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The Role of Protective Equipment, Heating and Cooling in Baseball Injuries in Iran's Premier League

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ABSTRACT

Millions of people participate annually in baseball and softball. Despite their popularity, these two sports account for a significant percentage of sports-related injuries. Fortunately, various interventions such as the use of protective equipment, proper training, and specific exercise programs have been implemented to reduce these injuries. The present study aimed to identify factors affecting the injury rate among Iranian baseball players, including the use of equipment, warm-up, and cool-down practices. For this purpose, 42 players from the Iranian Premier Baseball League were surveyed using a modified questionnaire. The results indicated that players in the Iranian Premier League place greater emphasis on warm-up exercises during competitions than during training sessions, whereas they perform cool-down exercises more frequently after training than after competitions. The use of protective equipment such as helmets and catchers' guards has received more attention among players as a preventive measure against injuries. More than 75% of players reported that they regularly use protective gear, including helmets while batting and guards and cups while catching.

1. INTRODUCTION

Baseball is one of the most thrilling and popular sports in North America and East Asia, attracting a considerable number of enthusiasts. The first documented modern baseball match dates back to June 4, 1838, in Beachville, Ontario, Canada. The inaugural baseball match in Tehran took place in 1941, organized by physical education students from the Darolfonoon School at Manzarieh, Tehran. In 1995, the Iranian Baseball Federation was established, and in 2007, the first league, featuring six teams, was held, expanding to 12 teams the following year. Currently, there are 20 active sports clubs in this field, and the Iran Baseball competitions are conducted in the form of League 1 and League 2.

Baseball is a team sport, each team comprising nine players, involving explosive, endurance, and strength movements. Due to the repetitive nature and prolonged duration of training and competition, players endure various

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injuries throughout a season. Given the increasing number of athletes and enthusiasts in baseball and the professionalization of the Iranian league, identifying risk factors in this sport requires more attention than ever. One of the critical factors in sports-related injuries in various sports is warming up and cooling down. Today, more emphasis is placed on the warming-up process and its role in preventing sports injuries. The significance of using sports equipment to prevent injuries in various sports is also undeniable.

The first step in preventing sports injuries, according to Van Michelin's model, is the identification of the incidence and prevalence of sports injuries. Additionally, determining the causes and mechanisms of injuries is the second crucial stage. Epidemiological studies play a vital role in answering these questions and removing barriers to implementing the best preventive measures. Although extensive research on the epidemiology of baseball injuries has been conducted in other countries, the role of cultural, geographical, and even racial factors in the incidence of injuries has been proven. Epidemiological research also requires periodic updates. Lack of awareness of the types and causes of injuries in this field leads to an increase in the rate of injuries and prolongs the duration of absence from sports.

Therefore, the aim of this study is to identify and investigate risk factors associated with warming up, cooling down, and the use of sports equipment and their relationship with the incidence of injuries in professional baseball in Iran. Given the researcher's knowledge, no studies have been conducted in this field in Iran, making this the first study that can provide valuable information for players, coaches, and sports teams.

2. MATERIALS AND METHOD

in this study is descriptive and retrospective due to the registration of injuries. The highest level of Iranian baseball, which is the country's premier league, comprises five teams. Out of the total of 79 players in Iran League 1, 42 have an average age of 76.07 ± 76.5 years, an average height of 52.181 ± 12.8 cm, an average weight of 81.16 ± 24.81 kg, and an average experience of 71.7 ± 76.5 years playing baseball. Five teams participated during the 2017-2018 season. A total of 20 games were played during the two rounds of the tournament. A modified questionnaire was utilized to document the injuries sustained by the players during the first eight games, which consisted of two periods.[1] The questionnaire gathered personal information, player position, playing time, heating and cooling duration, injury type and nature, and protective equipment details. The research considers injury under two comprehensive definitions: when a person is unable to continue the activity in the same training session or competition due to a collision or injury, or when the athlete is visited by the medical team for evaluation or treatment of an injury. Descriptive statistics, frequencies, and cross tables were used for statistical analysis due to the non-parametric nature of the data. The findings of this research were expressed using numbers, tables, and graphs as descriptive statistics. SPSS statistical software (version 19) was used for all statistical analyses.

