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RESEARCH ARTICLE

Prevalence and Risk Factors of Achilles Tendinopathy among University Soccer Players

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Abstract

Background: Tendinopathies especially that of the Achilles account for a significant amount of overuse injuries in sports that could hinder optimal performance in sport, might lead to permanent physical damage or disability, and it's epidemiology is not extensively documented in our clime. Therefore, this study aimed to determine the prevalence and risk factors associated with Achilles Tendinopathy (AT) among university soccer players.

Methods: A cross-sectional survey of 210 soccer players, where 79.5% of the participants were male purposively sampled from two universities. Data on selected anthropometric indices and socio-demographic characteristics of the participants was ascertained. Royal London Test and Victorian Institute of Sports Assessment-Achilles Questionnaire were used to assess AT. The inferential statistics of Spearman rank order correlation and chi square were used for data analysis at an alpha level of 0.05.

Results: The prevalence of AT was 21.9 per 100 persons. The mean AT score, age, height, weight, and Body Mass Index (BMI) of the participants were 92.29 ± 15.89, 22.46 ± 1.47 years, 1.74 ± 0.13 meters, 68.90 ± 7.46 kg, 19.73 ± 1.80 respectively. Significant correlation exists between AT score and the following variables: age ($p = 0.018$), weight ($p < 0.01$), height ($p < 0.01$), BMI ($p < 0.01$). There was no significant correlation between sex and AT score ($p = 0.215$).

Conclusions: The prevalence of Achilles tendinopathy in university soccer players was high. Age, height, weight, BMI except sex correlated with AT. The results depicts that the higher the BMI, the likelihood of having AT.

Keywords

Achilles tendon, Anthropometry, Prevalence, Soccer, Tendinopathy, University

Abbreviations

BMI: Body Mass Index; AT: Achilles Tendinopathy; VISA-A: Victorian Institute of Sports Assessment-Achilles Questionnaire

Introduction

Sports injuries have been found to inhibit optimal sports' performance and these injuries, which can have both long and short term harmful effects, causes lasting physical damage or disability [1], affect quality of life, thus could result in reduced physical activity participation. Every sport comes with risk of injury that is peculiar. The occurrence of sports injuries and its associated problems are on the increase [2]. In association football, commonly known as soccer, injuries have been identified to result from multiple risk factors and ankle injuries are one of the most common injuries [3]. Ankle injuries in soccer may give rise to problems like reduced performance, time away from competition and possibly disability [4]. The bones that make up the ankle joint are a regular site of injury and often times, bending and twisting forces can precipitate these injuries [5], with the most common being ankle sprain, fracture, and tendinopathy. Tendinopathy happens when the tendon is forced to endure high or peculiar load, presents as pain

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in the tendon and impaired performance sometimes accompanied by swelling [6].

Achilles tendinopathy is a clinical condition characterized by pain and swelling in and around the Achilles tendon, mainly arising from overuse [7]. It is often a result of increase in training load. The Achilles tendon is the strongest tendon in the body serving both the gastrocnemius and soleus muscles originating near the mid-calf and inserts posteriorly at the calcaneus [8]. Achilles tendinopathy commonly happens in the mid-substance of the tendon or less commonly at its insertion in the calcaneus [8]. Previous observational studies have proved that competitive athletes have a 24% lifetime incidence of Achilles tendinopathy [9]. One study in the Netherlands reported the annual occurrence of symptoms characteristic of Achilles tendinopathy in the general population as 2.01/1000 people [10]. There are certain risk factors associated or that makes one susceptible to Achilles tendinopathy. Identifying them is important in prevention and treatment of Achilles tendinopathy [11,12].

