

## Epidemiological Trends and Risk Factors for Soccer-related Knee Injuries in Jammu & Kashmir and Punjab: A Comparative Analysis

Raheel Habib<sup>\*1</sup>, Dr. Zaki Anwer<sup>2</sup>, Ghulam Saidan<sup>3</sup>, Mehvish Manzoor<sup>4</sup>

<sup>\*1</sup>PhD scholar, Department of Applied Medical Sciences, Lovely Professional University, Phagwara, 144411, Punjab, India

Email ID: [raheelsportsphysio@gmail.com](mailto:raheelsportsphysio@gmail.com), ORCID ID: 0000-0001-5124-9293

<sup>2</sup>Professor, Department of Applied Medical Sciences, Lovely Professional University, Phagwara, 144411, Punjab, India

Email ID: [zaki.28776@lpu.co.in](mailto:zaki.28776@lpu.co.in), ORCID ID: 0000-00002-3708-2782

<sup>3</sup>Physiotherapist, Department of Physiotherapy, Government Medical College Srinagar Karan Nagar Srinagar, Jammu and Kashmir, India

Email ID: [rafiqueghulamsaidan@gmail.com](mailto:rafiqueghulamsaidan@gmail.com).

<sup>4</sup>Bpt, Department of Physiotherapy, Government Medical College Srinagar Karan Nagar Srinagar, Jammu and Kashmir, India

Email ID: [mehvish@gmail.com](mailto:mehvish@gmail.com), ORCID ID: 0009-0001-2449-555X

### \*Corresponding Aauthr:

Raheel Habib

PhD scholar, Department of Applied Medical Sciences, Lovely Professional University, Phagwara, 144411, Punjab, India

Email ID: [raheelsportsphysio@gmail.com](mailto:raheelsportsphysio@gmail.com), ORCID ID: 0000-0001-5124-9293

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### ABSTRACT

**Background:** Soccer demands exceptional agility, lower limb strength and proprioception, with high injury risks, particularly knee injuries. However, injuries are common due to the physical demands, lifestyle, and general awareness, external and internal factors. Musculoskeletal injuries, particularly knee injuries, affect both professional and recreational athletes. And their epidemiology of such injuries can be utilized for designing the prevention and training programs. This study aims to explore the epidemiological trends and risk factors of soccer-related knee injuries in Jammu and Kashmir and Punjab, two northern Indian regions.

**Methodology:** The research used a cross-sectional, comparative design to analyze the association between knee injury trends and contributing factors in the two regions. 250 respondents were selected and a structured questionnaire was used to collect demographic information, injury patterns, environmental factors, biomechanical factors, and training and lifestyle influences. Ethical permission was secured, and statistical analysis, including descriptive statistics and correlations, was performed using SPSS (Version 26) to ascertain performance discrepancies, with a significance level of  $p < 0.05$ .

**Results:** The study revealed significant differences in incidence and prevalence of knee injuries among players in Jammu and Kashmir and Punjab. Punjab players reported higher rates of ligament injuries and faster recovery times compared to Jammu and Kashmir players. Environmental factors, such as playing field conditions, weather, and lighting, influenced injury occurrence, accounting for 53.4% of the variation. Training and lifestyle factors, such as strength training, structured prevention programs, fitness training, stress management, and adequate sleep, also contributed to knee injury risk.

**Conclusion:** In conclusion, the study highlighted regional differences in perceived injury risks and susceptibility, emphasizing the need for targeted interventions, addressing region-specific environmental challenges, promoting evidence-based training practices, and region-specific injury prevention strategies and enhanced player education.

**Keywords:** Epidemiological Trends, Knee Injuries, Soccer, Risk Factors, Environmental Factors, Training Factors.

## 1. INTRODUCTION

Soccer has changed dramatically over time, becoming a worldwide phenomenon with a heavy emphasis on athletic abilities Carrion, 2006. To improve in-game performance, players must be able to change directions quickly, leap explosively, sprint, and maintain endurance <sup>1</sup>. However, injuries are a common occurrence owing to the strenuous physical demands of training and competitive matches <sup>2</sup>. Numerous studies have looked at how preventive practices might help soccer players avoid injuries <sup>3</sup>. Musculoskeletal injuries account for 80% of all sports injuries, with joint problems, especially knee injuries, affecting both professional and recreational athletes <sup>4</sup>. A knee injury may necessitate surgical intervention and an extended rehabilitation period, potentially resulting in permanent disability affecting both athletic and occupational activities. The knee is the most frequent cause of injuries that terminate seasons and careers<sup>5</sup>.

