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Analysis of Injury Patterns in Türkiye's National Men's Handball Team During The 2024 European Championship Qualifiers: Implications For Prevention and Management

2024 Avrupa Şampiyonası Elemeleri Sırasında Türkiye Milli Erkek Hentbol Takımında Görülen Yaralanmaların Analizi: Önleme ve Yönetim İçin Çıkarımlar

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ABSTRACT

Handball is one of the most intense indoor sports, characterized by high physical demands such as frequent jumps, rapid changes of direction, and aggressive physical contact. Injuries in handball are common; however, there is limited information on injury patterns in the Turkish national men's handball team. This study aims to examine the patterns of injuries sustained by players during the 2024 European Championship qualification process.

This retrospective study included 46 athletes who participated in national team camps and matches between October 2022 and April 2023. Injury data, including type, location, and recovery time, were collected by the team physiotherapist. Descriptive statistics were summarized, and comparisons between acute and overuse injuries were made using the Student's T-test ($p<0.05$).

Of the 46 injuries, 24 (50%) occurred in the lower extremities, 18 (39%) in the upper extremities, and 5 (11%) in the trunk. Overuse injuries accounted for 52.2% of injuries, while 47.8% were acute. Athletes with more years of experience were more prone to overuse injuries ($p<0.05$), while acute injuries were linked to longer recovery times ($p<0.05$). The shoulder was the most frequently injured region (28.5%), with 11 out of 13 injuries due to overuse. Tendon injuries were the most common (47.8%), followed by muscle injuries (39.1%). Injuries over match exposure were 23.4/1000 h, and 13.2/1000 h for training exposure.

Overuse injuries, particularly in the shoulder, are prevalent among Turkish handball players. Proper injury prevention strategies, especially focusing on load management and preventive exercises, are essential to reduce injury rates.

Key Words: Professional athletes, overuse injuries, epidemiology

ÖZ

Hentbol, tekrarlayıcı sıçramalar, ani yöne değiştirmeler, agresif fiziksel temas yüksek fiziksel dayanıklılık gerektiren en yoğun salon sporlarından biridir. Hentbolda yaralanmalar yaygın görülür ancak Türk milli erkek hentbol takımındaki yaralanmalarla ilgili sınırlı bilgi mevcuttur. Bu çalışma 2024 Avrupa şampiyonası eleme sürecinde oyuncuların yaşadığı yaralanmaları incelemeyi amaçlamaktadır.

Bu retrospektif çalışmaya, Ekim 2022 ile Nisan 2023 arasında milli takım kamplarına ve maçlarına katılan 46 oyuncu dahil edilmiştir. Yaralanma verileri; yaralanmanın tipi, bölgesi ve iyileşme süresi gibi bilgileri içerecek şekilde takım fizyoterapisti tarafından toplanmıştır. Tanımlayıcı istatistikler özetlenmiş ve akut ile aşırı kullanım yaralanmaları arasındaki karşılaştırmalar, Student's T-testi kullanılarak yapılmıştır ($p<0.05$).

Toplam 46 yaralanmanın 24'ü (%50) alt ekstremitelerde, 18'i (%39) üst ekstremitelerde ve 5'i (%11) gövdede meydana gelmiştir. Sakatlıkların %52,2'si aşırı kullanım, %47,8'i ise akut yaralanma olarak sınıflandırılmıştır. Daha fazla spor tecrübesine sahip sporcuların aşırı kullanım yaralanmalarına daha yatkın olduğu görülmüştür ($p<0.05$), akut yaralanmalar ise daha uzun iyileşme süreleri ile ilişkilendirilmiştir ($p<0.05$). Omuz, en sık yaralanan bölge olup (%28,5), 13 sakatlıktan 11'i aşırı kullanıma bağlıdır. Tendon yaralanmaları, toplam sakatlıkların %47,8'i ile en yaygın olanı, kas yaralanmaları ise %39,1 ile ikinci sıradadır. Müsabaka maruziyeti üzerinden yaralanmalar 23.4/1000 saat, Antrenman maruziyeti için 13.2/1000 saatti.

Aşırı kullanım yaralanmaları, özellikle omuzda, Türk hentbol oyuncuları arasında yaygındır. Yük yönetimi ve önleyici egzersizlere odaklanan sakatlık önleme stratejileri, sakatlık oranlarını azaltmak için gereklidir.

Anahtar Kelimeler: Profesyonel sporcular, sık kullanım yaralanmaları, epidemiyoloji

Key Points

This study revealed important results in terms of understanding the injury characteristics in handball national teams.
The shoulder is the most frequently injured region.
The probability of overuse injury increases with increasing years of sport.
The low number of injuries sustained in matches is noteworthy and should be interpreted with caution.

Ethics committee approval of the study was obtained from Gazi University Ethics Committee on 25.7.2023.

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INTRODUCTION

Handball is perhaps the toughest of all indoor sports. Repetitive jumps, runs in different directions, sudden manoeuvres, deception movements, runs into the defence, violent contacts are inherent in this sport[1]. Fouling is legal in handball up to a certain level. Defences increase the dosage of harshness in order to disrupt attacking sets and resort to fouls. The attacking team tries to find solutions to avoid being caught by the defence and fouls. All these factors make handball risky in terms of sports injuries. The International Olympic Committee has revealed that handball is among the Olympic sports with high injury rates[2]. The injury rate in young players has been shown to be between 9,9 and 41,0 per 1000 match hours and between 0.9 and 2,6 per 1000 training hours[3]. An elite handball player playing at national and international level can play up to 70 matches a year, including national team matches. This busy schedule is another reason for injuries[4].

Athletes from different clubs, who train differently and have different levels of physical fitness are invited to the national teams. During the national team camp process, all players are exposed to a new training programme independent of their clubs[5]. Changing training loads can cause injuries in athletes[6].

The European men's handball championship has been organised every two years since 1994 and is preceded by qualifiers. Epidemiological data on injuries in handball generally consist of retrospective and prospective cohort studies and observational studies during tournaments[7]. It is important to determine the injuries that occur in national teams in order to develop strategies to prevent these injuries. To our knowledge, there is no study in the literature analysing the injuries of the Turkish handball national team. For this reason, the aim of this study was to examine and interpret which injuries national male handball players were exposed to during the national team process.

MATERIALS AND METHODS

Study Design

Retrospective-descriptive study

Participants

This retrospective descriptive study was carried out by following 46 athletes during the Euro 2024 qualifying matches of Türkiye A national men's handball team (3 October 2022-25 April 2023). During this period, the national team came together 4 times for camping and played 6 matches. A total of 46 athletes, including 5 goalkeepers, 5 right wingers, 4 left wingers, 8 centre-backs, 8 right backs, 8 left backs and 8 centres, who took part in the Euro 2024 qualifying matches in the national team, were included in the study.

Outcome Measures

Age, height, body weight, position, site of injury (shoulder, elbow, wrist and fingers, trunk, hip and groin, hamstring, quadriceps femoris, knee, ankle, achilles), type of injury (overuse or acute), kind of injury (strain, contusion, sprain, spasm and stiffness, tendinopathy), injured tissue (muscle, tendon, joint capsule and ligament, articular cartilage) and time away from sport were recorded. Injuries were identified and reported by the team physiotherapist. In order to determine the number of injuries per match and training hour, the number of matches, training sessions and hours were calculated. Injury data were recorded instantaneously during the camps and there was no under-reporting of injuries.

Statistical Analysis

Statistical analyses were performed with SPSS version 26. Normal distribution of variables was analysed by histograms and Kolmogorov-Smirnov tests. Descriptive statistics were given as mean and standard deviation. According to the type of injury, age at sport and duration of abstinence from sport

were compared by Student's T test. P value was accepted as 0,05.

Ethics Approval

Ethics committee approval of the study was obtained from Gazi University Ethics Committee on 25.7.2023. Consents of the volunteers included in the study and institutional permissions were obtained.

Pie and bar charts were created with Microsoft Excel.

RESULTS AND DISCUSSION

The mean age of the 46 participants included in the study was 25,78 ± 5,47 years, mean body weight was 96,2 ± 13,38 kg, mean height was 191,18 ± 6,15 cm, and mean body mass index was 26,25 ± 2,71 kg/m2.

Injury-related data of the athletes are shown in Table 1.

Among the 46 athletes evaluated, 32 presented to the physiotherapist with a total of 46 reported injuries. Injury distribution according to playing positions was as follows: goalkeepers (n=5) sustained 2 injuries, wingers (n=9) sustained 8 injuries, playmakers (n=24) accounted for 30 injuries, and centres (n=8) reported 6 injuries.

The shoulder was the most frequently injured region 13 times, 28,5%. Hip and groin injuries were in the second place with 9 times, 19,6% (Table 1.) (Figure 1.)

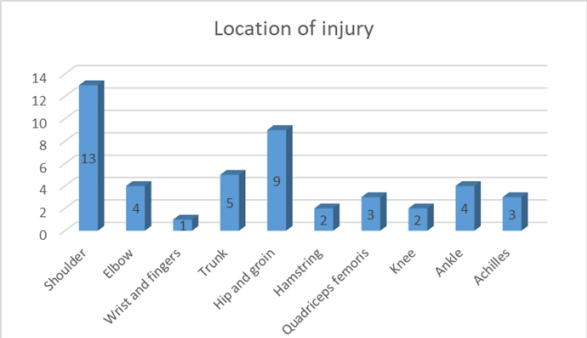

Figure 1. Distribution according to injury location

23 (50%) of the injuries occurred in the lower extremities, 18 (39%) in the upper extremities and 5 (11%) in the trunk. (Table 1.) (Figure 2.)

52% of the injuries were overuse and 48% were acute. (Figure 3.)

When we looked at the kinds of injuries, tendinopathy was most common with 22 (47,8%) times. Contusion injuries were in the second place with 8(17,4%) (Table 1.) (Figure 4.)

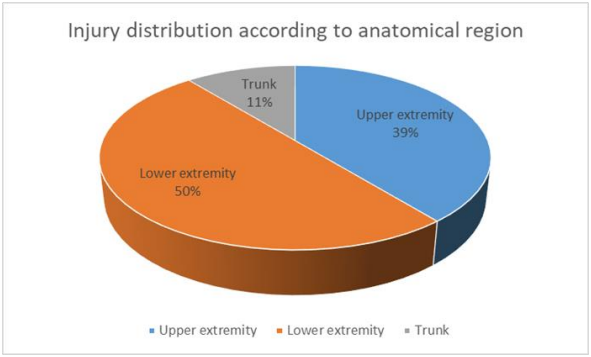

Figure 2. Injury distribution to anatomical region

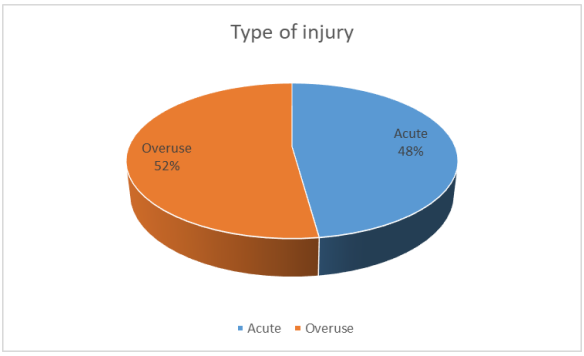

Figure 3. Distribution according to injury type

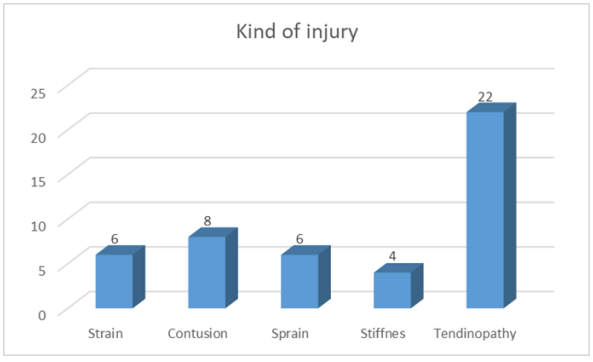

Figure 4. Distribution by kind of injury

In the distribution according to the injured tissue, tendons ranked first with 22(48%)

injuries. It was followed by muscle with 18(39%) injuries, joint capsule and ligament with 6(13) injuries. (Table 1.) (Figure 5.)