Soccer is widely recognized to be the world's most popular sport [13], and is played at different levels, worldwide, national, state, universities and even secondary schools. It is played by players in over 200 countries, making it the world's most popular sport [14]. Soccer involves several crafts that demand complex movements making the athletes susceptible to injuries, and tendinopathy is one of the most recorded overuse sports injuries in modern societies [15]. Participation in soccer is a worldwide event with tremendous health and economic benefits [16], increased self-esteem, peer socialization, general fitness, as well as reducing various diseases risks, crime rate and poverty [17]. A lot of attention has been given to elite soccer players while in university soccer players, there are higher numbers of participants who began playing early and continue for a longer period. For some of them, their gears are not always suitable for the sport, thereby increasing the threat of tendinopathy [9]. The average university soccer players play soccer at least three (3) times a week, and Achilles tendinopathy occurs as a result of overuse. The increase in the popularity of soccer and expectations from players make meaningful numbers of soccer injuries conceivable. University soccer players also go through rigorous physical training, preparing for inter-club competition, inter-school competition. They are not professionals, so much attention is not given to them, but the trainings and constant field activity also makes them susceptible to sports injuries like Achilles tendinopathy. Also, intrinsic factors inherent in individual's physiology could also influence susceptibility to Achilles tendinopathy [9]. Little or no thorough investigation or study on the occurrence of Achilles tendinopathy on this population has been carried out and we aimed to assess the prevalence as well as factors that would correlate with AT. Therefore, we hypothesized that AT will not be prevalent and also, that age, sex, weight, height, and body mass index would not correlate with AT in university soccer players.

Materials and Methods

Sampling and sample size calculation

Purposive sampling technique was used to recruit 210 participants from two selected universities in south east Nigeria for this cross-sectional study**.** Both male and female who have played soccer consistently for at least six (6) months were included and participants who actively engaged in other sports like basketball, sprinting were excluded because these sports could make them prone to Achilles tendinopathy.

Procedure for data collection

Ethical approval was obtained from Ethical Committee of Faculty of Health Science and Technology, of one of the University. A letter of introduction from the Department of Medical Rehabilitation was given to the coaches of the various teams seeking for permission to carry out the research with their teams. Informed consent was obtained from all participants and assuring them of confidentiality of their information.

The Royal London test, a psychometrically sound instrument, was used for assessing Achilles tendinopathy [18,19]. To start the test, the participant lay prone on the plinth with the feet hanging outside the table. The ankle was in neutral position and the Achilles tendon was palpated for tenderness. The participant was asked to dorsiflex and the ankle was palpated on dorsiflexion. Results were classified as tenderness present on dorsiflexion or absent. In patients with Achilles tendinopathy, tenderness was felt on palpation with the ankle in neutral position, but on dorsiflexion tenderness was absent or reduced.

Each participant stood upright on a bathroom weighing scale (with calibration set at 0) with minimal clothing and barefooted. The height was measured with participants standing erect, backing the calibrated part of the stadiometer, and looking straight ahead with both arms by the side and read starting from the vertex of the head to the sole of the feet. After, the Victorian Institute of Sports Assessment-Achilles (VISA-A) questionnaire was administered; it is a valid, reliable, and user-friendly index of the severity of Achilles tendinopathy [20,21], which contains eight [8] questions that covers the 3 domains of pain (questions 1 to 3), function (questions 4 to 6), and activity (questions 7 and 8). Questions 1 to 7 are scored over 10, and question 8 carries a maximum of 30. Scores are summed to give a total of 100. An asymptomatic person would score 100. For question 8 which has three part (A, B, C), participants must answer only one part; A, B, or C that relates to the person's reality. If the participant experiences pain when performing sport, he or she automatically loses at least 10, and possibly 20, points.

Table 1: Characteristics of University soccer players.

Variable N = 210 Male = 167 (79.5%) Female = 43 (20.5%)		Range	Mean S.D	t	p
Age (Years)	**Male**	18-27	22.56 ± 1.43	1.986	0.051
	Female	20-26	22.05 ± 1.54		
	Total	18-27	22.46 ± 1.47		
Height (Metres)	**Male**	1.52-1.92	1.76 ± 0.71	9.152	0.000
	Female	1.52-1.77	1.68 ± 0.03		
	Total	1.52-1.92	1.74 ± 0.25		
Weight (Kilogram)	**Male**	46-102	7023 ± 7.04	5.458	0.000
	Female	51-94	63.81 ± 6.88		
	Total	46-102	68.91 ± 7.45		
Body Mass Index	**Male**	14.0-27.6	19.91 ± 1.73	2.752	0.008
	Female	15.3-27.6	19.03 ± 1.92		
	Total	14.0-27.6	19.73 ± 1.80		
Achilles Tendinopathy Score	**Male**	48-100	91.86 ± 15.93	-0.775	0.441
	Female	37-100	93.95 ± 15.80		
	Total	37-100	92.29 ± 15.89		

Table 1 depicts the distribution by sex of the participants' age, height, weight, body mass index and Achilles tendinopathy score using ranges, mean and standard deviation

