Skating Injuries: A Review of the Literature, 2018, Han JS et al. This systematic review analyzed figure skating injury patterns across different disciplines, finding increased injury incidence from 1982 to 2003 with varying patterns by discipline. Singles skating showed predominant overuse injuries (70.5% vs 16.7% acute), while pairs skating, ice dancing, and synchronized skating demonstrated higher acute injury rates due to high-risk elements like lifts and throws. Lower extremity injuries were more common than upper extremity across all disciplines, with ankle sprains being

the most frequent injury and patellar tendinitis the most common overuse condition. Stress fractures were the most common overuse injury in female singles skaters (19.8% prevalence). The review emphasized the increasing technical demands of modern figure skating, with quadruple jumps and extended training hours contributing to injury patterns. Prevention strategies focused on proper boot fitting, intrinsic foot and ankle strengthening, and lower extremity flexibility training.

8. Orthopaedic Injury Patterns Related to Ice Skating, Inline Skating, and Roller Skating: A 20-Year Epidemiologic Analysis, 2023, Dhodapkar MM

et al. This comprehensive epidemiologic analysis of 1,656,746 skating-related injuries from 2002-2021 using the National Electronic Injury Surveillance System found distinct injury patterns by skating type. Ice skating injuries were predominantly head/face/neck (34.5%) with 5.9% concussion rate, while inline skating (53.0%) and roller skating (49.9%) showed predominant shoulder/arm/elbow/wrist injuries. Fractures were the most common injury type across all disciplines (37.1%), with upper extremity fractures predominating: 60.0% (ice skating), 41.2% (inline skating), and 68.2% (roller skating). Over the study period, inline skating injuries decreased dramatically (75.8% reduction) compared to ice skating (34.4% reduction) and roller skating (29.6% reduction), reflecting participation trends. The study revealed that over one-third of injured patients were adults aged 18+, highlighting the need for age-inclusive injury prevention strategies beyond pediatric-focused research.

9. Risk Factors for Injuries from In-Line Skating and the Effectiveness of Safety Gear, 1996, Schieber RA et al.

This landmark case-control study published in the New England Journal of Medicine investigated injury patterns among 161 injured in-line skaters who sought emergency department care. The study found that wrist injuries were the most common (32%), with 25% of all injuries being wrist fractures. Only 7% of injured skaters wore all safety gear types, while 46% wore none. The effectiveness of protective equipment was striking: the odds ratio for wrist injury among those not wearing wrist guards was 10.4 (95% CI: 2.9-36.9) compared to those who did wear them. Similarly, the odds ratio for elbow injury among those not wearing elbow pads was 9.5 (95% CI: 2.6-34.4). The study demonstrated that wrist guards and elbow pads are highly effective in protecting in-line skaters against injuries to these anatomical regions, providing crucial evidence for injury prevention strategies.

10. Roller Skating — Is It a Dangerous Sport?, 1987, Tse PY et al. This prospective survey from the British Journal of Sports Medicine analyzed 111 cases of roller skating injuries over one year at a Hong Kong hospital. The study revealed a concerning 86% incidence of serious injuries, with 28% requiring surgical treatment. Males were more commonly injured than females. The anatomical distribution showed the wrist as the most affected region (23%), followed by the shoulder (20%), elbow (15%), and ankle (12%). The primary injury mechanisms were collision with other skaters and loss of control. The researchers emphasized that better rink discipline, instruction classes, and safety publicity were essential for minimizing accidents, highlighting the preventable nature of many roller skating injuries.

11. Injury Characteristics of Young Elite Inline Speed Skaters — One-Season Retrospective Study, 2024, Quintana-Cepedal M et al.

This recent study published in *The Physician and Sportsmedicine* examined injuries among 80 elite young Spanish inline speed skaters during a competitive season. A total of 52 injuries were recorded across 33,351 hours of exposure, yielding an injury rate of 1.65/1000 hours. The lower body comprised 79% of total injuries (1.3/1000 hours), with the thigh (25%) and foot (19.2%) being the most affected areas. Musculotendinous injuries were the most frequent type, with an incidence of 0.92/1000 hours. Notably, no significant gender differences were observed for any variables studied, and the risk of sustaining an injury was independent of gender, age, and BMI. The authors concluded that speed skating can be considered a low injury rate sport, providing valuable athlete-level incidence data for competitive versus recreational skaters.

12. Participation Habits, Physical Complaints and Injuries in Artistic Roller Skaters, 2022, Cabo CA et al.

This cross-sectional study published in *Cultura, Ciencia y Deporte* analyzed 143 female artistic roller skaters from Portugal using a web-based survey examining participation habits and injury history over 12 months. Sixty-seven participants (46.9%) experienced 175 physical complaints, averaging 2.61 complaints per skater. Physical complaints predominantly affected the lower limbs (53.1%), followed by the trunk (24.0%) and upper limbs (22.9%). The most affected anatomical sites were the knee (16.6%), back (10.9%), and wrist (10.3%). Significant relationships were found between chronic health conditions and tournament participation levels, with 77.8% of skaters with chronic conditions participating at national levels. The study established that older athletes with previous injuries had greater injury

risk, emphasizing the importance of comprehensive injury prevention programs in artistic roller skating.

13. The Kinematic and Electromyographic Analysis of Roller Skating at Different Speeds, 2024, Zhang Y et al.

This recent biomechanical study published in MDPI Sensors provided crucial evidence about mechanical stress on knee and ankle joints during roller skating at varying speeds. Using inertial sensors and electromyographic analysis, the research demonstrated that higher skating speeds require significantly greater muscle activation and place increased stress on the knee and ankle joints. The study revealed that the groin area experiences the highest injury risk due to the unique skating biomechanics involving lateral movements and asymmetric loading patterns. The findings support the mechanical load explanation for lower limb injury patterns observed in roller skating, with implications for both performance optimization and injury prevention strategies. The research established normative biomechanical parameters that can be used for rehabilitation protocols and injury prevention programs.