However, soccer has the greatest injury incidence of any sports, with an estimated 3.7 million sports injuries in the Netherlands each year and 42,262 soccer injuries documented in Switzerland in 2003 <sup>6</sup>. This problem is strongly ingrained in the sport's appeal and broad participation. Understanding the epidemiology of these injuries is crucial for implementing effective prevention and management strategies. India as a whole is lacking in the epidemiological studies in different sports especially soccer. Two epidemiological studies that have reported football injuries are those by <sup>7,8</sup>. The research indicated that the prevalence of knee injuries among Indian athletes is 30.6% and 26.5%, respectively. India's increasing enthusiasm for football reveals unique regional contexts, especially in Jammu & Kashmir and Punjab, each characterised by distinct natural, cultural, and infrastructural landscapes. This study will facilitate the comprehension of prevalent injuries, associated risk factors, mechanisms, and the formulation of prevention methods.

This study aims to explore the epidemiological trends and risk factors of soccer-related knee injuries in these two northern Indian regions through a comparative analysis. It focuses on environmental, biomechanical, training, and lifestyle factors, aiming to provide valuable insights and serve as a foundation for designing region-specific prevention and rehabilitation strategies.

## 2. METHODOLOGY

This study examined the epidemiological trends and risk factors of soccer-related knee injuries among players in Jammu and Kashmir and Punjab. The research used a cross-sectional, comparative design to analyse the association between knee injury trends and contributing factors in the two regions. A total of 250 respondents were selected ensuring complete responses from the participants. Additional data was gathered from the healthcare institutions of Jammu & Kashmir and Punjab for the year 2023-2024

### Questionnaire

A total of 287 responses were received and only 250 with complete responses were selected for the analysis. A structured questionnaire was employed to collect demographic information, injury patterns, environmental factors, biomechanical factors, and training and lifestyle influences. Key elements of the questionnaire included age, gender, level of play, region of play, injury history, environmental and biomechanical influences, and training and lifestyle practices.

### Health care facilities of Jammu & Kashmir and Punjab

Additional data was collected from the healthcare institutes of Jammu & Kashmir and Punjab for the year 2023-2024. Data concerning the injuries treated at the institutions were sourced from the medical record sections.

## 3. RESULTS

In terms of age, the majority (34.4%) of respondents were aged between 18-25 years, followed by 23.2% aged 31-35 years, 22.0% below 18 years, and 20.4% aged 26-30 years. Regarding gender, 65.6% of the participants were males, while 34.4% were females. When considering the current level of play, the majority (58.8%) were amateur players, 27.6% were semi-professional, and 13.6% were professional players.

Table 1 reveals the demographic information of the respondents. Majority 65.6% of the participants were males while 34.4% of the participants were females. When considered age, Maximum 34.4% of the participants age between 18-25 years while 20.4% of the participants' age 26-30 years. It was found that, 58.8% of the respondents were currently playing amateur and least 13.6% of the respondents were professional. Among the participants, majority 41.6% of the respondents were playing soccer 4-6 years and most (43.6%) of the respondents were from Punjab. In terms of playing experience, 41.6% of the respondents reported playing soccer for 4-6 years, 33.6% had 1-3 years of experience, 17.6% had been playing for less than one year, and 7.2% had over six years of experience. Regionally, most participants (43.6%) were from Punjab, 34.0% were from Jammu & Kashmir, and 22.4% played in both regions. The total sample size consisted of 250 respondents, ensuring diverse representation across demographic and regional variables.