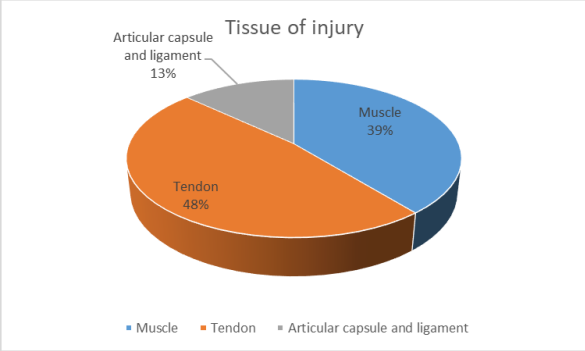

Figure 5. Distribution according to injured tissue

When acute and overuse injuries were compared in terms of sports age, the sports age of overuse injuries was significantly higher (p=0,004) (Table 2.).

When acute and overuse injuries were compared in terms of time away from sports, it was shown that acute injuries caused significantly longer time away from sports (p=0,037) (Table 2.)

Of the 46 injuries reported, 3 occurred during matches and 43 occurred during training. Accordingly, the injury rate for matches was 23,4 per 1000 hours, while for training it was 13,2 per 1000 hours.

In this study, the injuries in Türkiye A National Men's Team during the qualification for the 2024 European Handball Championship were analysed. When the results were analysed, 32 out of 46 athletes applied to the physiotherapist with at least 1 injury complaint.

The results show that the shoulder is the most commonly injured region in athletes and these injuries are mostly overuse injuries and tendon tenderness. It is not surprising that shoulder complaints are frequently seen in overhead sports. In a systematic review published in 2022, shoulder injuries were shown to be the most common injury in the upper extremity in parallel with our study[8]. It is noteworthy that 11 of the 13 shoulder injuries in our study consisted of tendinopathy findings resulting from overuse injuries. In line with these results, a comprehensive study following the incidence of tendinopathy in team sports for 8 years revealed that handball was the sport with the highest incidence of tendinopathy[9]. In a study following elite handball players in Brazil, it was shown that shoulder injuries ranked first among overuse injuries with 44% [10]. Handball is a sport in which overhead throws are performed at high speeds and repetitions, and this is the main reason for tendinopathy findings in the shoulder. During repetitive internal rotations performed at high speed and force, problems may frequently occur in the tendons of the supraspinatus, infraspinatus and biceps brachii muscles that stabilise the shoulder. When all injuries were analysed in our study, tendinopathy was by far the most common injury with 47%. Similar findings have been shown to occur in Achilles tendon, patellar tendon and adductor tendons other than the shoulder. One of the reasons for these complaints in the lower and upper extremities may be changes in training load. A study examining rugby players showed that an acute increase in training load of more than 15% can dramatically increase the risk of injury by 21% to 45 [11]. It has also been emphasised that an increase in load by 60% in handball players can cause an increase in injury rates[12]. National teams consist of athletes from different clubs with different levels of training and physical fitness. For some players, the level of training in the national team may be higher or lower than in their clubs. Another situation that may be effective in the formation of tendinopathies is the change of the ground on which training is performed[13]. Training and playing on harder or softer grounds than athletes are used to may pose a risk for adapted tissues that have adapted to a different ground[14].

In order to prevent tendinopathy injuries, it is important to implement preventive programmes for different parts of the body. The Oslo Sports Trauma Research Center's prevention programme for shoulder injuries can be effective[15]. Alfredson exercises for Achilles tendinopathy and Copenhagen adduction exercise for groin pain can be included in the warm-up routine[16,17].

Table 1. Overview of injuries

Location of injury (n)(%)	Type of injury (n) (%)		Kind of injury (n) (%)					Tissue of injury (n) (%)		
	Acute	Overuse	Strain	Contusion	Sprain	Stifness	Tendinopati	Muscle	Tendon	Articular capsule and ligament
Shoulder 13(%28,5)	2	11	2	-	-	-	11	2	11	-
Elbow 4 (%8,7)	1	3	-	-	1	-	3	-	3	1
Wrist and fingers 1 (%2,2)	1	-	-	-	1	-	-	-	-	1
Trunk 5(%10,9)	3	2	1			4		5		
Hip and Groin 9 (%19,6)	5	4	1	4	-	-	4	5	4	-
Hamstring 2 (%4,3)	2	-	2	-	-	-	-	2	-	-
Quadriceps femoris 3 (%6,5)	3	-	-	3	-	-	-	3	-	-
Knee 2 (%4,3)	-	2	-	-	-	-	2	-	2	-
Ankle 4 (%8,7)	4	-	-	-	4	-	-	-	-	4
Achilles 3(%6,5)	1	2	-	1	-	-	3	1	2	-
Total 46	22(%47,8)	24(%52,2)	6(%13)	8 (%17,4)	6(%13)	4(%8,7)	22(%47,8)	18 (%39,1)	22(%47,8)	6(%13)

n= number of cases

Table 2. Comparison of Age of Sport and Time Away from Training According to Injury Type

n=number of cases, d= effect size, p<0,05

	Acute (n=22)	Overuse (n=24)	Total (n=46)	Difference between groups	Effect Size
Age of sport (mean±sd)	12,27±3,54	16,66±5,94	14,56±5,37	p=0,004*	d=0,89
Time Away from Sport (days) (mean±sd)	2,18±1,4	1,37±1,13	1,76±1,31	p=0,037*	d=0,91

One of the remarkable findings was the 8 contusion type muscle injuries, all of which occurred in the lower extremities. In a comprehensive study examining injuries in 6

major handball tournaments, it was shown that contusion injuries were frequently seen[18]. Handball is a sport that is open to high intensity contact in defence and offence due to its structure. Especially knee impacts may cause contusion-type muscle injuries in the quadriceps femoris and iliotibial band. On the other hand, it is seen that contusion, especially in the muscles around the hip, usually occurs during a fall to the ground. Athletes prefer tights with pads that can absorb the impact in order to prevent this during the competition. However, these tights are usually not used in training. All these reasons may have caused a high rate of contusion injury. It is not very easy to prevent contusion injuries caused by impact, but besides wearable supports, the attitude of referees and fair play come to the fore.

If we evaluate the injuries according to the anatomical region, it is seen that half of them occurred in the lower extremities. These data coincide with the existing literature. In 2015, it was shown that 58,3% of the injuries occurred in the world championship held in Qatar occurred in the lower extremities[19].

In handball, injuries that cause an absence from sport for more than 21 days are classified as major injuries. In our study, none of the athletes suffered a major injury (anterior cruciate ligament, bankart lesion, etc.). A review of the literature shows that the incidence of major injuries in handball varies between 5 and 36 [4]. This study only examined injuries that occurred during national team camps and competitions. The limited duration and number of athletes may be the reason for the absence of major injuries. In this study, the average duration of the athletes who had an injury was a very short period of 1,76 days. Acute injuries caused a significantly longer time away from sports than overuse injuries. This difference of less than 1 day can be questioned from a clinical point of view, but in general, it can be considered natural that acute injuries result in a longer absence from sport than overuse injuries. Athletes with overuse injuries often tend to return to sport while their symptoms persist.

When acute and overuse injuries are compared in terms of sports age, it is seen that athletes with higher sports age are more likely to suffer from overuse injuries. The cumulative effect of repetitive activities such as throwing and jumping over the years can be especially damaging on the tendons. Advancing age is an important intrinsic factor in tendon degeneration[20]. In this context, it is important for athletes with a high sporting age to include preventive exercise programmes in their routines.

When the injuries according to the exposure are analysed, it can be said that the injuries that occur especially during the match are quite low compared to the literature with 23,4/1000 hours. In a study in which 3 major tournaments were analysed in men, injury rates were found to be between 89-129 per 1000 hours. In another study conducted with season follow-up, this rate was 77,7 /1000 hours in Bundesliga 1 and Bundesliga 2 [21]. This low rate in the Turkish National Team can be interpreted as positive at first glance. However, this situation may show us that the level of hardness of the handball played is insufficient.

CONCLUSION AND RECOMMENDATIONS

This study revealed the injuries seen at the A national team level for handball, where injuries occur frequently due to its nature. While no major injuries occurred in this process, the frequency of overuse injuries drew attention. The findings suggest that athletes should be involved in injury prevention programmes both in their clubs and national teams and that loading periodisation should be carefully adjusted during the transition from club to national team and from national team to club.

Limitations

This study has some limitations. In the study, only the injuries that occurred in the men's national team within a certain period of time were analysed. This situation prevents generalisations. In our study, the loading data of the athletes were not measured. This led to a discussion based only on estimation. Another limitation is that the injury data was collected by a single physical therapist. This situation poses a risk of observer bias.

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Declaration of Conflicting Interests

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Author Contributions

Conception, analysis and interpretation: YUKSEL F, GUZEL A. N.

Design, data collection and processing, writer: YUKSEL F, Critical Review: GUZEL A. N.

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