KEYS: N: Frequency; SD: Standard Deviation

Statistical analysis

Data collected was analyzed using SPSS version 20. Data set was assessed for normality using Kolmogorov-Smirnov and Shipiro-Wilk statistics and some were found not to be normally distributed ($p < 0.05$). Descriptive statistics was summarized using ranges, mean, standard deviation, percentages and frequency count. Inferential statistics was analyzed using Independent t-test, Pearson chi square and Spearman rank order test. Level of significance was set at 0.05. Prevalence was calculated using the formula for point prevalence;

$$\Pr evalence = \frac{number\ of\ existing\ cases\ on\ a\ specific\ date}{number\ of\ people\ in\ the\ population\ on\ this\ date}$$

Results

A total of 210 soccer players, both male and female within 18 to 27 years of age participated in this study and only two participants were obese and these two have symptomatic Achilles tendinopathy as shown in the Table 1 and Figure 1. They were selected from four campuses of two universities with majority from University A (64.8%); of the 46 that tested positive to Achilles tendinopathy (21.4%), 45 were symptomatic as seen in Table 2.

Prevalence = 0.219

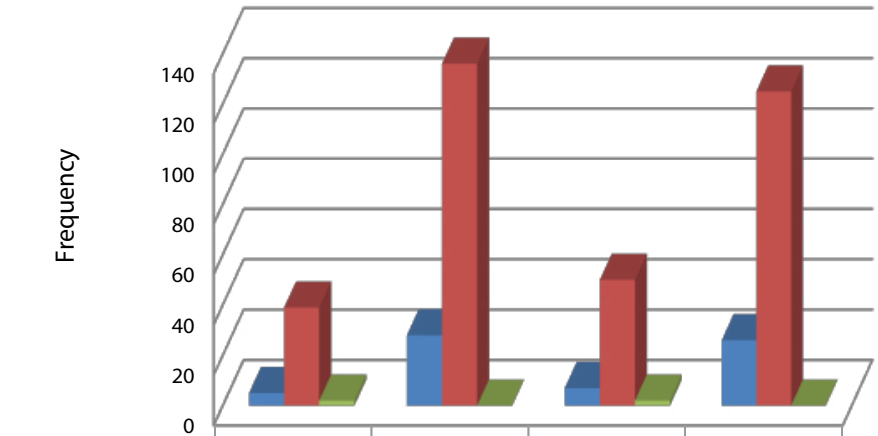
Therefore, point prevalence of Achilles tendinopathy in university soccer players is 21.9 per 100 persons. Table 3 shows that Age, height, weight, and Body Mass Index significantly correlated with Achilles tendinopathy score ($p < 0.05$). There was no significant correlation between sex and AT score ($p = 0.215$ with an odd ratio of 1.942).

Discussion

In this present study, the prevalence of Achilles tendinopathy in university soccer players is 21.9 per 100 persons. Aiyegbusi, et al. [9] reported a prevalence rate of 15.9 per 100 persons among local soccer players while a higher prevalence of 21.5% among Australian male professional football players was reported by Docking, et al. [22]. In the study by Obst, et al. [23] on recreational athletes in a Sub-Saharan African country, a much lower prevalence rate was recorded. The increased rate in this study maybe due to lack of attending medical team and Physiotherapist for this school teams or neglect by the school body. It may also be attributed to difference in sample population.

The participation rate for both sexes in university soccer has been evaluated with almost 80% dominance by males. This could be as a result of many factors which according to Joshua, et al. [24] in a study conducted in Ilorin includes cultural beliefs, parental influence, religion, peer-group, gender bias (women had been valued so much for their succulent, dedicated bodies and good looks which are assumed to be incompatible with the physical vigor, strength

Fig. 1 Achilles Tendinopathy Distribution by Body Mass Index (BMI))



BMI Underweight	5	28	7	26
BMI Normal weight	39	136	50	125
BMI Overweight	2	0	2	0

Figure 1: It is a graphic representation of the participants' Achilles tendinopathy score (positive and negative), and it's severity (symptomatic and asymptomatic AT) distribution by their BMI.

Table 2: Geographical Characteristics, BMI and Achilles Tendinopathy Distribution of University Soccer Players.