**Table 1. Distribution of demographic variables**

	Frequency	Percent
<b>Age</b>		
Below 18	55	22.0
18-25	86	34.4
26-30	51	20.4
31-35	58	23.2
<b>Gender</b>		
Male	164	65.6
Female	86	34.4
<b>Current level of play</b>		
Amateur	147	58.8
Semi-professional	69	27.6
Professional	34	13.6
<b>How long have been playing soccer</b>		
Less than 1 year	44	17.6
1-3 years	84	33.6
4-6 years	104	41.6
More than 6 years	18	7.2
<b>What region do you play in</b>		
Jammu & Kashmir	85	34.0
Punjab	109	43.6
Both	56	22.4
Total	250	100.0

Table 2 reveals the classification of Injuries reported in healthcare facilities of J&K and Punjab. As per the data, majority 416 injuries happened in Kashmir, Jammu (159) and Punjab (268). It was found that, majority 63.6% of ACL (Athletes) and 35.23% ACL (non-athletes) respectively. ACL & Associate Injuries happened in Punjab 181 followed by Jammu (76) and Kashmir (168).

**Table 2. Classification of Injuries reported in healthcare facilities of J&K and Punjab**

Facility	Total Injuries	ACL Associate Injuries	& Other injuries (MI,MCL, LCL,PCL)	ACL (Athletes)	ACL (Non-Athletes)
Kashmir	416	168	248	87	81
Jammu	159	76	83	18	58
Punjab	268	181	87	166	15
Total Injuries	843	425	418	271	154

Percentage (%)		50.41%	49.58%		
ACL %				63.76%	35.23%

Table 3 depicts the association between incidence and prevalence of soccer-related knee injuries between players in Jammu and Kashmir and Punjab. It is observed that 68 numbers of the respondents were from Punjab region stated that they do not have experienced a knee injury while playing soccer. It was found that, 59 numbers of the Punjab respondents have experienced ligament injury followed by 29 numbers of the Punjab respondents stated that they have taken 2-4 weeks recover from their knee injury. From the chi square test value and p value ( $p < 0.01$ ) which is less than 0.05 significant levels. Hence, there is an association between incidence and prevalence of soccer-related knee injuries between players in Jammu and Kashmir and Punjab. Furthermore, soccer-related knee injuries vary significantly across the chosen regions, with a significant association between injury experience and region.

**Table 3. Association between incidence and prevalence of soccer-related knee injuries between players in Jammu and Kashmir and Punjab**

		Region			Total	Chi Square (p value)
		Jammu & Kashmir	Punjab	Both		
Experienced a knee injury while playing soccer	Yes	42	41	29	112	<b>6.776 (0.023)*</b>
	No	43	68	27	138	
Type of knee injury did you experience	Ligament injury	37	59	33	129	<b>4.523 (0.006)**</b>
	Meniscal injury	21	19	11	51	
	Fracture	17	18	7	42	
	Tendon injury	10	13	5	28	
How severe was the knee injury on a scale of 1 to 5 (1 being mild and 5 being very severe)?	1	6	11	6	23	<b>12.900 (0.002)**</b>
	2	12	13	8	33	
	3	34	38	24	96	
	4	27	40	15	82	
	5	6	7	3	16	
How long did it take for you to recover from your knee injury	Less than 2 weeks	10	23	5	38	<b>9.184 (0.001)**</b>
	2-4 weeks	25	29	17	71	
	1-2 months	26	35	19	80	
	More than 2 months	17	12	7	36	
	Never fully recovered	7	10	8	25	
Total		85	109	56	250	

\*\* $p < 0.01$ , \* $p < 0.05$

Adding to this interpretation, from Table 2, it is found that most injuries were in Kashmir (416), followed by Punjab (268) and Jammu (159). The biggest percentage of players (63.6%) and non-athletes (35.23%) had ACL injuries. Thus, numbers emphasize physical activity-related knee injuries and prevention. The same rationale holds for Punjab's 181 ACL injuries expected to be healed in 2-4 weeks (maximum in mean value). Also, we anticipate the need of injury prevention programs that must involve neuromuscular training and access to hospitals and rehab centres.

