

Risk Factors of Tendo-Achilles Injury in Football, Cricket and Badminton Players at Dhaka, Bangladesh

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Abstract

Achilles tendon is the tendon connecting the heel with the calf muscles. Tendo-achilles injury (TAI) in players is common in games. The frequency of TAI is unknown and aetiology is controversial. The present descriptive cross-sectional study was done to determine the prevalence of TAI and associated factors contributing to it in football, cricket and badminton. From January to June 2012, male players (n=131), age 17-35 years, were selected by purposive sampling technique from renowned sporting clubs at Dhaka, Bangladesh. TAI was diagnosed through structured questionnaire and interviewing the respondents. The analysis by Statistical Package for Social Sciences (SPSS) programme revealed that 11.5% players suffered from TAI, i.e. prevalence was 115 per 1000 respondents. Most injuries (70/131; 53.4%) occurred in the playground and (59/131; 45.3%) happened in practice field. Injuries among the players of third division were higher, i.e. about 36% (p=0.000). TAI was significantly dependent on occupation (p=0.046), BMI (p=0.008), divisional status (p=0.023), game type (p=0.043), ground condition (p=0.05) and injury severity (p=0.000). The injured players referred for treatment to the physiotherapist was highest (9/15, i.e. 60%) followed by the physicians (5/15, i.e. 33%) (p=0.000). The associations of TAI with various factors were discussed suggesting effective measures be taken and treatment, particularly physiotherapy, be given to injured players. However, there is a need of team work with sports medicine specialist also to enable the injured players to continue their professional games.

Introduction

Achilles tendon is the tendon connecting the heel with the calf muscles. Although the Achilles tendon is one of the most commonly ruptured tendons, Tendo-achilles injury (TAI) or Achilles tendon injury (ATI) has increased over the past few decades.¹ A complete Achilles tendon rupture (ATR) usually occurs in the sports that require jumping, running, and quick turns.² Many investigators reported that ATR was most often observed among recreational athletes, although elite athletes and sedentary individuals also sustain ruptures.^{3,4} It was reported that because of the functional impairment total ruptures were often, but not always, diagnosed early after injury.^{3,4}

In professional English Football Leagues (EFL), players were at a greater risk of slight and minor injuries, overuse injuries, lower leg injuries (especially the Achilles tendon) and rectus femoris strains during the preseason period.⁵ More than a third of National Football League (NFL) players who sustained TAI were never able to return to the profession. The injured players who did return to active play averaged a 50% reduction in their power ratings.^{6,7}

In elite cricket in Australia, South Africa and England, based on retrospective injury information, a total of 32% Achilles related injuries were reported during the preseason period.^{8,9} There was an average of 3.5 Achilles tendon related injuries per week during preseason and an average of one per week during the competitive season. The most common types of injuries to the Achilles tendon during preseason i.e. about 94% were inflammatory conditions such as tendonitis or paratendonitis. However, the lower-limb injuries accounted for nearly half of the injuries i.e. about 49.1% and on the other hand, ligament or joint sprains were almost 23%. Another study from South Africa reported that the primary foot and ankle injuries of about 41% were contusions or hematomas and ligament/joint sprains were about 29% in cricket.^{9,10}

Badminton was a frequent cause of TAI/ATI most commonly seen in badminton players in a Danish study. The combination of high loads applied rapidly with directional changes could overload and completely rupture that tendon.¹⁰ Most patients resumed badminton within one year, but some finished their sports career mainly due to fear of a new injury.^{11,12}

However, the true frequency of TAI/ATI is unknown and its aetiology is still controversial. It was mentioned that injuries were a significant threat to the health and performance of football players.¹³⁻¹⁶

Literature review had indicated that no studies were done or reported from Bangladesh in this area of research. The present study was therefore designed and undertaken to know about associated factors of TAI in football, cricket and badminton players at Dhaka, Bangladesh.

Materials and Methods

Study Design and Population: In the present descriptive cross-sectional study, 131 male players were included in the study by purposive sampling technique with age range 17-35 years, playing in third, second and first division matches in different clubs at Dhaka, Bangladesh. **Inclusion Criteria:** (i) Male players who were willing to give consent, (ii) Age varied from 17 to 35 years; (iii) Only football, cricket and badminton players. **Exclusion criteria:** Players who refused to provide informed consent and age below 17 or above 35 years; **Data Collection and Analysis:** A structured questionnaire was used to collect information by face to face interview on TAI amongst the players and the question items were comprised of five sections: (i) Socio-demographic characteristics and background information of the play such as - name, gender, age, height, weight, body mass index (BMI), occupation and monthly income; (ii) Club name, division (status) and type of game; (iii) Type of injury, time of injury, place of injury, condition of grounds and protection of ankle; (iv) Information on referral for treatment after injury and presence of trainer; (v) Information on playing stress, level of coaching and level of satisfaction. The diagnosis of TAI made by the physicians was obtained from the patient's history by face to face interview. The data collected were compiled and checked for correctness, completeness and internal consistency. The corrected data only were entered into the computer and analysed by using SPSS software version 16 with $p \leq 0.05$ as statistical significance level.^{17,18} All ethical issues related to research involving human subjects were addressed appropriately and prior permission was taken from the Ethical Review Committee (ERC) of State Collage of Health Sciences (SCHS), Dhaka, Bangladesh.

Results

The findings of the present descriptive cross-sectional study conducted with football, cricket and badminton players (n=131) with age range: 17-22

years (n=86, 65%), 23-28 years (n=41, 31%), 29-35 years (n=4, 3%) from renowned football, cricket and badminton clubs at Dhaka, Bangladesh are presented.

The prevalence of TAI was 11.5% (15/131) i.e. 115 per 1000 football, cricket and badminton players, footballers being the most sufferers. The major portion of the players had injuries other than TAI. About 47.3% (n=62) injury of the respondents were before six months, but only 12.2% (n=16) participants were injured one week before collecting the data. Remarkably 77.1% (n=101) players carried out their practice in ups and downs ground, which clearly indicate the ground condition, although 22.1% practiced in smooth ground. More than 70% (n=92) players used protection for ankle in any competition or practice matches, but only 11.5% (n=15) did not use any ankle protection and remaining 18.4% (n=24) used other or traditional protection. About 53% (n=70) injuries were taken place in the sports field and 45% (n=59) injuries were happened in the practice field. Table-I describes the injury of the players in details where injuries unrelated to sports were not included, nor was any absence due to illness.

Table I: Distribution of the injury of the respondents (n=131)

Variable	Category	Frequency	Percent
Nature of injury	TAI	15	11.5
	Others	62	47.3
	No injury	54	41.2
	Total	131	100%
Ground condition	Ups & Downs	101	77.1
	Smooth	29	22.1
	Others	1	.8
	Total	131	100%
Ankle protection	Shoes	92	70.2
	Nothing	15	11.5
	Others	24	18.3
	Total	131	100%
Field surface	Sports field	70	53.4
	Practice field	59	45.0
	Gymnasium	2	1.5
	Total	131	100.0

Among the players, 35.9% played in the third division, 33.6% in second division and 30.5% in first division respectively and the divisional status of the respondents were significantly related to TAI ($p=0.023$) (Table-II).

Table II: Division (Status) of the respondents by TAI and other injuries (n=131).

Division (Status)	TAI & other injuries of the respondents			Total
	TAI	Others	No injury	
1 st division	4	26	10	40
2 nd division	4	22	18	44
3 rd division	7	14	26	47
Total	15	62	54	131

Pearson Chi-Square (χ^2) = 11.356^a, df = 4, $p = 0.023$

$p \leq 0.05$: Significant; $p > 0.05$: Not-significant.

The distribution of the respondents (n=131) according to the game type were Cricket players: 43.5% (n=57), Football players: 32.1% (n=42) and Badminton players: 24.4% (n=32). The TAI in respondents was also significantly dependent on game type, TAI being highest in football players (7/15, 46.7%); $p < 0.043$, Table III).

Table III: Game type of the respondents by TAI and other injuries (n=131)

Game type	TAI & other injuries of the respondents			Total
	TAI	Others	No injury	
Football	7	23	12	42
Cricketer	3	23	31	57
Badminton	5	16	11	32
Total	15	62	54	131

Pearson Chi-Square ($\chi^2 = 8.906^a$, $df = 4$, $p = 0.043$)
 $p \leq 0.05$: Significant; $p > 0.05$: Not-significant.

The minimum and maximum body weights of the respondents were 42 kg and 85 kg respectively with Mean \pm SD: 61.24 \pm 8.22 kg. The BMI of 13.7% (n=18) players were underweight (<18.5), 79.4% (n=104) players were normal (18.5-24.9), about 6.1% (n=8) were overweight (25.0- 29.9) and 0.8% (n=1) were obese (≥ 30.0). TAI was significantly related to BMI of the players ($p = 0.008$).

About the occupation, 45% (n=59) were students, 39% (n=51) were professional players, 12% (n=16) were doing jobs and remaining 4% (n=5) had other professions. Statistical analysis of Occupation by TAI and other injuries of the respondents were found to be significant ($p = 0.046$). Ground condition of the respondents were significantly associated with TAI which was highest in incidence i.e. 11/15, 73.2% ($p = 0.05$).

About 35% (n=46) players were referred to the physiotherapist for their injury for better treatment. Only 17% (n=22) were referred to the doctor, 7% did not go anywhere and 41% did not respond. Table-IV shows the pattern of referral for the treatment of TAI to physiotherapists, doctors and others. The highest number of respondents, i.e. 9/15 (60%) with TAI were referred to physiotherapist for treatment ($p = 0.000$).

IV: Referral for treatment of the respondents by TAI and other injuries (n=131)

Referral for treatment	TAI & other injuries of the respondents			Total
	TAI	Others	No injury	
None	1	8	0	9
Physiotherapist	9	37	0	46
Doctor	5	17	0	22
No referral required	0	0	54	54
Total	15	62	54	131

Pearson Chi-Square ($\chi^2 = 131.936^a$, $df = 6$, $p = 0.000$)
 $p \leq 0.05$: Significant $p > 0.05$: Not-significant.

Significant relationship was observed between the severity of injury and the referral for their treatment. Pattern of injury severity were significantly related to TAI ($P = 0.000$). It showed that 11/15, i.e. 73.2% of the respondents with TAI were able to play after treatment, whereas 4/15, i.e. 26.7% were unable to continue playing (Table-V).

Table V: Injury severity of the respondents by TAI and other injuries (n=131)

Injury severity	TAI & other injuries of the respondents			Total
	TAI	Others	No injury	
Unable to continue playing	4	7	0	11
Continue to play after treatment	11	46	0	57
Continue to play without treatment	0	9	0	9
Not applicable	0	0	54	54
Total	15	62	54	131

Pearson Chi-Square ($\chi^2 = 138.107^a$, $df = 6$, $p = 0.000$)
 $p \leq 0.05$: Significant; $p > 0.05$: Not-significant.

Among the large number of players with injury referred to the physiotherapist (n=46), 38 players (83%, 38/46) were successfully able to continue to play after treatment in contrast to a fewer number of players referred to the physician for the treatment (Table-VI).

Table VI: Relationship between the injury severity and referral for treatment of the respondents (n=131)

Outcome	Referral				Total
	None	Physiotherapist	Doctor	Others	
Unable to continue playing	3	5	3	0	11
Continue to play after treatment	4	38	15	0	57
Continue to play without treatment	2	3	4	0	9
No referral required	0	0	0	54	54
Total	9	46	22	54	131

Pearson Chi-Square ($\chi^2 = 134.501$, $df = 6$, $p = 0.000$)
 $p \leq 0.05$: Significant; $p > 0.05$: Not-significant.

Discussion

Today football is the most elite sport, cricket is the most famous sport and badminton is the most prestigious sport in the world. The popularity of these three games has increased dramatically across the world. Owing to their popularity, these sports are being played more and hence more injuries occur among the players.

In the present study, 131 players (football, cricket, badminton) were interviewed from February 2012 to July 2012. Although most of the participants were cricketers, number (%) of cricket, football and badminton players were 57(43.5%), 42(42.32%) and 32(24.4%) respectively playing in different clubs in Dhaka City. The prevalence of TAI of

11.5% i.e. 115 per thousand respondents observed in the present study was comparable with other studies.¹⁻³ TAI was statistically significantly associated with BMI, occupation, division (status), ground condition, injury severity and referral for treatment ($p \leq 0.05$) and non-significantly associated with age group, income, game type, playing surface, stress and satisfaction ($p > 0.05$). Our study indicated that the experienced sportsmen were dealing with more physical training and tangibly brings less injury, but inexperienced were dealing with less implicating more chances of injury (Table I-III).

In the present study, a total of 11.5% of the TAI were recorded, other injuries occurred were 47% and 40% were no injury. Around 47% injury of the respondents were enrolled before six months, in contrast only 12% participants were injured one week before collecting the data and the recent injury was registered slightly over 22% of the total injury. More than 70% of sportsmen used protection for ankle in any competition or practice matches and 11.5% did not take any ankle protection during sporting (Table I).

The ground condition would appear to be related to TAI since there was a disproportionately high number of injuries recorded when the ground was dry and hard. During the preseason the ground was reported as dry in 70% of cases, similar conditions were reported in 51% of cases during the competitive season. In 40% of in season injuries the ground was wet and/or muddy; such conditions were only reported in 8% of preseason injuries. Amongst the different reasons for increasing TAI incidence, hard playing surface was the most important as reported by Woods et al.⁵ Among the respondents, 77.1% (101/131) players carried out their practice in ups and downs ground whether it was hard, wet or muddy and 22.1% (29/131) practiced in smooth ground.

In the current study, about 70% ($n=92$) players used protection for ankle, but it could not be confirmed whether the shoes were adequately effective and appropriate or not for any practice matches or competition. Only 11% did not use any ankle protection and remaining 18% used other or traditional protection methods (Table I). Good running shoes appropriate to players' foot type for best fit and function are recommended for running drills during the preseason since this may help to reduce injuries, especially of the lower leg, during the preseason in UK.⁵

In South Africa more injuries occurred during first-class cricket matches (32%), with limited-over matches (26%) and practices and training (27%)

resulting in a similar number of injuries.^{7,9} In the present study, 47 ($n=35.95$) injuries were taken place in third division matches, but in first division matches 40 (30.5%) injuries occurred and 44 ($n=33.6\%$) injuries recorded in second division matches which was significant (Table-II). Older footballers are possibly more experienced in dealing with the physical and mental demands during the period of the season.⁵

Regarding BMI of the respondents, 80% ($n=104$) players had BMI within normal range contrary to less than 1% ($n=1$) was obese; around 6% ($n=8$) were overweight and 13.7% ($n=18$) were underweight. Ian and others reported that 30% of professional American football players who sustained TAI between 1997 – 2002 never returned to play in National Football League (NFL).^{13,14,19}

It was reported that among the 39 players with TAI, 35 were in full employment, three were students, and one was unemployed.¹⁶ In the present study, 39% were professional players, 12% were doing jobs, remaining 4% were others and remarkably, largest number of respondents, i.e. 45% were students. Also, significant relationship was observed between the severity of injury and the referral for their treatment ($p < 0.000$; Table VII). A large number of players (35%, $n=46$) were referred to the physiotherapist with variety of injuries and among them, 38 players were successfully able to continue to play after treatment. This was in contrast to fewer number of players (17%, $n=22$) referred to the physicians for the treatment and returning to the game after treatment (Table IV-VI).

It is evident from the present study that there is a need to continue with injury surveillance as well as with studies that evaluate the efficacy of intervention strategies in order to reduce the risk of TAI among players. Efforts should be initiated to prevent and minimize the injuries among the footballers, cricketers and badminton players, so that they can continue playing their games. The proper guidance of a sports physiotherapist for reducing TAI should be regarded and followed strictly. Every club should appoint a Sports Physiotherapist enabling the clubs to save from huge financial losses and resume their players in the sports.^{14,15,19,20} A sports medicine specialist physician should also be consulted. Although the sports physiotherapists are indispensable for the players, their role should not be ignored.

In conclusion, the frequency of TAI of 115 among the respondents (football, cricket and badminton players) is comparable with other studies. TAI is a major injury inflicting serious restrictions for the players to perform properly or even to come back into their professional life. Referral for treatment of

TAI to physiotherapists seemed to be very important as highly significant proportion of them managed to come back and continue to play after treatment. Not only physiotherapist, a specialist doctor in sports medicine should also be consulted. However, the limitation of the present study was smaller sample size due to time constraint and finance. Further research should be carried out in a broader aspect involving larger number of respondents.

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