3. RESULTS

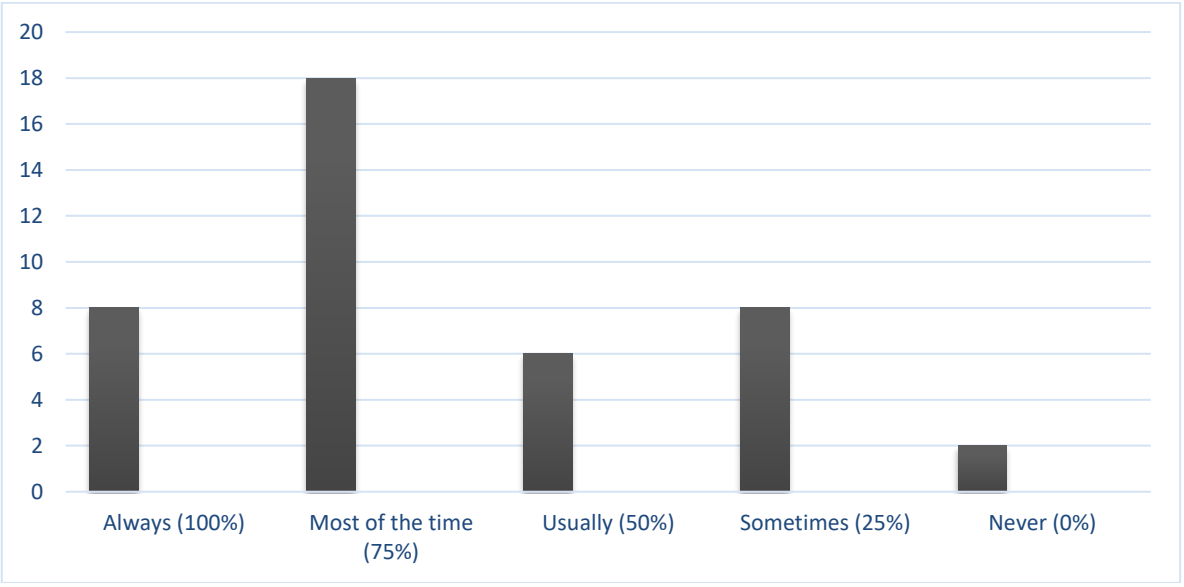

Fig. 1. The number of players using helmets during training

Out of the 42 players included in the study on helmet use during training, 18 players (42.9%) reported using helmets for the majority of the time (75% of the time), while 8 players (19%) reported using helmets sometimes and 2 players (4.8%) reported never using helmets