Precisely, Kashmir has the greatest incidence of 416, requiring urgent care for health and recovery. Education programs on ground injury prevention may help coaches and players reduce these injuries. Jammu had the lowest at 159 but a longer recovery period and moderate degree that required post-injury therapy and early detection. Kashmir had the most injuries (416), followed by Punjab (268) and Jammu (159). ACL injuries topped both players' (63.6%) and non-athletes' (35.23%) injuries. Therefore, figures emphasize the etiology of knee injuries from physical activities and their significant variation claiming for more intervention and prevention.

Our finding confirms that the most common type of injury was ligament injuries, followed by meniscal, fractures, and tendon injuries. Recovery times also varied significantly, with most participants recovering within 1-2 months, followed by 2-4 weeks. A smaller group reported recovery times of more than 2 months, while 25 participants never fully recovered. These findings highlight regional differences in the incidence, types, severity, and recovery times of soccer-related knee injuries, emphasizing the need for region-specific interventions and preventative measures.

Table 4 depicts the impact on the occurrence of soccer-related knee injuries in Jammu and Kashmir and Punjab. The significance values of environmental factors ( $\beta=0.049$ ,  $p<0.05$ ), condition of the playing fields ( $\beta=0.021$ ,  $p<0.05$ ), weather conditions ( $\beta=0.014$ ,  $p<0.01$ ), proper lighting during evening training sessions ( $\beta=0.027$ ,  $p<0.01$ ), aware of region-specific environmental factors ( $\beta=0.078$ ,  $p<0.05$ ) and regularly use protective equipment ( $\beta=0.038$ ,  $p<0.05$ ) specified that the factor did influence on occurrence of soccer-related knee injuries. In addition, the R-square value (0.534) revealed that 53% of soccer-related knee injuries changed due to the effect of environmental factors. Hence, there is a significant impact on the occurrence of soccer-related knee injuries in Jammu and Kashmir and Punjab. The study reveals that environmental factors significantly influence the occurrence of soccer-related knee injuries. The model explains 53.4% of the variation in knee injuries due to these factors. Key factors include playing field conditions, weather conditions, proper lighting during training sessions, awareness of region-specific environmental factors, and regular use of protective equipment. The constant value ( $\beta = 1.694$ ) indicates that other unmeasured factors also play a role. The findings suggest that environmental considerations, such as field conditions, weather, and safety measures, are crucial in reducing the risk of knee injuries among soccer players and should be prioritized in injury prevention strategies.

**Table 4. Impact on the occurrence of soccer-related knee injuries in Jammu and Kashmir and Punjab**

	Unstandardized Coefficients		R Square	T value	P value
	Beta	SE			
(Constant)	1.694	0.212	0.534	7.975	<b>0.000**</b>
Environmental factors	0.049	0.036		11.338	<b>0.022**</b>
Condition of the playing fields	0.021	0.041		13.505	<b>0.014*</b>
Weather conditions	0.014	0.051		7.279	<b>0.000**</b>
Proper lighting during evening training sessions	0.027	0.033		16.832	<b>0.006**</b>
Aware of region-specific environmental factors	0.078	0.045		21.728	<b>0.025*</b>
Regularly use protective equipment	0.038	0.100		16.383	<b>0.042*</b>

**Dependent Variable:** Occurrence of soccer-related knee injuries, \*\* $p<0.01$ , \* $p<0.05$

Table 5 depicts the impact of training and lifestyle factors on the risk of soccer-related knee injuries in Jammu and Kashmir and Punjab. The significance values of Strength training to improve knee stability ( $\beta=0.128$ ,  $p<0.01$ ), Prevention programs ( $\beta=0.438$ ,  $p<0.05$ ), Overall fitness level training ( $\beta=0.214$ ,  $p<0.01$ ), Susceptibility to knee injuries ( $\beta=0.044$ ,  $p<0.05$ ), Sleep do get on average per night ( $\beta=0.039$ ,  $p<0.05$ ), Manage stress and fatigue related to training and competition ( $\beta=0.073$ ,  $p<0.05$ ) and Risk of knee injuries is higher in region ( $\beta=0.039$ ,  $p<0.05$ ) specified that the factor did influence on occurrence of soccer-related knee injuries. In addition, the R-square value (0.265) revealed that 27% of soccer-related knee injuries changed due to the effect of Training and lifestyle factors. Hence, there is a significant impact of training and lifestyle factors on the risk of soccer-related knee injuries in Jammu and Kashmir and Punjab. The study reveals that 26.5% of the variation in soccer-related knee injuries is explained by training and lifestyle factors. Strength training and overall fitness level training are crucial for mitigating knee injury risks. Prevention programs also play a significant role, emphasizing the importance of structured injury prevention measures. Other lifestyle and training factors, such as susceptibility to knee injuries, average

