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Epidemiology and Associated Factors of Sports Injuries in Iranian Goalball Athletes

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ABSTRACT: Visually impaired individuals have higher risk of injuries particularly in sports like goalball. It is specifically designed for the visually impaired people. It is imperative to prevent injuries prior to their occurrence for avoiding negative effects on sporting success, financial losses, and motivation. This study was aimed to determin the Epidemiology and Associated Factors of Sports Injuries in Iranian Goalball Athletes.

This study is a descriptive-correlational and retrospective research. A total of 205 male and female goalball athletes, aged between 18 and 50 years, completed the injury registration form. The Fuller et al. injury registration form was utilized for data collection. The information gathered included injury prevalence, injury mechanisms, injury severity, injury incidence across different anatomical regions, injury timing (training/competition), and injury type (acute or chronic). Frequency and percentage were used to assess injury prevalence, and the Chi-square test was employed to analyze relationships between variables.

The highest prevalence of injuries was related to contusions and bruises (28.3%), while fractures and dislocations had the lowest prevalence (3.9%). No significant relationship was found between sports injury prevalence and factors such as age group, activity history, activity level, and sports class. The knee exhibited the highest frequency of local and overall anatomical injuries (19.5%), while the sole of the foot had the lowest frequency (1.0%). The most common types of injuries were facial and cheek abrasions, cuts, and wounds (8.3%), followed by wrist and shoulder muscle strains, each affecting 15 athletes (7.3%). Regarding injury mechanisms, the most frequent cause was ball impact with the athlete (34.2%), while the least common mechanism was player collision with the goalpost (5.2%). A significant correlation was found between injury mechanism and activity level (p = 0.031). The most frequent injury severity category was "very mild" (31.2%, affecting 114 athletes), whereas "very severe" injuries had the lowest frequency (10.7%, affecting 39 athletes). A significant positive correlation was observed between injury severity and activity level (p = 0.02).

Based on the findings and the significance of the issue, injury prevention must be prioritized to reduce the occurrence of injuries. Consequently, coaches, athletes, and other stakeholders should collaborate to lower injury rates by incorporating sports injury prevention programs.

KEYWORDS: Prevalence, Blind athletes, Goalball, Sports injuries

1 Introduction

One of the sensory impairments is related to blindness and visual disabilities. Visual impairment, which encompasses blindness and low vision, is one of the most prevalent disabilities and primary causes of functional limitations in adults, impacting mobility and everyday tasks (1). This disability can either be congenital (present at birth) or acquired. Generally, visual impairment arises from (a) hereditary and genetic conditions, and (b) injuries caused by infectious diseases, accidents, burns, poisoning, high blood pressure, and other health issues (2). The World Health Organization reports that 285 million people worldwide have visual impairments, including 39 million who are blind and 246 million with low vision, with 90% of this group residing in developing countries, and 28% falling within the 15-49 age range (3). Engaging in sports helps alter society's views of individuals with disabilities. Thus, sports for the blind and visually impaired are especially important. According to the International Blind Sports Federation (IBSA), 115 countries now have active national federations, and around 5,000 visually impaired people globally are involved in a variety of professional sports (4). Goalball is one of the sports recognized by the IBSA. This Paralympic sport is tailored specifically for athletes who are blind or visually impaired, categorized into B1, B2, and B3 classifications. Goalball competitions are conducted in teams, with separate events for men and women (5). A review of previous studies on sports injuries among visually impaired individuals has shown that goalball was one of the two sports with the highest injury rates at the London Paralympics (6). Reports indicate that during the 2012 Summer Paralympic Games in London, five-a-side football had an injury incidence rate of 12.7 injuries per 1,000 training hours, seven-a-side football had a rate of 11.2 injuries per 1,000 training hours, while goalball had an injury incidence rate of 19.5 injuries per 1,000 training hours. The study also considered athletic characteristics, age, gender, and disability classification as important variables, suggesting that future research should adopt a similar methodology (6). Silva et al. (2013) examined the epidemiology, nature, and patterns of sports injuries in Brazilian visually impaired Paralympic track and field athletes, also evaluating differences based on visual classification and gender. A total of 31 athletes reported 77 sports injuries, with a prevalence of 78%, a clinical incidence rate of 1.93 injuries per athlete, and an incidence rate of 0.39 injuries per athlete per competition. Overuse injuries made up 82% of the cases. The highest injury occurrence was in the lower limbs (87%), with the most affected areas being the thighs (33.8%), lower legs (16.9%), and knees (9.1%). The most common injury types were spasms (26%) and tendinopathy (24.3%) (7). What can be inferred from previous studies is that understanding injuries and their risk factors in sports is crucial for standardizing sports disciplines. Therefore, identifying risk factors and sports injuries across various sports can help prevent injuries and provide solutions to enhance athlete safety (8, 9). Various sports injuries lead to significant discomfort in different parts of athletes' bodies. In recent years, research on sports injuries has grown, offering valuable insights into sports injury pathology for medical and rehabilitation teams, coaches, and athletes. These objectives can be achieved through systematic and thorough studies on the epidemiology of sports injuries in specific disciplines. Given the increasing number of people with disabilities participating in sports, including goalball, along with its growing popularity and the importance of regular physical activity for individuals with disabilities, examining the epidemiology of goalball-related injuries in Iran is crucial due to the lack of existing research and data. Therefore, this study aims to explore the epidemiology of injuries among male and female goalball athletes in Iran. Furthermore, considering factors such as gender, age, experience level, activity level, and degree of disability in visually impaired goalball athletes during training and competitions could help reduce the risk of sports injuries, assess physical conditions more effectively, and improve athletic performance. This study examines the relationship between these factors and injury prevalence. Accordingly, the researcher