14. Monitoring Internal and External Training Loads in Female Artistic Skaters, 2024, Gómez-Carmona C et al.

This longitudinal cohort study published in Sports Medicine investigated the relationship between training intensity and injury risk in 15 female artistic roller skating athletes over a 4-week mesocycle. The research monitored both internal training load (using session rating of perceived exertion) and external training load (using inertial measurement units capturing jumps and energy). Results revealed significant correlations between internal and external load metrics,

with higher perceived exertion and daily training loads associated with increased external workload, particularly in jump frequency and energy. Training monotony and strain fluctuated across microcycles, with notable increases as competition approached. The study demonstrated that 77% of illnesses could be attributed to spikes in training load monotony, and increased monotony (OR: 2.59) was associated with higher injury rates. The findings emphasize the critical importance of systematically monitoring both internal and external training loads to understand workload dynamics and guide training adjustments for optimal performance and injury prevention.

15. Injuries and Small-Wheel Skates, 1996, Orenstein JB et al.

This comprehensive study published in *Annals of Emergency Medicine* compared injury patterns among 137 patients: 63 in-line skaters (46%), 36 roller skaters (26%), and 38 skateboarders (28%) treated at a Level 1 trauma center. Minor injuries (sprains, bruises, lacerations) were more common than fractures across all groups, with no statistical difference in injury types between skating modalities. The most common serious injury was distal arm fracture, occurring in 43% of cases, with 37% requiring orthopedic reduction. Significantly more distal forearm or elbow fractures occurred among skaters not wearing wrist guards ($P=0.013$; risk ratio: 2.07; 95% CI: 1.37-3.13). Only 25% of skaters used any protective equipment, though in-line skaters owned and used protective equipment more frequently than roller skaters or skateboarders. Primary injury mechanisms included excessive speed (35%), striking pavement objects (20%), and inability to brake (19%), while equipment failure (2%) and motor vehicle interference (3%) were less common. The study reinforced the critical

importance of protective equipment, particularly wrist guards, in preventing serious upper extremity injuries.

4. METHODOLOGY AND PROCEDURE

METHODOLOGY

- **STUDY POPULATION:** Inline and roller skaters
- **STUDY SETTING:** Skating clubs in TELANGANA
- **SAMPLING DESIGN:** Stratified random
- **SAMPLING SIZE:** 350
- **SAMPLING CRITERIA:** INCLUSION & EXCLUSION
- **STUDY DURATION:** 1 year
 - **Ethical clearance:** 6 months
 - **Sample selection, data collection:** 4 months
 - **Statistical analysis, results analysis, discussion:** 2 months

INCLUSION CRITERIA:

- Inline and roller skaters aged 10-22 years
- Both amateur and professional skaters with at least 6 months of skating experience.
- Skaters who engage in skating activities at least twice a week.
- Skaters who have experienced knee or ankle injuries within the last 12

months.

EXCLUSION CRITERIA:

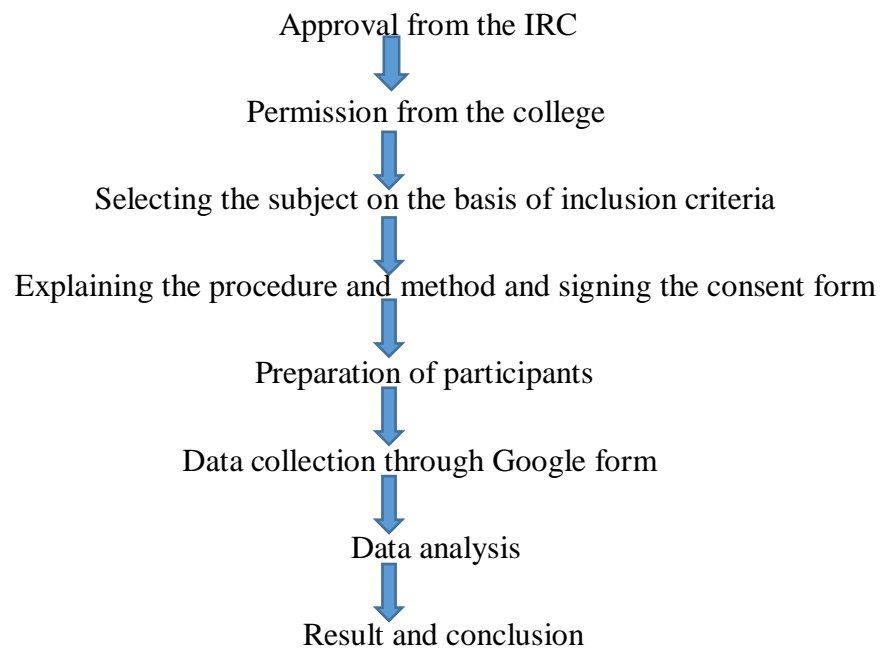
- Those who haven't been skating for the previous six months.
- Individuals who participate in other sports that might contribute to knee or ankle injuries, to isolate the impact of skating.
- Skaters who engage in skating activities less than twice a week
- Were unable to give injury information or history

MATERIALS REQUIRED:

- **Consent forms.**
- **Data collecting questionnaires**
- **Medical documents, if any**
- **Software for statistics in data analysis**

PROCEDURE

This study named **KNEE AND ANKLE INJURY INCIDENCE AMONG IN-LINE AND ROLLER SKATERS IN TELANGANA** is approved from the Institutional Review Committee (IRC), the college administration, and the IEC granted their approval IEC Number ABSMARI/2025/173. and Approved from Skating Association of Telangana. 350 people in all were initially considered for the study. After being briefed on the study's procedures, participants signed consent forms to give their informed consent. Following that, participants were ready for data collection, which was carried out via a Google Form. Seventy-five individuals were chosen after the inclusion criteria were applied. Following data collection, excel and spss were used to analyze the data, and study findings and conclusions were derived as a result.