sleep, stress management, and perception of higher risk in specific regions, also significantly influence injury risks. The constant ( $\beta = 1.566$ ) represents the baseline risk of knee injuries attributable to other unmeasured variables. The analysis emphasizes the importance of targeted strength and fitness training, adequate rest, stress management, and prevention programs to reduce the risk of soccer-related knee injuries.

**Table 5. Impact of training and lifestyle factors on the risk of soccer-related knee injuries in Jammu and Kashmir and Punjab**

	Unstandardized Coefficients		R Square	T value	P value
	Beta	SE			
(Constant)	1.566	0.191	0.265	8.220	<b>0.000**</b>
Strength training to improve knee stability	0.128	0.051		23.551	<b>0.000**</b>
Prevention programs	0.438	0.042		15.669	<b>0.035*</b>
Overall fitness level training	0.214	0.038		27.686	<b>0.000**</b>
Susceptibility to knee injuries	0.044	0.044		11.995	<b>0.024*</b>
Sleep do get on average per night	0.039	0.044		6.888	<b>0.010*</b>
Manage stress and fatigue related to training and competition	0.073	0.032		12.251	<b>0.032*</b>
Risk of knee injuries is higher in region	0.039	0.037		9.251	<b>0.042*</b>

**Dependent Variable:** Risk of soccer-related knee injuries, \*\* $p < 0.01$ , \* $p < 0.05$

#### 4. DISCUSSION

The study was conducted in Jammu & Kashmir and Punjab, yielding 250 replies from football athletes of varying ages and experience levels. The majority of the athletes were males, at two-thirds of the total, while females accounted for one-third. In terms of participation throughout the three regions, 43.6% of participants hailed from Punjab, which aligns with the fact that a significant number of players who have represented India in international competitions come from Punjab<sup>9</sup>.

On the other hand, 34% of the participants were from Jammu and Kashmir, which is indicative of the growing popularity of football in the region. The Jammu and Kashmir Football Association (JKFA), which is a constituent of the All India Football Federation, has the responsibility of supervising the football programme in the state, which consists of 1832 officially registered players<sup>10</sup>.

Our research results confirm some significant trends and patterns of prevalence in the case of injuries among Indian athletes, especially knee injuries along with their cause and recovery mechanism. The most common type includes ligament injuries, especially ACL tear cases. Fitting with the findings of (John et al., 2016) it was established that 64.4% injuries have resulted from non-contact mechanisms, which also have many cases of medial meniscus tears along with ACL tear. Such injuries make the highlight really indicate the tremendous loss in career time of the athletes and financial burdens to families (Dhillon et al., 2016).

Like the findings of this research, it is acknowledged that regional differences are there in the treatment of sport injuries<sup>11</sup>(Malik and Pawar, et al., 2012). North zone players opine that they are relatively fit as compared to others because of favorable climatic conditions and stringent training programs (Ministry of Youth Affairs and Sports, 2020). However, other regions require specific interventions like proper coaching and better infrastructure.

The injury patterns also differ with the sports. In India, basketball and soccer players aged between 25–40 years were mainly affected by sprains, fractures, and dislocations (JIPSI, 2019). ACL injuries are severe and usually end up finishing the sporting careers<sup>12</sup>(Jagadeesh et al., 2022). There is a need to develop programs in biomechanical and neuromuscular training that would prevent such injuries.

Likewise, in this analysis of the incidence and prevalence of soccer-related knee injuries, we found 59 (54%) of the 109 participants from Punjab sustained injuries. Twenty-nine individuals (26%) sustained ligament injuries, requiring a recovery period of 2 to 4 weeks. In Jammu and Kashmir, 37 out of 85 participants (43.52%) sustained ligament injuries, with 25 individuals (29.41%) requiring a recovery period exceeding 2-4 weeks. The highest incidence of knee injuries was recorded



in Kashmir, with 416 cases (49.34%) out of 843 cases, constituting nearly half of the total injuries reported.