Variable N = 210 Male = 167 (79.5%) Female = 43 (20.5%)			Frequency	Percentage (%)
Body Mass Index (BMI)	**Underweight**	**Male**	20	12.0
		Female	13	30.2
		Total	33	15.7
	Normal weight	**Male**	146	87.4
		Female	29	67.4
		Total	180	83.3
	Overweight	**Male**	1	0.6
		Female	1	2.3
		Total	2	1.0
Achilles Tendinopathy Symptom	**Asymptomatic**	**Male**	128	76.6
		Female	23	53.5
		Total	151	71.9
	Symptomatic	**Male**	39	23.4
		Female	20	46.5
		Total	59	28.1
Achilles Tendinopathy Test Distribution	**Negative**	**Male**	127	76.0
		Female	37	86.0
		Total	164	78.1
	Positive	**Male**	40	24.0
		Female	6	140
		Total	46	21.9

Table 2 shows the participants sex distribution of body mass index categories (underweight, normal weight and overweight), Achilles tendinopathy score categories (positive and negative), and it's severity (symptomatic and asymptomatic AT)

Table 3: Correlation Matrix of Age, Weight, Height, BMI with Achilles Tendinopathy Score.

		Weight	Height	Body Mass Index	Age	Achilles Tendinopathy score
Weight	r	1	0.587**	0.914**	0.103	-0.350**
	p		< 0.01	< 0.01	0.135	< 0.01
Height	r	0.587**	1	0.264**	0.039	-0.223**
	p	< 0.01		< 0.01	0.572	< 0.01
Body Mass Index	r	0.914	0.264**	1	0.109	-0.296**
	p	0.435	< 0.01		0.114	< 0.01
Age	r	0.103	0.039	0.109	1	-0.163*
	p	0.135	0.572	0.114		0.018
Achilles Tendinopathy score	r	-0.350**	-0.223**	-0.296**	-0.163*	1
	p	< 0.01	< 0.01	< 0.01	0.018	

Table 3 highlights the correlation matrix among Achilles tendinopathy score, age and some selected anthropometric indices such as weight, height, and BMI.

and force supposedly required for sport competitions). In this study, there exists no association between sex and Achilles tendinopathy; although the dataset used was not normally distributed. So, this may affect the generalisability of this result. Longo, et al. [25] previously found no link between sex and tendinopathy with a suggestion that any association between gender differences may simply be the result of differences in reporting of injuries or seeking care. Also van der Vlist, et al. [26] reported that there is conflicting evidence that sex affects the risk for AT; In his review, one cohort study reported that being female is associated with AT [27], while no association was demonstrated in two cohort studies [28,29].

A significant negative correlation between age and Achilles tendinopathy score was observed in this study. This result is in tandem with the finding by Franceschi, et al. [30], where a potential interaction between age and degenerative tendon changes was identified. This associative predisposition to Achilles tendinopathy as one age could be as a result of wears and tears attributed to age and decreased rate of repair as one ages. Surprisingly, these findings are in disagreement with the results of the study by Aiyegbusi, et al. [31], where no association was found between age and AT. This conflicting result could be as a result of the small sample size used in the latter study as the author concluded that a similar study of a larger study is needed for a generalized application.

Weight and BMI significantly correlated with Achilles tendinopathy. This results agrees with the findings of Frey and Zamora [32], which showed that a high BMI (both in overweight and in obese range) significantly increased the chances of Achilles tendinopathy, and this association is also echoed by the report of significant association between obesity and Achilles tendinopathy in the study by Franceschi, et al. Contrarily, the systematic review done by van der Vlist, et al. showed that BMI has no significant association in three cohort studies [33-35]. Also, Taunton, et al. [36] reported no statistically significant association between obesity and tendinopathy. The conflicting result could be as a result the nature of research of the later study as it was a retrospective case control analysis. Therefore, the researcher considers weight as a risk factor for Achilles tendinopathy from the observations made in the current study. The height of the participants significantly associated with Achilles tendinopathy and a cohort study [27] also, reported an increased height in patients with AT. To the best of the researcher's knowledge, there is limited evidence that height does not affect the risk for AT and the researcher concludes that height could be considered as a risk factor for AT.

Conclusions

The prevalence of Achilles tendinopathy in university soccer players was high. Age, height, weight, BMI except gender correlated with Achilles tendinopathy. The results depicted that the higher the BMI, the higher the likelihood of having AT; and of all the participants that were overweight, all had AT. Also, there may be need to encourage female active participation in soccer as the number recruited for this study is low due to reduced number of female turnout for soccer practice during the data collection phase of this study.