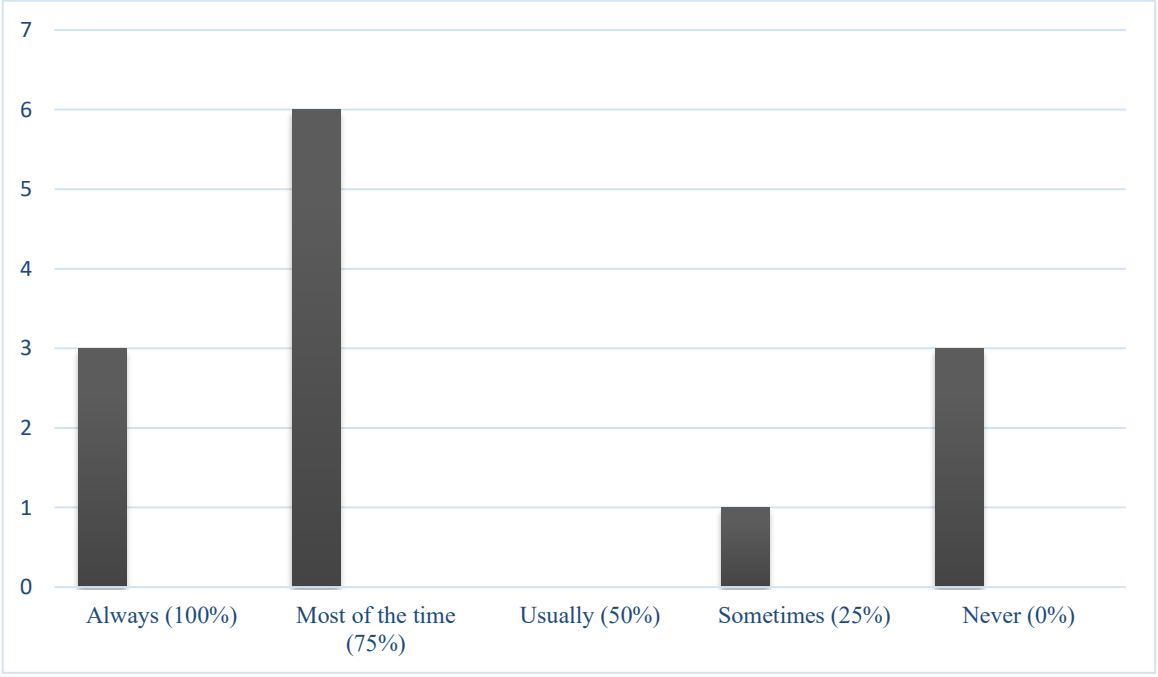

Fig. 2. The amount of use of cups and guards by catchers during training

During the training of the players who receive in the post (catcher), out of the total of 13 present players, 3 players (23.1%) never use the protective equipment for catcher (guard and cup). 70% of players use catcher's protective equipment more than 75% of the time.

Table 3. Do you do the warm-up phase in the exercises?

Position	Percentage	Number	
1	**76.2 %**	**32**	**Always (100%)**
2	**21.4 %**	**9**	**Most of the time (75%)**
3	**2.4 %**	**1**	**Often (50%)**
4,5	**0 %**	**0**	**Sometimes (25%)**
4,5	**0%**	**0**	**Never (0%)**
	100	**42**	**Total**

During training, 76.2% of players always complete the warm-up phase. No player begins the training phase without first warming up.

Table 4. Do you warm up in competitions?

Position	Percentage	Numbers	
1	**100%**	**42**	**Always (100%)**
3,5	**0 %**	**0**	**Most of the time (75%)**
3,5	**0 %**	**0**	**Often (50%)**
3,5	**0 %**	**0**	**Sometimes (25%)**
3,5	**0 %**	**0**	**Never (0%)**
	100	**42**	**Total**

All players (100%) always warm up before the start of the match**.**

Table 5. Amount of players' warm-up during training

Position	Percentage	Numbers	
4,5	**7.1 %**	**3**	5 min
3	**23.8 %**	**10**	10 min
1	**35.7 %**	**15**	15 min
2	**26.2 %**	**11**	20 min
4.5	**7.1 %**	**3**	More than 20 min
	100	**42**	Total

Iranian baseball players warm up for approximately 15 minutes before training 35.7% of the time. About 14.3% of players warm up for approximately 5 minutes, while another 14.3% take more than 5 minutes.

Table 6. Amount of players' warm-up during matches

Position	**Percentage**	Numbers	
5	**0 %**	**0**	5 min
4	**2.4 %**	**1**	10 min
1	**47.6 %**	**20**	15 min
2	**40.5 %**	**17**	20 min
3	**9.5 %**	**4**	More than 20 min
	100	**42**	Total

During competitions, approximately 47.6% of players warm up for about 15 minutes, 40.5% warm up for 20 minutes, and 9.5% warm up for more than 15 minutes. Interestingly, none of the players undergo a warm-up phase lasting less than 10 minutes.