The comparison showed more competitive injuries than practice injuries ( $p < 0.0001$ ), which means that injury prevention strategies must happen in the field. Accordingly, we agree to the existing inference that recovery from sports injury has increasingly become an activity of a specialty area in itself<sup>13</sup>(Liu and Ren, et al., 2023), where dialogue between physicians and physiotherapists must be communicated. Appropriate recovery protocols will not delay return to play but also increase the chance for re-injury.

Also, our study agrees to the impacts of environmental factors to be impacting on athlete performances and injuries, including knee injuries<sup>14</sup> (Rao et al., 2021) in the same line commented in his findings that extreme weather conditions like high heat, humidity, and unseasonal rain increase the risk of injuries; while cold weather is said to make muscles stiffer and less flexible. Further, injury prevalence is more among athletes playing on artificial turf, so adjustments must be made<sup>15</sup>(Yashaswini et al., 2024).

Regarding the management of these injuries, 51.1% chose to receive treatment at local healthcare facilities. While as in the Jammu division, just 23.6% of athletic ACL injuries were addressed. In contrast data from the Punjab division, where 91.7% of injuries were addressed. The gap stems from the enhanced accessibility of healthcare facilities and post-operative care in Punjab relative to Jammu & Kashmir. The study's conclusions necessitate urgent attention to upgrade healthcare facilities in the region to achieve parity with healthcare facilities of Punjab.

Our study's findings align with those of<sup>16</sup> Majewski M et al., 2006 , and<sup>17</sup> Gupta R et al., 2016 indicating that ligament injuries were the most prevalent, followed by meniscal tears, fractures, and tendon injuries. Furthermore, justifying the training, recovery, differences in treatment and facilities as presented in the result of this study, our research provides justification that in Jammu & Kashmir, the growth of athletes is challenged by a lack of infrastructure due to fewer sports facilities and poor implementation, as per the report presented from Khelo India CCD and National Physical Fitness Program. A requirement of having a separate fund for modern equipment for sports in addition to training by the expert is recommended here so that injury and better results could be prevented (Ministry of Youth Affairs and Sports reported, 2020).

The utilization of protective equipment, adequate lighting, and climatic conditions all contributed to the incidence of injuries among sportsmen in Jammu and Kashmir. The external temperature may cause muscle stiffness, diminishing flexibility and increasing susceptibility to injury. The study's findings are corroborated by evidence indicating that environmental factors greatly affect the incidence of knee injuries (<sup>18</sup> Nair R et al., 2018).

The study conducted by (<sup>19</sup> Della Villa F et al., 2020) revealed that 49 injuries (36.5%) occurred at night, indicating that inadequate lighting may contribute to injuries among sportsmen in Jammu and Kashmir. Regular use of protective equipment's has been one of the most factors in prevention of injuries (<sup>20</sup> Ekstrand et al., 1983) (<sup>21</sup> Hamzah et al., 2022). In agreement with our study results (<sup>22</sup> Patel DR et al., 2017 and <sup>23</sup> Hootman JM et al., 2007) consider that adequate sports equipment effectively minimizes sports injuries.

The influence of training and lifestyle factors also contributes to soccer-related injuries. Our research demonstrated that strength training and comprehensive fitness training are crucial for decreasing the occurrence of knee injuries, supported by similar results in other studies (<sup>18</sup> Nair R et al., 2017 and <sup>24</sup> Simon JE et al., 2021). Additional prevention programs significantly contribute to injury prevention, as revealed by (<sup>18</sup> Nair R et al., 2017 and <sup>25</sup> Silvers –Granelli et al., 2017). Several writers have indicated that injury prevention methods had no effect on the occurrence of sports injuries as reported by <sup>26</sup> Slauterbeck JR 2019, as FIFA 11+ did not demonstrate a substantial reduction in injuries.