intends to analyze the prevalence and associated factors of sports injuries among goalball athletes participating in the national championships.

2 Methods

2.1 Participants

This is a descriptive-correlational study of a retrospective nature, conducted to determine the prevalence of sports injuries in the sport of goalball for blind individuals over 1000 hours of training, including the anatomical region of the injury, causes of injury, type of injury, injury severity, and the timing of injury in goalball athletes at the national level over the past year. The study population consists of all male and female goalball athletes in the country aged 18 to 50 years. The sample includes 94 female and 111 male goalball athletes who have participated in provincial and national teams, are members of a national goalball team, and have competed in the National Championship held in 1400. Ultimately, the sample size was determined to be 205 individuals based on the accessible population and their consent to participate in the study. Data collection was done through a field method. The researcher distributed the questionnaires among participants at the National Goalball Championship held in December 2021 in Babolsar, Mazandaran. Given the visual status of the participants, the researcher read the questionnaires question by question to ensure the accuracy of responses and recorded the answers. Participants willingly and consciously consented to participate in the study. Non-participation, withdrawal from the study, and lack of memory to recall past injury experiences were considered as exclusion criteria

2.2 Measurement and Tools

In this regard, the Fuller et al. questionnaire was used to record the injury level of the subjects. This questionnaire includes information such as competition details (date and weight), athlete characteristics (name and gender), and injury features (body region, location, and severity). According to the current medical definition, a sports injury is defined as acute or chronic musculoskeletal symptoms and signs resulting from goalball during sessions (10). Multiple injuries in an athlete are classified based on the injured body area (for example, a knee sprain is listed under knee injury, while an ankle sprain is recorded under ankle injury, regardless of whether the two injuries occurred during the same incident or in separate incidents).

2.3 Statistical Analysis

To analyze the data, descriptive statistics methods were used to calculate central tendency and dispersion indices, as well as to plot graphs. Frequency and percentage of frequency were used to assess the extent of injury and injury prevalence. The Chi-square test (Eta coefficient) was employed to examine the relationship between variables. Data analysis was carried out using SPSS statistical software version 23, with a default alpha level set at 0.05 for statistical significance.

3 Results

A total of 205 male goalball athletes were the study participants with mean age of 29.71 ± 2.46 years. Table 1 provides the demographic information of participants.

Table 1. Demographic information of research variables

Variable	Average	Standard deviation
Age (years)	29/71	2/46

Weight (kg)	70/85	14/57
Height (cm)	1/70	0/009
Body mass index (kg/m2)	24/20	4/15
Professional experience (years)	9/04	1/20
History of blindness (years)	25/45	1/32

Table 2. The distribution of sports injury types in goalball athletes

		No		Yes	
	Variable	Frequency	Percentage of frequency	Frequency	Percentage of frequency
Injury prevalence	Dislocation	194	94/6	11	5/4
	Muscle strain	158	77/1	47	22/9
	Bruises and bruises	147	71/7	58	28/3
	Scratches, cuts, and wounds	164	80/0	41	20/0
	Cracking and hair loss	0/197	96/1	8	3/9
	Fracture	188	91/7	17	8/3
	Twisting	187	91/2	18	8/8
	Disc and meniscus injuries	193	94/1	12	5/9
	Tendon rupture	196	95/6	9	4/4
Anatomical Injury Locations	Chin and maxilla	189	92/2	16	7/8
	Face and cheeks	181	88/3	24	11/7
	Wrist	171	83/4	34	16/6
	Finger	199	97/1	6	2/9
	foot	203	99/0	2	1/0
	Ankle	182	88/8	23	11/2
	shin	190	92/7	15	7/30
	Knee	165	80/5	40	19/5
	Skull	201	98/0	4	2/0
	Neck	197	96/1	8	3/9