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Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Authors' Contribution

UMC and CMA conceived and designed the study while IUO and UNA make a substantial contribution in the implementation phase. All authors were involved in data collection, analysis and interpretation. All authors read and approved the final manuscript.

Conflict of Interests

The authors have no conflict of interest to disclose.

References

1. Oloyede TA, Olawunmi SA (2019) Predictors of sports' injuries among male professional soccerers in Nigeria. KIU Journal of Social Sciences 5: 283-292.
2. Finch CF, Wong SA, Clapperton A (2014) Time to add a new priority target for child injury prevention?The case for an excess burden associated with sport and exercise injury. Population- based study. BMJ Open 4: e005043.
3. Polzer H, Kanz KG, Grote S (2012) Diagnosis and treatment of acute ankle injuries: development of an evidence- based algorithm. Orthop Rev (Pavia) 4: e5.
4. Doherty C, Delahunt E, Caulfield B, Hertel J, Ryan J, et al. (2014) The Incidence and Prevalence of Ankle Sprain Injury: A Systematic Review and Meta-Analysis of Prospective Epidemiological Studies. Sports Med 44: 123-140.
5. Chang TT, Li Z, Wang XQ, Zhang ZJ (2020) Stiffness of the Gastrocnemius–Achilles Tendon Complex Between Amateur Basketball Players and the Non-athletic General Population. Front Physiol 11: 606706.
6. Maffulli N, Longo UG, Spiezia F, Denaro V (2010) Free hamstrings tendon transfer and screw fixation for less invasive reconstruction of chronic avulsions of the Achilles tendon. Knee Surg Sports Traumatol Arthrosc 18: 269-273.
7. Longo UG, Ronga M, Maffulli N (2009) Achilles Tendinopathy. Sports Med Arthrosc Rev 17: 112-126.
8. Asplund CA, Best TM (2013) Achilles tendon disorders. BMJ 346: f1262.
9. Aiyegbusi AI, Owoeye IO, Balogun JO, Fapojuwo OO, Akinloye OA (2021) Prevalence of Achilles tendinopathy and associated selected intrinsic factors among Nigerian footballers. Muscles, Ligaments and Tendons Journal 11: 118-127.
10. De Jonge S, van den BergC, de Vos RJ, van der Heide HJL, Weir A, Verhaar JAN, et al. (2011) Incidence of midportion Achilles tendinopathy in the general population. Br J Sports Med 45: 1026-1028.
11. Iftikhar S, Batool S, Ahmad A, Sharif F, Ghaffar K (2020) Frequency of Achilles Tendonitis in Obese Patients. Biomed J Sci & Tech Res 25: 17474-17478.
12. O'Neil S, Watson PJ, Barry S (2016) A delphi study of risk factors for Achilles tendinopathy- opinions of world tendon experts. Int J Sports Phys Ther 11: 684-697.
13. Giulianotti R, Robertson R (2013) Globalization and sport. Malden, Carlton: Blackwell Publishing.
14. Pifer ND, Wang Y, Scremin G, Pitts B, Zhang JJ (2018) Contemporary global Football industry: An introduction.
15. Yu C, Deng L, Li L, Zhang X, Fu W (2022) Exercise Effects on the Biomechanical Properties of the Achilles Tendon-A Narrative Review. Biology 11: 172.
16. Reiner M, Niermann C, Jekalic D, Wol A (2013) Long term health benefits of physical activity – A systematic review of longitudinal studies. BMC Public Health 13: 813.
17. DiFiori JP, Benjamin HJ, Brenner JS, Gregory A, Jayanthi N (2014) Overuse injuries and burnout in youth sports: A position statement from the American medical society for sports medicine. Br J Sports Med 48: 287-288.
18. Maffulli N, Oliva F, Loppini M,Aicale R, Spiezia F, et al. (2017) The Royal London Hospital Test for the clinical diagnosis of patellar tendinopathy. Muscles Ligaments Tendons J 7: 315-322.
19. Matthews W, Ellis R, Furness J, Hing WA (2021) The clinical diagnosis of Achilles tendinopathy: A scoping review. Peer J 9: e12166.
20. Iversen JV, Bartels ME, Langberg H (2022) Systematic review: The victorian institute of sports assessment-Achilles questionnaire (VISA-A) - A reliable Tool for measuring Achilles tendinopathy. The international journal of sports physical therapy 76-84.
21. Kaux J-F, