



# Injury evaluation of the Turkish national football team over six consecutive seasons

## Türkiye A Milli Futbol Takımı'nda altı sezonda görülen yaralanmaların değerlendirilmesi

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### BACKGROUND

The aim of our study was to evaluate the incidence, mechanisms and anatomic sites of injuries of the Turkish National Men's Football Team over six years.

### METHODS

The affected anatomic site, incidence rate, type of injury, and applied treatment procedures were recorded by the medical staff. Official and friendly games and training sessions over the period January 2000 - December 2005 were documented daily. Cross-tabulation, frequency analysis, descriptive statistics, and chi-square test methods were used in statistical evaluations.

### RESULTS

In total, 52 official and friendly games were played and 208 training sessions were conducted. The total number of injuries recorded in this period was 108, and the averages per match and training were 1.0 and 0.27, respectively. The most commonly affected anatomic site was the thigh (25%), the most common injury type was contusion (32%) and the most common applied treatment procedure was physical therapy and rehabilitation (89.8%).

### CONCLUSION

Our results provide valuable information about the incidence, affected anatomical site, and type and severity of injuries in football. This study can serve as reference data for future scientific studies in the field, and also provides information regarding the prevention of injuries.

**Key Words:** Anatomic site; soccer; injury; incidence; Turkish National Team.

### AMAÇ

Altı yıllık bir dönemde A Milli Erkek Futbol Takımı'nda meydana gelen yaralanmaların anatomik bölge, sıklık ve oluş mekanizması değerlendirildi.

### GEREÇ VE YÖNTEM

Sağlık ekibi tarafından Ocak 2000 ile Aralık 2005 tarihleri arasında kapsayan dönemde yapılan tüm resmi ve özel karşılaşmalar, antrenmanlar ve kamplar sırasında kayıt tutuldu. Yaralanmaların anatomik bölgeleri, tipleri, uygulanan tedavilere dair bilgiler içeren bu kayıtların değerlendirilmesi deskriptif istatistik, frekans analizi, çapraz tablolar ve ki-kare testi ile yapıldı.

### BULGULAR

Çalışma süresince toplam 208 antrenman, 52 resmi ve hazırlık karşılaşması yapıldı. Bu sürede 108 sakatlık kaydedildi. Bu sakatlıkların maç ve antrenman başına oranı sırasıyla 1,0 ve 0,27 idi. Yaralanmaların %80,6'sı alt ekstremitelerde meydana geldi. En sık yaralanan anatomik bölge uyluk (%25), en sık sakatlık tipi kontüzyon (%32) ve en sık uygulanan tedavi yöntemi fizik tedavi ve rehabilitasyon (%89,8) idi.

### SONUÇ

Çalışmamız futbolda gerçekleşen yaralanmaların görülme sıklığı, etkilenen anatomik bölge yaralanmanın tipi ve ciddiyeti hakkında değerli sonuçlar vermektedir. Çalışmanın sonuçları bu alanda daha sonra yapılacak çalışmalar için ve futbol yaralanmalarından korunmak açısından önemlidir.

**Anahtar Sözcükler:** Anatomik bölge; futbol; yaralanma; sıklık; Türk Milli Takımı.

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Throughout the world, football has become a huge industry. There has been enormous development in all aspects of football including the nature and physical demands of the game. This change began in the second half of the 20th century, and has accelerated in the last decades. The greater number of participants, enormous number of supporters and fans compared to other sports and the magnitude of its economical potential have made this happen. Unfortunately, the number of injuries and medical problems related to football seem to have increased parallel to this development. This increase concerns many people involved in football, primarily the footballers and then managers and coaches, due to losses in working capacity and economical capability. Thus, football injuries and their consequences are followed closely by football players, their clubs and the large crowds of fans.<sup>[1]</sup> The prevalence of football injuries has increased in recent years, in addition to the greater number of injuries in comparison to other sports.<sup>[2]</sup>

Investigating football injuries according to their type, the reasons for the higher incidence rates, the injury mechanisms, and the most affected anatomic sites will facilitate the development of management strategies in health care, especially in preventive medicine.

In the last decade, the achievements of Turkish football teams and the Turkish National Men's Football Team have taken Turkey to higher ranks in the world football classification. More importance is given to the athletes' health, and an increasing number of scientific studies have also played a crucial role in this development.

The aim of this study was to evaluate the injuries of the Turkish National Men's Football Team over a six-year period. The affected anatomic sites, incidence rate, and type and severity of the injuries are analyzed, in order to compare with international data and to contribute to the literature.