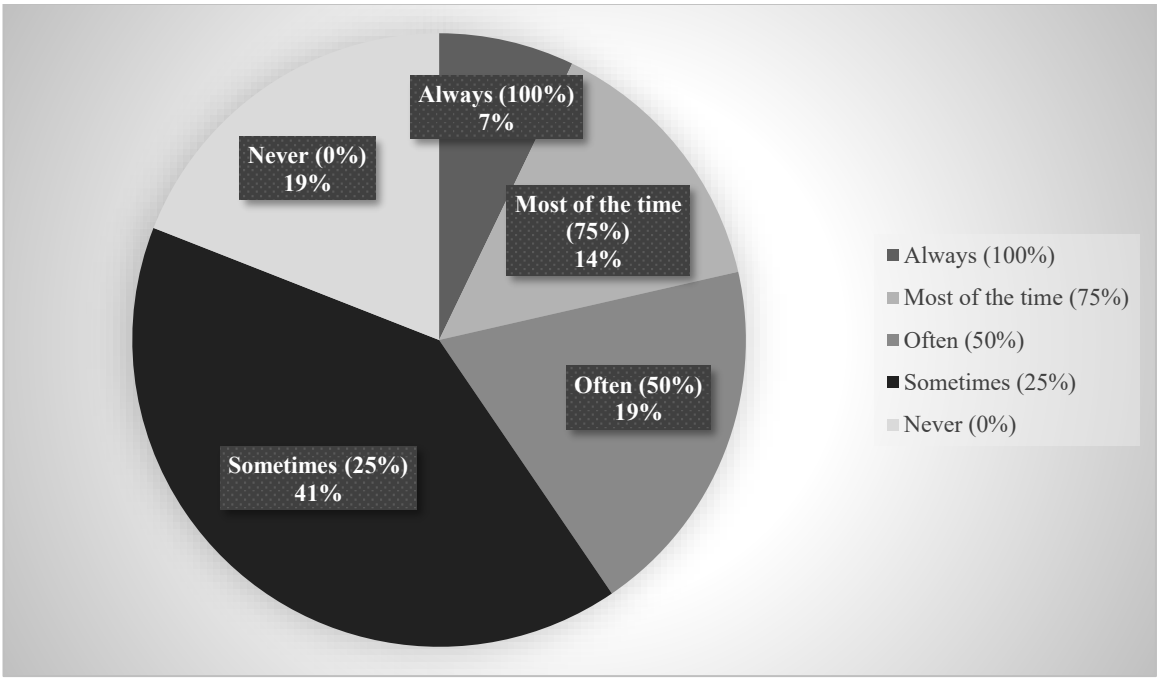

Fig. 3. Do you do a cool down phase in your workouts?

After their training sessions, 41% of Iranian baseball league players sometimes engage in the cool-down phase. Interestingly, only 7% of players always incorporate the cool-down phase after their training, and 19% of players never perform the cool-down phase.