Nose	188	91/7	17	8/30
Shoulder and arm	190	92/7	15	7/30
Lumbar	191	93/2	14	6/8
Elbow and forearm	182	89/8	21	10/2
Mouth and teeth	188	91/7	17	8/30
Back	202	98/5	3	1/5
Pelvis	198	96/6	7	3/4
Thigh	192	93/7	13	6/3
scapular	185	90/2	20	9/8
Forehead	200	97/6	5	2/40
Ear	201	98/0	4	2/0
Ribs	198	96/6	7	3/40
Toes	201	98/0	4	2/0
Chest	194	94/6	11	5/40

* significance= $p < 0.05$

The highest prevalence of injuries was related to contusions and bruises (28.3%), while fractures and dislocations had the lowest prevalence (3.9%). Table 2

Table 3. The distribution of sports injury types in goalball athletes

	Variable	Frequency	Percentage of frequency
	Collision with each other	92	25/2
	Ball hits athlete	125	34/2
	Player hits the goal	9	2/5
	Falling down	20	5/5
injury Mechanism	Slipping	45	13/2
	Spinning	18	4/9
	Running	24	6/6
	Throwing the ball into the goal or overusing the member	29	7/9
Injury Severity	Very mild	114	31/2
	Mild	75	20/5

Medium	78	21/4
Severe	59	16/2
Very Severe	39	10/7

* significance= p<0.05

The most common types of injuries were facial and cheek abrasions, cuts, and wounds (8.3%), followed by wrist and shoulder muscle strains, each affecting 15 athletes (7.3%). Regarding injury mechanisms, the most frequent cause was ball impact with the athlete (34.2%), while the least common mechanism was player collision with the goalpost (5.2%). Table 3

Table 4. The relationship between sports injury and risk factors

	Variable	Phi correlation coefficient	P value
Injury prevalence	Injury prevalence with age	0/417	0/953
	Injury prevalence with history of activity	0/573	0/134
	Injury prevalence with activity level	0/332	0/234
	Injury prevalence with type of exercise class	0/380	0/532
Anatomical Injury Locations	Anatomical Injury Locations with age	0/676	0/968
	Anatomical Injury Locations with history of activity	0/755	0/198
	Anatomical Injury Locations with activity level	0/496	0/327
	Anatomical Injury Locations with type of exercise class	0/583	0/681
Mechanism	Mechanism with age	0/185	0/993
	Mechanism with history of activity	0/258	0/571
	Mechanism with activity level	0/201	0/031[*]

	Mechanism with type of exercise class	0/141	0/923
Severity	Severity with age	0/177	0/760
	Severity with history of activity	0/207	0/428
	Severity with activity level	0/175	0/021[*]
	Severity with type of exercise class	0/159	0/305

* significance= p<0.05

No significant relationship was found between sports injury prevalence and factors such as age group, activity history, activity level, and sports class (p ≥ 0.05). No significant relationship was found between sports injury Mechanism and severity with factors such as age group, activity history, and sports class (p ≥ 0.05). Table 4

A significant correlation was found between injury mechanism and activity level (p = 0.031). The most frequent injury severity category was "very mild" (31.2%, affecting 114 athletes), whereas "very severe" injuries had the lowest frequency (10.7%, affecting 39 athletes). A significant positive correlation was observed between injury severity and activity level (p = 0.02).

5. Discussion and Conclusion

The aim of the present study was to examine the epidemiology and related factors of sports injuries in Iranian goalball athletes. The initial results of this study indicated that the highest frequency of injury prevalence was related to bruising and contusions, while the lowest frequency of injury prevalence was related to fractures and hairline cracks. Overall, 57.1% of individuals had experienced injuries in the past six months. From a sports medicine perspective, injury prevention is crucial because injuries occurring at a young age—whether short-term or long-term—can impact both physical and mental health. Therefore, a primary sports injury could prevent an individual from engaging in physical activity for the rest of their life and may also influence their attitude toward sports and physical activity. As a result, preventive research is essential to protect visually impaired individuals from the negative consequences of sports participation. The studies closest to the present research include those by Tan et al. (2024) , Ruben et al. (2019), and Fahimi Nejad et al. (2020) (11, 12, 13). In their study on the prevalence of injuries among goalball players, Ruben et al. found that 64% of players had experienced injuries in the past six months, which aligns with the findings of this study (12). Similarly, in the research conducted by Ana et al. on 43 goalball players (24 women and 19 men), they found that 44% of players had sustained injuries in the past six months. Additionally, they identified a relationship between injuries and body mass index (BMI), suggesting that BMI could influence the occurrence of injuries among players (13). Fakher et al. (2018) conducted a study to determine the one-year prevalence of sports injuries among Paralympic athletes with visual impairments, exploring the relationship between injury occurrence, visual classification, gender, and weight. Out of 45 participants, 38 athletes reported injuries, resulting in an annual prevalence rate of 84%. Male athletes reported a higher number of injuries compared to female athletes (14).

Few studies have examined injuries or traumas to people with visual disabilities, let alone publications describing this problem in players practising goalball, being the only Paralympic team sport dedicated only to athletes with visual disabilities (12). Observations of other authors conducted among blind soccer players, swimmers, and athletes showed that the location of injuries is closely related to the sport and playing technique (15, 16). During defensive playing and in attack, the upper limbs are exposed to heavy loads. A player performing defensive elements usually adopts an intermediate or low position, with the lower limbs in direct contact with the ground and the arms repress entinga support point for the upper bodys egments. The target defensive position is to lie on the side with straightened and stiffened lower and upper limbs with the head between the arms (17).

Other findings revealed that there was no significant relationship between injury mechanisms and severity with age group, activity history, or sports classification. However, a significant positive relationship was found between these variables and the level of physical activity. Since the researcher found no previous studies that examined these mechanisms, and considering that goalball goal safety standards are fully adhered to, it is not surprising that ball impact with the athlete was the most frequent injury mechanism among goalball players. In general, there is a lack of research in the literature regarding injuries and trauma among visually impaired athletes, particularly in relation to the specific characteristics of a sport. This was confirmed by studies conducted by Fakher et al. (2014) and silva et al. (2019), which took a broad approach to the issue by examining injury prevalence in swimmers, track and field athletes, football players, and judokas (18, 19). This methodological approach is understandable, as Willick et al. (2013) explained in their study, where they highlighted that research in Paralympic sports often involves a relatively small number of participants, especially when considering factors like the type and degree of disability, the sport, medical classification, and gender (20). Furthermore, considering the positive relationship between injury mechanisms and an athlete's level of physical activity, the impact of inadequate warm-up in causing sports injuries in goalball should not be ignored. A proper and sufficient warm-up raises body and muscle temperature, enhances the elasticity of collagen tissues, improves flexibility, and reduces muscle soreness, all of which play a role in preventing injuries (21). One possible explanation for injury severity is that athletes with lower levels of physical activity tend to exercise with more control, intentionally being more cautious when performing movements and skills. This careful approach helps to reduce the severity of injuries in athletes with lower activity levels. Fahimi Nejad et al. (2020) reported that 44% of goalball players had experienced injuries in the past six months. In 42% of these cases, the injury required less than one month of rest from training, while 8% of injuries did not require any rest. They also noted that 23% of injured athletes underwent rehabilitation (13).

It is important to emphasize that the severity of sports injuries and the length of time away from training or competition are closely linked to the athlete's activity level and the specific type of injury (22). The relatively mild to moderate nature of injuries observed in goalball players in this study may be due to the types of injuries sustained, such as dislocations, subluxations, strains, sprains, bruises, and contusions, which are typically classified as mild to moderate in severity (23). Athletes recovering from these injuries can typically return to training and competition after a short period of rest and rehabilitation, minimizing their time away from sports (24). In light of these findings and the significance of the issue, injury prevention should be prioritized to reduce their frequency. Coaches, athletes, and other involved parties should collaborate to decrease both the frequency and severity of injuries, which calls for a focus on injury prevention programs. Future studies should aim to implement injury prevention strategies and interventions to address risk factors and injury mechanisms specific to goalball.

Ethical considerations

Compliance with ethical guidelines

All ethical principles in the present research have been adhered to. Participants were allowed to withdraw from the study at any time they wished, and all participants were informed about the research process. Their information was kept confidential

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authors' contribution

All authors contributed equally to the preparation of this article.

conflict of interest

The present research has no conflicts of interest.

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