## MATERIALS AND METHODS

This study describes the injuries of the Turkish National Men's Football Team during friendly, official and tournament matches and training camps over the period 2000-2005. The injury recording and documentation were made by the same medical team. The staff was composed of a team doctor, a physiotherapist, a mentor, and three massage therapists. The daily records of the injuries were kept by the team doctor. The players who were injured and remained on the team received care and treatment from the national team medical staff during the camp period. The recovery times of the players resuming their treatment after the camp period in their own clubs were also obtained.

During the study period, many of the players were invited to the team more than once, so the total number of participants was 577. Twenty-two participants were excluded for various reasons in order to increase the reliability of the study. The injuries were recorded and documented according to the procedures of the FIFA Medical Assessment and Research Centre (F-MARC) injury-evaluation forms.

Injury Incidence Calculation and Statistical Analysis: Calculating incidence: 1) injury per activity (total number of injuries/number of activities), 2) injury per 1000 hours ( $1000 \times \text{total number of injuries} / \text{total activity hours}$ ), and 3) total activity hours (for match:  $11 \text{ players} \times 1.5 \text{ hours}$ ; for training: number of players participating in the training  $\times 1.5 \text{ hours}$ ).<sup>[3]</sup> Crosstabulation, frequency analysis (frequencies) and descriptive statistics methods were used in the statistical analysis. The difference between match and training injuries was calculated with chi-square test as the sufficient data were obtained. All of the statistics were evaluated by SPSS 10.0 for Windows (SPSS Inc, Chicago, IL).

## RESULTS

The injury incidence rates and general characteristics of the Turkish National Team from 2000-2005 are shown in Table 1.

From 2000-2005, the Turkish National Men's Football Team players played 52 friendly and official matches and completed 208 training sessions. One hundred and eight injuries occurred in this camp period, with 52 of them occurring during matches and 56 of them during trainings. The average number of injuries for each activity and trainings were 1.0 and 0.27, respectively. The risk of injury for every 1000 hours of match time was 60.6 and for training sessions was 8.08 (Table 1).

There was no significant difference in injury severity among the players on the Turkish National Men's Football Team from 2000-2005 ( $p > 0.05$ ;  $\chi^2 = 5.162$ ). Most of the injuries (37%) recovered in 1-3 days, followed by 23.1% in 0 day, 22.2% in 4-7 days, 13% in 7-28 days, 4.6% in 28 days, and the remainder in longer time periods. 26.9% of the match injuries recovered in 0 and 1-3 days, 23.1% in 4-7 days, 17.3% in

**Table 1.** Injury incidence and characteristics

	Match	Training
Amount of activity	52	208
Total hours	858	6922.5
Total number of injures	52	56
Injury per activity	1.0	0.27
Injury per 1000 hours	60.6	8.09

**Table 2.** Severity of the injuries

Severity of the injuries	Match	Training	Total
0 Day	14 (26.9%)	11 (19.6%)	25 (23.1%)
1-3 Days	14 (26.9%)	26 (46.4%)	40 (37%)
4-7 Days	12 (23.1%)	12 (21.4%)	24 (22.2%)
7-28 Days	9 (17.3%)	5 (8.9%)	14 (13%)
≥28 Days	3 (5.8%)	2 (3.6%)	5 (4.6%)
<b>Total</b>	<b>52 (100%)</b>	<b>56 (100%)</b>	<b>108 (100%)</b>

$\chi^2 = 5.162$ ;  $p > 0.05$ .

**Table 3.** Anatomic sites of injuries

Anatomic site	Match	Training	Total
Head-Face	7 (13.5%)	2 (3.6%)	9 (8.3%)
Neck	1 (1.9%)	2 (3.6%)	3 (2.8%)
Lower back	2 (3.8%)	5 (8.9%)	7 (6.5%)
Fingers	1 (1.9%)	1 (1.8%)	2 (1.9%)
Groin	2 (3.8%)	7 (12.5%)	9 (8.3%)
Thigh	17 (32.7%)	10 (17.9%)	27 (25%)
Knee	8 (15.4%)	9 (16.1%)	17 (15.7%)
Leg	3 (5.8%)	9 (16.1%)	12 (11.1%)
Ankle	8 (15.4%)	4 (7.1%)	12 (11.1%)
Foot	1 (1.9%)	2 (3.6%)	3 (2.8%)
Toes	2 (3.8%)	5 (8.9%)	7 (6.5%)
<b>Total</b>	<b>52 (100%)</b>	<b>56 (100%)</b>	<b>108 (100%)</b>

**Table 4.** Injury areas (lower-upper extremities)

Injury area	Match	Training	Total
Lower extremity	41 (78.8%)	46 (82.1%)	87 (80.6%)
Others	11 (21.2%)	10 (17.9%)	21 (19.4%)
<b>Total</b>	<b>52 (100%)</b>	<b>56 (100%)</b>	<b>108 (100%)</b>

$\chi^2 = 0.187$ ;  $p < 0.05$ .

7-27 days, and 5.8% in ≥28 days. 19.6% of the training injuries recovered in 0 day, 46.4% in 1-3 days, 21.4% in 4-7 days, 8.9% in 7-28 days, and 3.6% in ≥28 days (Table 2).

The most common injury area was the thigh (25%), followed by the knee (15.7%), leg and ankle (11.1%), head, face and groin (8.3%), toes and lower back (6.5%), neck and foot (2.8%), and fingers (1.9%). During matches, 37% of injuries occurred in the thigh, followed by 15% in the ankle and knee, 13% in the head and face, 5.8% in the leg, 3.8% in the lower back and toes, and 1.9% in the neck, fingers and ankle. During trainings, 17.9% of injuries involved the thigh, 16.1% the knee and leg, 12.5% the groin, 8.9% the lower back and toes, 7.1% the ankle, and 3.6% the head-face, neck and foot. There was no significant difference between match and training injuries of the Turkish National Men's Football Team in terms of injury areas from 2000-2005 ( $p > 0.05$ ;  $\chi^2 = 0.187$ ) (Table 3).

In 80.6% of injuries, the involved body part was

the lower extremity and in 19.4%, the head and face, back, neck, and fingers. The difference between lower extremities and other body parts was statistically significant ( $\chi^2 = 0.187$ ,  $p < 0.05$ ).

During matches, 78.8% of injuries occurred in the lower extremity and 21.2% in other sites. During trainings, 82.1% of injuries occurred in the lower extremities and 17.9% in other sites (Table 4).

From 2000-2005, the most common injury type among the Turkish National Men's Football Team was contusion (32.4%), followed by strain (30.6%), sprain (21.3%), concussion without loss of consciousness, tendonitis and laceration/abrasion (2.8%), ligament rupture with instability (1.9%), and concussion with loss of consciousness (0.9%). During matches, 5.8% of injuries were concussions with (1.9%) and without (3.8%) loss of consciousness. Lacerations/abrasions and ligament ruptures with and without instability had the same frequency, at 3.8%. Other mechanisms were seen more frequently than those mentioned above, and

**Table 5.** Injury types

Injury type	Match	Training	Total
Concussion with loss of consciousness	1 (1.9%)	0 (% 0%)	1 (% 0.9%)
Concussion without loss of consciousness	2 (3.8%)	1 (% 1.8%)	3 (% 2.8%)
Ligament rupture with instability	2 (3.8%)	0 (0%)	2 (1.9%)
Ligament rupture without instability	2 (3.8%)	0 (0%)	2 (1.9%)
Sprain	9 (17.3%)	14 (25%)	23 (21.3%)
Strain	19 (36.5%)	14 (25%)	33 (30.6%)
Contusion	15 (28.8%)	20 (35.7%)	35 (32.4%)
Bursitis	0 (0%)	1 (1.8%)	1 (0.9%)
Tendonitis	0 (0%)	3 (5.4%)	3 (2.8%)
Laceration/Abrasion	2 (3.8%)	1 (1.8%)	3 (2.8%)
Other	0 (0%)	3 (2.8%)	2 (1.9%)
<b>Total</b>	<b>52 (100%)</b>	<b>56 (100%)</b>	<b>108 (100%)</b>

**Table 6.** The treatment protocols for injuries among the Turkish National Men's Football Team from 2000-2005

Treatment	Match	Training	Total
Surgery	6 (11.5%)	5 (8.9%)	11 (10.2%)
Physical therapy and rehabilitation	46 (88.5%)	51 (91.1%)	97 (89.8%)
<b>Total</b>	<b>52 (100%)</b>	<b>56 (100%)</b>	<b>108 (100%)</b>

$\chi^2 = 0.201$ ;  $p > 0.05$ .

their rates were strain 36.5%, contusion 28.8% and sprain 17.3%.

During trainings, 35.7% of injuries were contusions, followed by sprains and strains (with same rate, at 25%). Other mechanisms were seen rarely (tendonitis at 5.4% and all the others [bursitis, concussions without loss of consciousness and lacerations/abrasions] at 1.8%). No concussions with loss of consciousness or ligament ruptures with instability were seen (Table 5).

No statistically significant difference was determined between the treatment of match and training injuries of the Team recorded from 2000-2005 ( $p > 0.05$ ;  $\chi^2 = 0.201$ ). Treatment involved mostly physical therapy and rehabilitation, at 89.8%, while the remainder required surgery (10.2%). For the injuries occurring during matches, 11.5% were treated with surgery and 88.5% with physical therapy and rehabilitation. On the other hand, 8.9% of injuries during trainings required surgery, while the remainder (91.1%) were treated with physical therapy and rehabilitation (Table 6).

## DISCUSSION

According to FIFA and UEFA, there are 200 million licensed football players in some 203 countries, and over 22 million (21 million men, 1.3 million women) licensed players in 51 countries, respectively. [4] Football, which is a very popular sport played and watched by large numbers of people throughout the world, evokes attention also with regards to its inju-

ries, and their incidence, location and severity. Several studies about football injuries have investigated the injury incidence and possible methods to decrease their rates.[5-8] The injuries should be identified using similar classifications in order to compare the results.

A six-year follow-up period, held by the same medical team, is a considerably long period of time and the data elicited are hence very important. During this period, nearly every single injury was diagnosed with the support of reliable advanced techniques (X-ray, ultrasound, CAT scan, magnetic resonance imaging [MRI]) and confirmed with appropriate consultations when necessary.

The injury incidence of the Turkish National Men's Football Team was 1.0 per match, which was lower than the injury rate of 2.7 of the World Cup Study 2002.[9] Further, the incidence rate of 60.6 for 1000 hours of match time was lower than reported in the same study, which presented a 81.0 injury rate.[10] The incidence rate in our study was quite lower in comparison to the 2000 Asia Cup (411 Asian football players participated and 52 matches were played), with 141.8 injuries/1000 hours of match time.[11] Most of the injuries during both matches and trainings (37%) were mild injuries with 1-3 days' recovery time. This ratio is similar to that reported in some other studies.[6,9] Serious injuries that prevented participation in matches or trainings over 28 days were rare in our study and likewise in other studies in the literature. These injury rates were 5.8% for matches and 3.6% for trainings,

with an insignificant difference between occasions ( $p>0.05$ ).

According to our study, the most common football injuries involved the ankle, knee, thigh, and calf areas, as in some other studies.<sup>[2,3,12]</sup> The thigh was the most common injury area (25%), followed by the knee (15.7%), lower leg (11.1%) and ankle (11.1%). Ekstrand et al.<sup>[2]</sup> found the knee as the most common injury area, at 20%, and the thigh as the third most common injury area, at 14%, after a one-year follow-up period in Swedish leagues. In the 2002 World Cup, the thigh was the most common injury area, similar to our study, followed by the calf, ankle and knee.<sup>[9]</sup> In the 2000 Asia Cup, the knee was found to be the most common injury area (at 18%), followed by the calf (17.3%), ankle (14.2%) and thigh (13.8%).<sup>[11]</sup>

In our study, the incidence of head traumas with or without loss of consciousness during matches and trainings was found as 3.7%, in contrast with the study of Tysvaer et al.,<sup>[12]</sup> which reported a 4-22% incidence rate.

We found higher incidence rates for the thigh area, similar to some reviewed studies. When groin injuries were added to thigh injuries, the incidence rate reached 33.3%, which demonstrated that 1 in every 3 injuries occurred in the thigh area. The possible causes for these results could be inadequate warm-up, improper rehabilitation of the previous injuries, strength differences in anteroposterior and mediolateral thigh muscle groups, inflexibility, and improper training techniques.<sup>[13,14]</sup>

In our study, the lower extremity injury incidence among the Turkish National Men's Football Team was 80.6%, which differed from the literature, at 61-90%.<sup>[4]</sup> The most common injury types in our study were contusions (32.4%), muscle strains (30.6%) and sprains (21.3%). These results showed similarities with other studies.<sup>[4,7]</sup> In the treatment of injuries, physical therapy agents and rehabilitation were used primarily (89.8%).

This six-year injury follow-up period presents notable information about the incidence, location, and type and severity of football injuries, and was conducted and recorded by the same medical team. It is intended that the data may serve as a reference for future studies.

In comparison to other studies, our higher incidence rate for thigh injuries is remarkable for our country. Thus, precautionary measures should be taken by associated technicians, physicians, physiotherapists, and massage therapists in terms of preventive medicine, which will be an appropriate step towards decreasing productivity losses and health expenses.

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