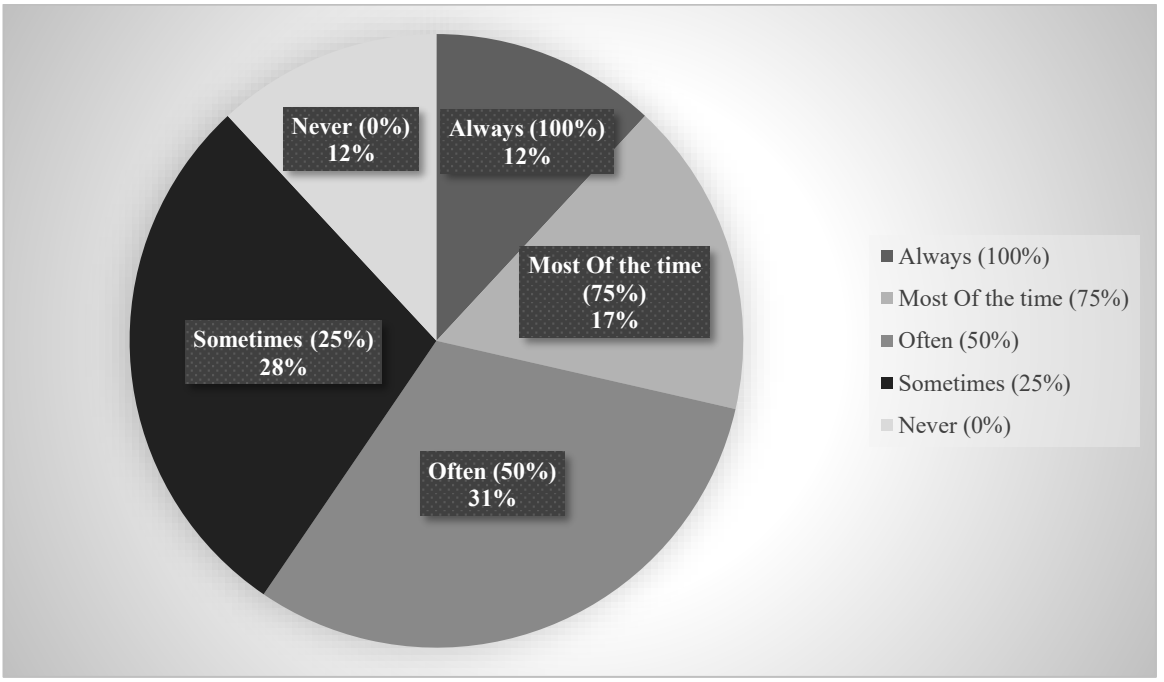

Fig. 4. Do you do a cool down phase in matches?

After completing the match, only 12% of the players consistently perform the cooling phase, while another 12% never do.

4. DISCUSSION

In the United States, forty million people participate in organized softball leagues annually, and an additional eighteen million participate in organized baseball league games [2]. Baseball and softball are popular sports in the United States, but they also have a high rate of injuries. However, there are several interventions that have been proven to be effective in reducing injuries in these sports. Interventions such as using hats, changing the cardamom stick, removable bases, face shields on helmets, training, and repetition have all been effective in preventing millions of injuries and billions in medical care costs every year. Despite the high speed at which pitchers throw the ball towards the catcher and the proximity of the attacking batter, there is a risk of the ball hitting the player's body. Baseball players use protective equipment, such as helmets for the head and face, to prevent possible hub damage. Helmets are considered mandatory baseball equipment for the safety and health of players. Referees will give a warning and prevent a player from starting the game if they do not use them. In recent times, helmets have been modified to cover a part of the face due to the increasing speed of ball throwing and the short reaction time. However, some players neglect to use protective headgear during training due to the lack of compulsion, increasing the risk of injury. The present research indicates that 4.8% of the players surveyed never use a helmet during training 42.9% . use helmets most of the time, while 19% only use them sometimes. Additionally, 14.3% report using helmets often. Only 19% of people always use a helmet during training and consider this protective device mandatory. It is important to note that helmet usage should always be a top priority for safety.

Although being hit by a pitch is a rare occurrence during games, it is often cited as a reason for players to avoid the sport.[3] The most commonly affected areas when hit by a pitch are the hands and fingers, followed by the head and face.[3] Catchers can wear additional protective gear, such as a special guard and cup. This protective device is required for players during competitions. However, during training, only 23.1% of the 29 players who have practiced in the coach position always used this equipment. 46.2% used it most of the time, 7.7% used it sometimes, and 23.1% never used it. It is important to note that the use of protective devices is crucial for player safety. Not using the special catch and cup guard increases the risk of injury due to the high intensity of the ball throw and the throw error

of the post pitcher players, as well as the out of bounds hits by the better player (fall ball). These types of acute injuries and collisions usually cause bruises and fractures that may not be compensated and cause the loss of the sports future of these players. Therefore, it is expected that team coaches will help prevent injuries by informing post-Kecheri players about the consequences of not using proper equipment. Warming up is an essential part of sports. Prior to every training session, competition, or sports activity, players should warm up to prepare their muscles to bear and create more pressure, thus preventing sports injuries. Comprehensive programs, such as the 11+ in football, are designed for targeted warm-up to prevent sports injuries. Research has shown that the use of these warm-up protocols has reduced injuries among young football players [4].

Also, the teams that used the 11+ program suffered 30 to 70 percent less injuries.[5] The maximum use of plyometric exercises, along with strengthening the muscles acting on the knee and wrist joints, in the majority of a systematic warm-up program, has beneficial effects on the prevention of knee injuries.[6] According to the research, 76.2% of the players of the Iranian professional baseball league do the warm-up phase before training. 21.4% of people warm most of the time and 2.4% of people often; And none of the players do their exercises without warming up. It is interesting to note that it is not far from expected that all the players, without exception, do the warm-up phase before the start of the match. Due to the nature of baseball, where the players experience many overhead throws during training and competition, it is very important to warm up the upper body of the shoulder and the muscles related to throwing.

Players who throw the ball with high intensity without warming up often suffer from shoulder muscle strain. Fast starts after hitting (batting) to reach the first base and other bases as quickly as possible, as well as the start to catch balls, provide the basis for increasing the risk of hamstring muscle strain damage. Hamstring injury is a common soft tissue injury in sports with fast intensity and maximum running speed.[7] Therefore, due to the prevalence of this injury among baseball players, it is very important to warm up this area before training and competitions. The amount of warm-up of baseball players during training was 5 minutes in 1.7% of people, 10 minutes in 23.8% of people, 15 minutes in 35.7% of people, 20 minutes in 2.2% of people, and 1.7% of people were more than 5 minutes. Is .The warm-up time for players during matches has significantly increased compared to training. All players warm up for at least 10 minutes, with 9.5% warming up for more than 25 minutes, 40.5% for 20 minutes, 47.6% for 15 minutes, and 2.4% for 10 minutes before stage competitions. Insufficient or excessive warm-up time can negatively affect the athlete's performance. Insufficient warm-up time can lead to inadequate muscle preparation for optimal sports performance and increase the risk of injury. Conversely, excessive warm-up time can cause fatigue, reduce range of motion, and decrease functional efficiency. Maintaining the appropriate warm-up routine based on the type of activity can help prevent injuries and improve performance. Research has shown that dynamic warm-ups can increase strength and power, while warm-ups with standard weight sticks can improve stick swing speed. Short-term static warm-ups, on the other hand, do not have any effect on increasing power output. Passive heating and cooling have been found to be largely ineffective [8].

Additionally, the cooling phase is one of the most important factors in preventing sports injuries. In the Iranian baseball league, players are aware of the importance of this issue, with 1.7% always performing the cooling phase after training, 14.3% doing it most of the time, 19% often, and 40.5% sometimes. However, 19% of people never cool down after their workouts. After completing the competition, only 11.9% of participants always perform the cooling down stage. 16.7% often do it, 31% do it sometimes, and 28.6% rarely do it. Additionally, 11.9% of participants never cool down after finishing their race .Also, 11.9% of people never do the cooling phase after finishing their race. An active cool down can reduce the risk of injury in the next session; because it leads to better recovery for neuromuscular fatigue [9].Coaches and sports pathologists often face the challenge of players neglecting the cooling phase after matches and training. This crucial stage is frequently overlooked, particularly when players are preoccupied with the outcome of the game. It is important to emphasize the significance of cooling down to prevent injury and promote recovery. Proper cooling not only prevents possible injuries in subsequent sessions but also enhances efficiency and performance. Given the low cooling rate of Iranian Premier League baseball players after training and matches, coaches and pathologists should inform players about the benefits of cooling down to reduce injuries and improve performance. It is important to take positive action to promote baseball in the country.

Transparency Statement

The data supporting this study are available upon reasonable request to the corresponding author, subject to ethical and confidentiality considerations.

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Declaration of Interest

The authors declare that they have no competing interests.

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