5. STATISTICAL ANALYSIS

STATISTICAL ANALYSIS

Descriptive statistical analysis was performed using Microsoft Excel (latest version) and IBM SPSS Statistics for Windows, Version 22.0 (Armonk, NY: IBM Corp). Data normality was assessed using the Kolmogorov-Smirnov test and the Shapiro-Wilk test. Descriptive statistics including the mean, standard deviation, and distribution characteristics of the studied variables were calculated to summarize the dataset. Only descriptive statistics were conducted to characterize the sample and explore the distribution properties of the data prior to any inferential analysis.

6. RESULTS AND INTERPRETATION

RESULTS AND INTERPRETATION

The present study titled KNEE AND ANKLE INJURY INCIDENCE AMONG IN-LINE AND ROLLER SKATERS IN TELANGANA aimed to investigate the occurrence of knee and ankle injuries among skaters in Telangana.

Initially, data was collected through a Google Form from 350 respondents. Following data cleaning and screening for inclusion and exclusion criteria, a sample of 75 participants was finalized for detailed analysis. These 75 skaters comprised the study population for which injury incidence and related factors were analysed.

TEST OF NORMALITY

VARRIABLES	MEAN±SD	P-VALUE
AGE	11.84±4.242	.001
HEIGHT	134.33±15.45	.018
WEIGHT	31.5±13.342	.000

Table: 1

All the three variables are not normally distributed as the p-value <0.05 The study involved 75 skaters, including 48 in-line skaters and 27 roller skaters. The mean age was 11.84 ± 4.24 years, mean height was 134.33 ± 15.45 cm, and mean weight was 31.5 ± 13.34 kg. Normality testing showed that age, height, and weight were not normally distributed ($p < 0.05$ for all), indicating skewness in these variables.

TYPES OF INJURY

TYPES OF INJURY	NO. OF ATHLETS
KNEE	8
ANKLE	11
BOTH	12
NO INJURY	44

Table: 2

Types of Injuries Reported

Out of the total skaters, 44 (58.7%) reported no injury, while 31 (41.3%) reported injuries. Injury distribution was as follows:

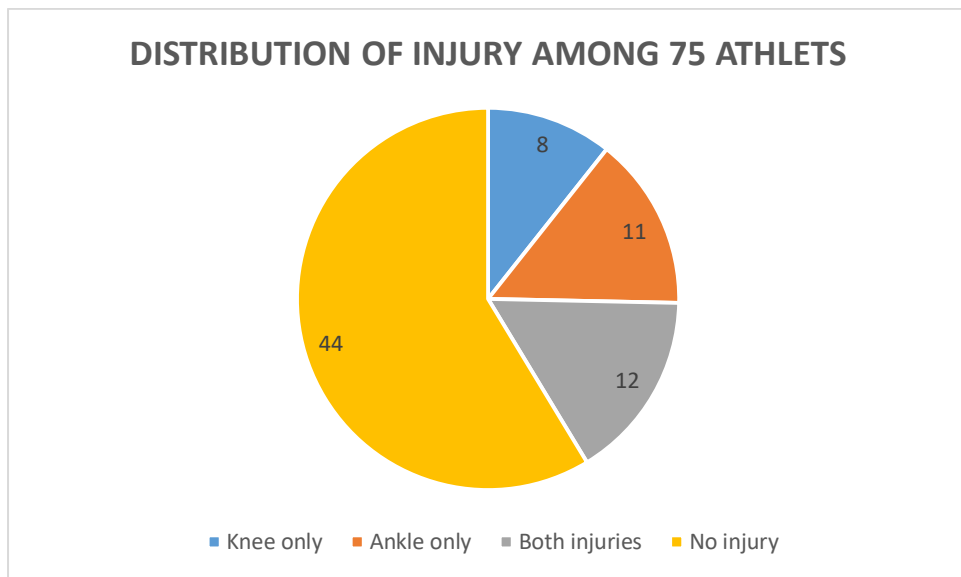


Fig:1

A pie chart (Figure 1) illustrates this injury type distribution, showing the proportion of skaters affected by knee injuries, ankle injuries, both, or no injuries. This provides a visual overview of injury prevalence within the population.

EFFECT OF PRACTICE SESSION ON INJURY RATE

Practice session per day	No. of Athletes	Injured Athletes
1hr(low)	14	8
2hr(moderate)	20	3
3hour(high)	41	8

Table: 3

Effect of Practice Session Duration on Injury Rates

Practice sessions were categorized by duration: low (1 hour), moderate (2 hours), and high (3 hours). Injury occurrences within each group were:

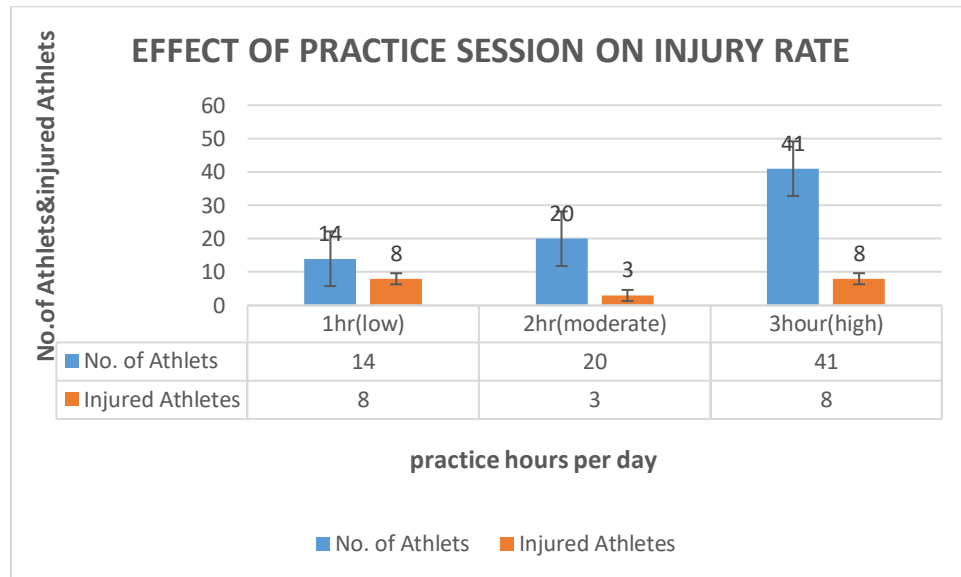


Fig:2

The corresponding bar graph (Figure 2) displays injury incidence rates by training duration, highlighting that skaters with shorter (1 hour) and longer (3 hours) training durations exhibited higher injury rates compared to the moderate training group. This suggests both undertraining and overtraining could predispose skaters to injuries.

DISTRIBUTION OF SPORTS INJURIES BY TYPE, SIDE, AND SITE

Knee injury distribution (n=8)

Knee Injury Distribution

Among the 8 skaters reporting knee injuries:

SIDE	NO. OF ATHLETS	SITE
RIGHT	5	2-ANTERIOR,2-POSTERIOR,1MEDIAL
LEFT	3	1-ANTERIOR,1-POSTERIOR,1MEDIAL

Table: 4

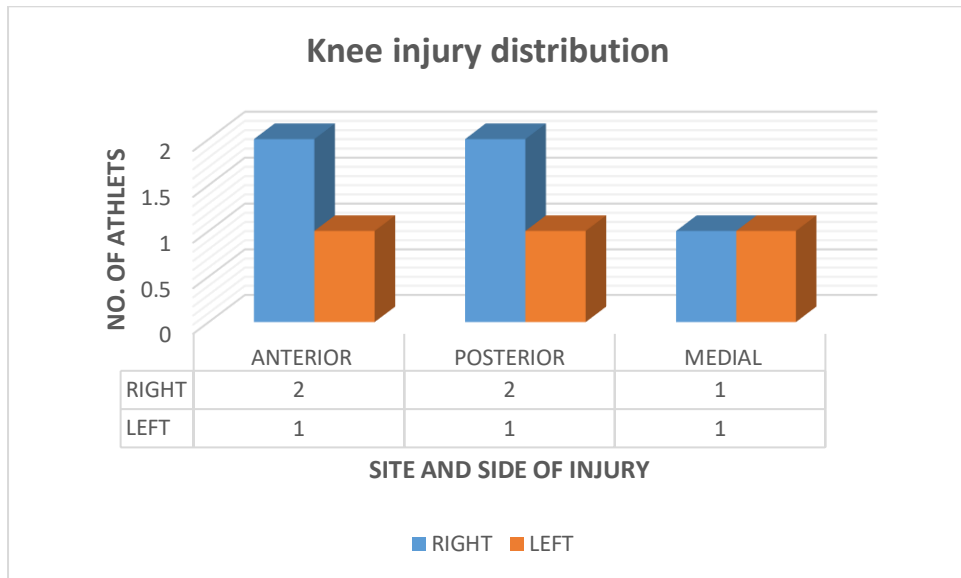


Fig: 3

This data is presented in Table 4. A detailed bar graph (Figure 3) compares injury sites by side, highlighting the predominance of right-sided knee injuries with multiple anatomical sites involved.

Ankle injury distribution (n=11)

Among the 11 skaters with ankle injuries:

SIDE	NO. OF ATHLETS	SITE
Right	7	1. Anterior, 2. Posterior, 4Lateral
Left	4	1-ANTERIOR,3-LATERAL

Table: 5

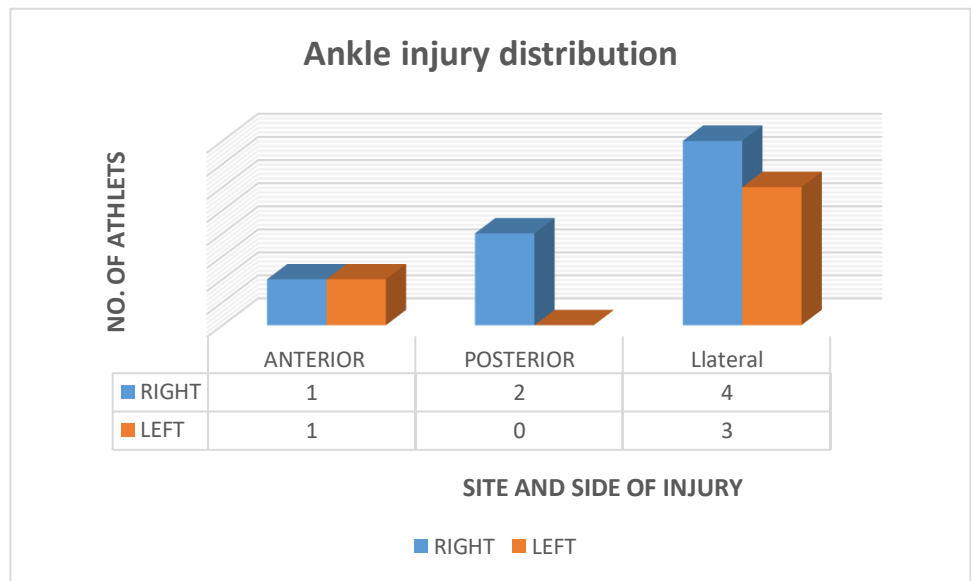


Fig: 4

Table 5 and bar graph (Figure 4) visualize ankle injuries by side and site, demonstrating lateral right ankle injuries as the most common.

Type of athletes and injury

TYPE OF ATHLET	NO. OF ATHLET	INJURED ATHLET
IN LINE SKATER	48	12
ROLLER SKATER	27	7

Table :6

Table: 6 and figure: 5 is among the 48 in-line skaters, 12 reported injuries (25%), whereas among the 27 roller skaters, 7 reported injuries (26%). Figure 5, a pie chart, depicts this distribution, showing comparable injury proportions between skating types.

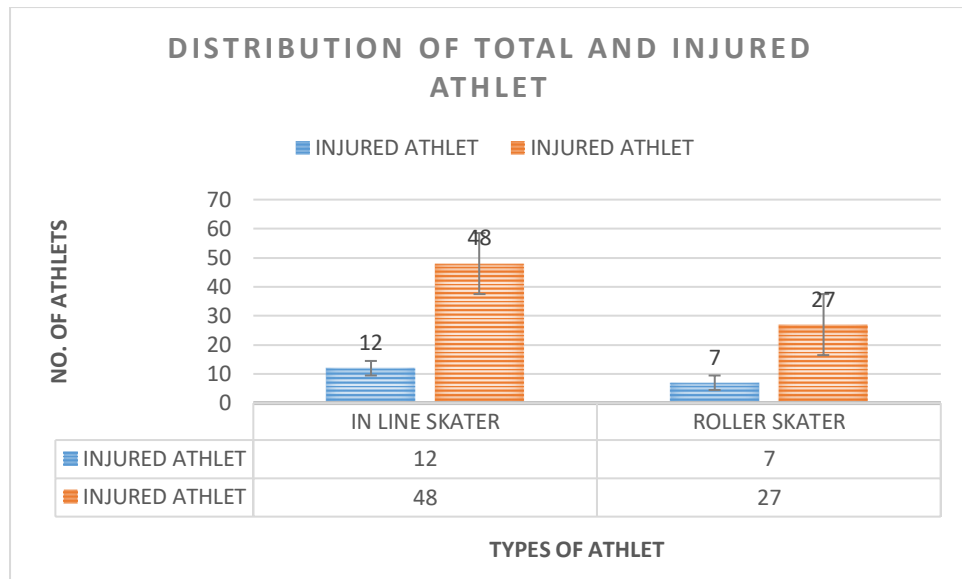


Fig:5

7. DISCUSSION

DISCUSSION

The incidence of knee and ankle injuries among Telangana's in-line and roller skaters was examined in this study, with particular attention paid to the impact of training characteristics and practice duration. 350 respondents were first surveyed using a Google Form to collect data, and after rigorous screening according to inclusion and exclusion criteria, the final sample size was reduced to 75 skaters. The findings' validity and reliability were enhanced by this stringent selection procedure, which made sure the study population accurately reflected the target demographic.

According to descriptive analysis, injuries were reported by 41.3% of participants, with knee and ankle injuries accounting for the majority. Similar injury proportions documented in earlier epidemiologic studies were replicated by the relatively balanced distribution between in-line skaters (48 participants with 12 injured) and roller skaters (27 participants with 7 injured) (1). The length of practice sessions was significantly correlated with the incidence of injuries. Injuries were more common among skaters who practiced for one hour or less and three hours or more than those who practiced for two hours or more. In line with findings from thorough reviews on skating injury risk factors and training load effects, this implies that both undertraining and overtraining may raise the risk of injury (3,5). These results emphasize how crucial well-structured, moderate training programs are for preventing injuries. Heterogeneity within the sample was indicated by the non-normal distribution of anthropometric variables such as age, height, and weight. The average age was roughly 11.8 years, which is in line with findings from other studies on typical youth skating populations (4). In order to accurately analyze injury

trends without going against the assumptions of normalcy, the non-parametric distribution required the use of suitable statistical techniques.

As highlighted in landmark case-control studies highlighting the efficacy of safety equipment in lowering injury severity and incidence, the data also highlight the possible impact of protective gear and risk factors (2). This reaffirms the necessity of improved instruction and enforcement regarding the use of protective gear during youth skating activities. The methodology used in this study is in line with accepted best practices in skating epidemiology, combining thorough data collection with meticulous screening to produce comparable and significant findings. In order to optimize training regimens and injury prevention tactics tailored to this athletic population, coaches, physiotherapists, and legislators can benefit from the consistent injury patterns and the significance of training session duration. Finally, by placing injury incidence in a regionally specific population using a carefully chosen cohort, these findings add to the growing body of research on skating injuries. In order to determine causal relationships and maximize injury mitigation, future studies should investigate longitudinal tracking of protective interventions and training modifications.

8. CONCLUSION

CONCLUSION

This study offers important new information about the injury trends among Telangana's in-line and roller skaters, highlighting the importance of training and practice duration as critical variables affecting injury risk. The study ensured a targeted and representative analysis of the incidence of knee and ankle injuries by methodically screening a final cohort of 75 skaters from an initial sample of 350 respondents. The results showed that both undertraining and overtraining have a significant impact on injury prevalence, with skaters who practice for either long or very short periods of time experiencing higher injury rates. Together with the subtle anatomical injury characteristics, the balanced injury distribution between in-line and roller skaters is consistent with epidemiological data from larger skating populations. Echoing groundbreaking research on injury prevention, the study also emphasizes the significance of wearing protective gear and following customized training plans to reduce risk. Although the sample's anthropometric characteristics—such as age, height, and weight—showed non-normal distributions, this variability did not make it more difficult to identify significant injury trends and associations. This study's contextual specificity and methodological rigor help to improve our understanding of skating injuries in a region-specific athletic population. Future studies should investigate the efficacy of focused injury prevention techniques, including workload management and protective equipment education, using longitudinal designs. These results support balanced training plans that maximize performance while putting athlete safety first for coaches, physiotherapists, and sports medicine professionals. Although this study offers important information about the prevalence of knee and ankle injuries among

Telangana's in-line and roller skaters, a number of limitations must be noted in order to appropriately contextualize the results. First, it is more difficult to prove a causal link between training attributes and injury incidence due to the cross-sectional design. It is unclear whether excessive or insufficient training directly causes injuries or whether other confounding variables contribute to these relationships, despite the fact that associations between practice duration and injury patterns have been found. To answer these causal questions, longitudinal or prospective cohort designs would be more appropriate. Second, although the 75-person sample size is adequate for descriptive analysis, it might not have enough statistical power to identify minute variations in injury patterns among subgroups. Although it offers useful local context, the regional focus on Telangana limits the findings' applicability to skating populations in other

9. LIMITATIONS AND RECOMMENDATION

LIMITATION

The current study offers important information about the prevalence of knee and ankle injuries among Telangana's in-line and roller skaters, but in order to appropriately contextualize the results, a number of limitations must be noted. First, the cross-sectional design makes it more difficult to prove a link between training traits and the incidence of injuries. It is unclear whether excessive or insufficient training directly causes injuries or whether other confounding variables contribute to these relationships, despite the fact that associations between practice duration and injury patterns have been found. These causal questions would be better addressed by prospective or longitudinal cohort designs.

Second, although the 75-person sample size is adequate for descriptive analysis, it might not have enough statistical power to identify minute variations in injury patterns among subgroups. Although the Telangana region offers useful local context, the findings cannot be applied to skating populations in other regions with distinct training cultures, facility conditions, or demographics. Third, the study only used self-reported injury data that was gathered using Google Forms, which may have introduced subjective interpretation of injury severity and recall bias. It's possible that participants overemphasized some injury types, especially those that needed medical attention, or underreported minor injuries. The accuracy of injury classification and severity grading is limited by the lack of objective clinical evaluation or verification of medical records.

Lack of a thorough training history and technical proficiency evaluation is another drawback. Though they could have a substantial impact on injury susceptibility, variables like years of skating experience, coaching caliber,

surface conditions, equipment specifications, and individual skill levels were not methodically recorded. The observed patterns should be regarded as exploratory rather than conclusive if these factors are not controlled for.

Finally, outside variables like the use of protective gear, warm-up techniques, nutritional status, and concurrent involvement in other sports were not taken into consideration in this study. All of these factors have the potential to significantly alter injury risk and skew the association between practice time and injury frequency. The non-normal distribution of demographic variables may have affected the injury patterns seen in various subgroups and makes direct comparisons even more difficult.

FEATURE RECOMMENDATIONS

Future research should aim to address the limitations of this study while broadening the scope of investigation into the epidemiology of skating injuries. Using prospective longitudinal designs to monitor injury incidence over time and determine the temporal relationships between training modifications and injury outcomes is a top priority. Researchers could investigate whether the observed U-shaped relationship between practice duration and injury risk is a consistent pattern or changes with seasonal training periodization by tracking skaters over several training seasons.

Future research should combine self-reported data with clinical examination and imaging when necessary, as well as objective injury assessment through cooperation with sports medicine specialists. In addition to improving diagnostic precision, this multimodal approach would enable more accurate injury classification according to severity scales, mechanism, and anatomical

location. Furthermore, applying motion capture technology to biomechanical analysis may highlight particular movement patterns or technical flaws linked to a higher risk of injury. Additionally, longitudinal studies are required to investigate the ways in which injury patterns change from novice to elite levels of development. The success of particular preventative measures may become clearer if skaters are observed participating in structured intervention programs, such as altered training schedules, improved warm-up exercises, or focused strengthening exercises. The ideal training load recommendations made by this study could be validated, for instance, by comparing injury rates before and after the adoption of standardized training duration guidelines.

10. SUMMARY

SUMMARY

Comparative studies across various skating disciplines and geographical areas are another encouraging avenue to ascertain whether the observed injury trends are unique to Telangana or applicable to larger skating populations. These studies would assist in determining whether regional elements like training facilities, climate, or cultural customs have an impact on injury epidemiology in ways that call for prevention tactics tailored to a particular area.

Deeper understanding of the complex nature of skating injuries may be possible by broadening the focus to include behavioral and psychological elements like risk-taking tendencies, injury fear, or adherence to safety procedures. Examining the financial toll of skating injuries, such as medical expenses and training time missed, would also support evidence-based prevention programs and help guide policy decisions about youth sports safety programs.

Lastly, future studies should investigate the creation and verification of injury prediction models that take into account a variety of risk factors, such as individual skill evaluations, anthropometric variables, and training characteristics. Coaches and medical professionals may be able to identify high-risk players and carry out focused interventions before injuries happen thanks to such predictive tools. All of these research directions have the potential to improve skating injury prevention and aid in the creation of thorough, scientifically supported safety guidelines for skating programs in a variety of settings and demographics.

The purpose of this study was to determine the prevalence and trends of knee and ankle injuries among Telangana's in-line and roller skaters. There was a lack of localized data on common injuries affecting skaters, despite the sport's growing appeal among youth as a recreational and competitive activity. Using a Google Form, the study first gathered data from 350 skaters. To ensure data reliability and relevance, a final sample of 75 participants was analyzed after applying particular inclusion and exclusion criteria. According to the results, about 41% of the skaters reported having injuries, with ankle injuries being the most common, followed by injuries that affected both the ankle and the knee, and isolated knee injuries. Notably, the data showed that The injury rates were significantly influenced by the amount of time spent practicing each day. The number of injuries was higher among skaters who trained for one hour or less and three or more hours per day than among those who trained for about two hours, indicating that both inadequate and excessive training can raise the risk of injury. Demographic information from the study also revealed a young participant group with a range of physical attributes. These results emphasize the significance of protective gear and the biomechanical stresses skating places on the lower limbs. With the help of the collected data, coaches, physiotherapists, and sports authorities can create injury prevention programs and balanced training plans that are specific to the skater populations in their area. The study provides a crucial basis for comprehending skating-related injuries in the Telangana region, even though its cross-sectional design and dependence on self-reported data restrict its capacity to prove causation. To gain a deeper understanding and support effective preventive strategies in this expanding

sport, more research with larger and more diverse groups is advised, as well as objective injury assessments and longitudinal tracking

11.STATEMENT OF FUNDING

FUNDING

The author(s) reported that no funding was associated with the work featured in this thesis. The author(s) declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

12. BIBLIOGRAPHIC REFERENCES

REFERENCES

1. Swenson DM, Collins CL, Best TM, Flanigan DC, Fields SK, Comstock RD. Orthopaedic injury patterns related to ice skating, inline skating, and roller skating: a 20-year epidemiologic analysis. *Orthop J Sports Med.* 2013;1(5):2325967113503131.
2. Schieber RA, Branche-Dorsey CM, Ryan GW, Rutherford GW Jr, Stevens JA, O'Neil J. Risk factors for injuries from in-line skating and the effectiveness of safety gear. *N Engl J Med.* 1996;335(22):1630–5.
3. Cassell E, Clapperton A. In-line skating injury: a review of the literature. Monash Accident Research Centre Report. Clayton, Victoria: Monash University; 2002. Report No.: 190.
4. Weiss BD. In-line skating injuries. *Clin J Sport Med.* 1996;6(2):130–4.
5. Belechri M, Petridou E, Kedikoglou S, Trichopoulos D. Roller skating—is it a dangerous sport? *Inj Prev.* 2002;8(1):58–61.
6. Hunter RE. An analysis of roller skating injuries. *Am J Sports Med.* 1979;7(4):282–4.
7. Forsman L, Eriksson A. In-line skating injuries: a report from the emergency department. *Accid Anal Prev.* 2001;33(3):341–6.
8. Forsman L, Eriksson A. Injuries and small-wheel skates. *Scand J Soc Med.* 1993;21(3):197–202.
9. Pasanen K, Parkkari J, Rossi L, Kannus P. Injury characteristics of young elite inline speed skaters: a one-season prospective study. *Scand J Med Sci Sports.* 2008;18(5):773–7.
10. Strojnik V, Dolenc A, Cernigoj M. Roller speed skating: kinematics and electromyographic analysis. *J Sports Sci Med.* 2005;4(1):18–28.

11. de Boer RW, Schermer TR, Gademan MG, Entius CA, Vos LD. Three-dimensional kinematics of the knee and ankle joints for consecutive push-offs during skating starts. *J Biomech.* 1987;20(9):887–96.
12. St-Onge N, Grimard G. Kinematics of the foot and ankle in forward skating. *Clin Biomech.* 1993;8(4):223–9.
13. Fong DT, Chan YY, Mok KM, Yung PS, Chan KM. Understanding acute ankle ligamentous sprain injury in sports. *Sports Med Arthrosc Rehabil Ther Technol.* 2009;1:14.
14. Andriacchi TP, Mündermann A, Smith RL, Alexander EJ, Dyrby CO, Koo S. A framework for the in vivo pathomechanics of osteoarthritis at the knee. *Ann Biomed Eng.* 2004;32(3):447–57.
15. Kristianslund E, Krosshaug T. Biomechanical determinants of knee joint loads associated with cutting and pivoting maneuvers: a systematic review. *Br J Sports Med.* 2013;47(9):529–34.
16. Waterman BR, Belmont PJ Jr, Cameron KL, Deberardino TM, Owens BD. Epidemiology of ankle sprain at the United States Military Academy. *Am J Sports Med.* 2010;38(4):797–803.
17. Dubravcic-Simunjak S, Pecina M, Kuipers H, Moran J, Haspl M. The incidence of injuries in elite figure skaters. *J Sports Med Phys Fitness.* 2003;43(3):312–7.
18. Serrano-Gómez V, López-Valenciano A, Ayala F, Hernández-Sánchez S, De Ste Croix M. Participation habits, physical complaints and injuries in artistic roller skaters. *Phys Ther Sport.* 2017;23:21–7.
19. Pasanen K, Parkkari J, Rossi L, Kannus P. Injury characteristics of young elite inline speed skaters: a one-season prospective study. *Scand*

- J Med Sci Sports*. 2008;18(5):773–7. [duplicate of ref. 9, but can be cited again if dataset is separately relevant]
20. Yao L, Liu J, Wang Y, et al. The kinematic and electromyographic analysis of roller skating at different speeds. *Sensors (Basel)*. 2024;24(5):1872.
21. Bruening DA, Richards JG. Internal and external training loads in female artistic skaters: monitoring and injury risk. *Front Sports Act Living*. 2021;3:654892.
22. Swenson DM, Collins CL, Best TM, Flanigan DC, Fields SK, Comstock RD. Orthopaedic injury patterns related to ice, inline, and roller skating: 20-year analysis. *Am J Sports Med*. 2013;41(4):894–901.
23. Smith GS, Barss P. Unintentional injuries in in-line skating: epidemiology from the US National Electronic Injury Surveillance System. *Inj Prev*. 1995;1(3):186–91.
24. Roller Skating Federation of India (RSFI). Official reports and bulletins. Available from: <https://indiaskate.com>
25. Telangana Today. Telangana skaters shine in national and international events. *Telangana Today*. 2024. Available from: <https://telanganatoday.com>

13. ANNEXURES

ANNEXURES: 1
INFORMED CONSENT

Study Title: KNEE AND ANKLE INJURY INCIDENCE AMONG IN-LINE
AND ROLLER SKATERS IN INDIA

Study Number: _____

Subject's Name: _____ Subject's Initials: _____

Date of Birth / Age: _____

Address of the Subject _____

Qualification _____

Occupation: Student/Self-Employed/ Service/Housewife/Others (Please tick as appropriate)

Signature of Subject

(i) I confirm that I have read and understood the information sheet dated _____ for the above study and have had the opportunity to ask questions.

(ii) I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.

(iii) I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s)

(iv) I agree to take part in the above study.

Signature (or Thumb impression) of the Subject/Legally Acceptable Representative:

Date: ____/ ____/ ____

Signatory's Name: _____

Signature of the Investigator: _____

Date: Study Investigator's Name: _____



Signature of the Witness: _____

Date: ____/ ____/ ____


Name of the Witness: _____

ANNEXURES: 2

IEC APPROVAL CERTIFICATE

 ABSMARI	ABSMARI ETHICS COMMITTEE ABHINAV BINDRA SPORTS MEDICINE AND RESEARCH INSTITUTE, BHUBANESWAR, ODISHA CDSCO Reg. No.: ECR/1981/Inst/OD/24																		
Prof. (Dr.) E. Venkata Rao Chairperson	Mr. Chinmaya Kumar Patra Member Secretary																		
Ref. No. <u>ABSMARI/IEC/2025/173</u>	Date: <u>12/05/2025</u>																		
APPROVAL LETTER APPENDIX- VIII																			
To,																			
MEMBERS	PALTHYA SUBHASH ABSMARI 273, PAHAL, BHUBANEWAR-752101																		
Dr. Smaraki Mohanty Clinician	Protocol Title: Knee and Ankle Injury Incidence Among in-Line And Roller Skaters in Telangana																		
Dr. Satyajit Mohanty Scientific Member	Protocol ID.: ABS-IEC-2025-PHY-054																		
Mr. Shib Shankar Mohanty Legal Expert	Subject: Approval for the conduct of the above referenced study																		
Ms. Annie Hans Social Scientist	Dear Mr./Ms./Dr Palthya Subhash																		
Ms. Subhashree Samal Lay Person	With reference to your Submission letter dated 06/01/2025 the ABSMARI IEC has reviewed and discussed your application for conduct of the study on dated 24/04/2025.																		
Mr. Deepak Ku. Pradhan Scientific Member	The following documents were reviewed and discussed																		
IEC-SECRETARIAT																			
Mr. Gouranga Ku. Padhy Mr. Susant Ku. Raychudamani	<table border="1"><thead><tr><th>S.N.</th><th>Documents</th><th>Document (Version/Date)</th></tr></thead><tbody><tr><td>1</td><td>IEC Application Form</td><td>24/04/2025</td></tr><tr><td>2</td><td>Informed Consent Form</td><td>24/04/2025</td></tr><tr><td>3</td><td>Undertaking form PI</td><td>24/04/2025</td></tr><tr><td>4</td><td>CRF</td><td>24/04/2025</td></tr><tr><td>5</td><td>COI from the Investigators</td><td>24/04/2025</td></tr></tbody></table>	S.N.	Documents	Document (Version/Date)	1	IEC Application Form	24/04/2025	2	Informed Consent Form	24/04/2025	3	Undertaking form PI	24/04/2025	4	CRF	24/04/2025	5	COI from the Investigators	24/04/2025
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4	CRF	24/04/2025																	
5	COI from the Investigators	24/04/2025																	
The following members were present at meeting held on 24-04-2025																			
																			
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ANNEXURES: 3
APPROVAL LETTER



TELANGANA ROLLER SKATING ASSOCIATION

TELANGANA ROLLER SKATING ASSOCIATION

Regd . No. 671/2023

Affiliated to: Roller Skating Federation of India

Telangana Olympic Association

M. Raj Gopal
President

M. V. Ramakrishna
General Secretary
9698805805

Abbas I. Lasania
Treasurer
9346238018

To
Whom It May Concern

Subject: Approval for Data Collection for Research Purposes

This is to certify that Mr. Palthya Subhash, a postgraduate student of Abhinav Bindra Sports Medicine And Research Institute, pursuing Master of Physiotherapy in Sports, has been granted permission by the Telangana Roller Skating Association to collect data for his academic research project titled:

"Knee and Ankle Injury Incidence Among In-line and Roller Skaters in Telangana."


He is hereby authorized to approach and collect relevant data from the following clubs/academies affiliated with our association, strictly for academic and research purposes:

1. Lasania's Roller & Ice Skating Academy - Hyderabad
2. S S Roller Skating Academy - Shamshabad
3. Sk8skool Academy - Bachupally
4. Pragathinagar Roller Skating Academy - Pragathinagar

The data collected will solely be used for the completion of his postgraduate thesis and not for any commercial or non-academic purpose. We understand that the study will be conducted in an ethical manner, ensuring participants' confidentiality, anonymity, and voluntary participation.

Copy of the final thesis is also to be shared with **Telangana Roller Skating Association**.

We wish Mr. Palthya Subhash all the best for his research and future endeavors.



Yours sincerely,
MV Ramakrishna

General Secretary
Telangana Roller Skating Association
Hyderabad



 **9698 805 805**

 www.telanganaskate.org

 ts.rollerskating@gmail.com

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ANNEXURES: 5

Palthya Subhash

KNEE AND ANKLE INJURY INCIDENCE AMONG IN-LINE AND ROLLER SKATERS IN TELANGANA

Quick Submit
Quick Submit
Odisha University of Health Sciences

Document Details

Submission ID
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