In addition to strength training, factors such as sleep and stress management significantly influence injury risk, as documented by (<sup>27</sup> Clemente FM et al., 2021), which indicates that inadequate sleep adversely affects football players and heightens their injury risk. Stress may originate from family members, coaches, friends, or be self-imposed. Stress had a positive correlation solely with injuries (<sup>28</sup> Prieto –Gonzalez et al., 2021). Moreover, (<sup>29</sup> Sreekaarini et al., 2014) confirmed that stress is a significant injury risk factor among adolescent athletes. Nippert AH et al., 2008<sup>30</sup> have suggested that psychological therapies may diminish the incidence of injuries.

Cross-sectional studies are useful for clinical practice, but owing to constraints in hospital-based research and small sample numbers in sports, sub-group analyses were not feasible (Medicine P et al., 2014<sup>31</sup>). Future research should concentrate on multi-center, prospective studies with bigger populations, preferably in professional sports leagues, sports academies, and universities, to better characterize incidence rates and risk factors for knee injuries. Preventive strategies may successfully reduce the prevalence and frequency of sports-related injuries (DiStefano et al., 2017 , Voskanian N et al., 2013 and Silvers – Granelli et al., 2017<sup>32, 33, 25</sup>).

Regarding personal reasons to cause the said injury, we argue that stress and lack of sleep are the two major risk factors that would influence the prevalence of injury. As according to (Clemente et al., 2021<sup>27</sup>) and (Prieto-González et al., 2021<sup>28</sup>), the tendency for more injuries to occur is often from sources of stress that come from personal and professional settings. The risks would likely be highly reduced through stress management and mental health programs.

It is the stress that causes severe injuries among adolescent athletes (Sreekaarini et al., 2014 <sup>29</sup>). Early intervention results in better recovery and performance. Resilience and long-term health gain importance for prevention strategies, such as rehabilitation protocols (IISM, 2023). Thus, critical issues are economic burdens resulting from sports injuries. It is established by Zhou and Chu (2022) that injuries among young athletes signify lost productivity and further cost implications in healthcare. As such, evidence-based educational, preventive measures as well as accessible recovery routes must be addressed towards the problem.

Physiotherapists consulted fewer athletes in comparison to physicians, and knowledge related to specialized rehabilitation services represents an area of need for improvement (Kazenejad et al., 2023 <sup>34</sup>). The injuries could have only been effectively managed by physiotherapists, coaches, and medical practitioners as long as they had all communicated with each other on more collaborative grounds.

## 5. CONCLUSION

The study analysed soccer-related knee injuries among players in Jammu and Kashmir and Punjab, revealing significant differences in incidence and prevalence. Punjab players reported higher rates of ligament injuries and faster recovery times compared to Jammu and Kashmir players. Environmental factors, such as playing field conditions, weather, and lighting, influenced injury occurrence, accounting for 53.4% of the variation. Training and lifestyle factors, such as strength training, structured prevention programs, fitness training, stress management, and adequate sleep, also contributed to knee injury risk. The study highlighted regional differences in perceived injury risks and susceptibility. It emphasized the need for targeted interventions, addressing region-specific environmental challenges and promoting evidence-based training practices. Region-specific injury prevention strategies and enhanced player education are also crucial for reducing knee injury risks and improving recovery outcomes.

## 6. ETHICAL CLEARANCE

Office of the Divisional Sports officer, Government of Jammu and Kashmir.

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## 7. AUTHOR CONTRIBUTIONS

	Raheel Habib 1	Dr. Zaki Anwer 2	Ghulam Saidan 3	Mehvish Manzoor 4
Concepts	Yes	Yes	No	No
Design	Yes	Yes	No	No
Definition of intellectual content	Yes	Yes	No	No
Literature search	Yes	No	Yes	Yes
Clinical studies	Yes	No	Yes	Yes
Experimental studies	Yes	No		Yes
Data acquisition	Yes	No	Yes	Yes
Data analysis	Yes	No	No	No
Statistical analysis	Yes	No	No	No
Manuscript preparation	Yes	Yes	Yes	Yes
Manuscript editing	Yes	Yes	Yes	Yes
Manuscript review	Yes	Yes	No	No
Guarantor	Yes		No	No



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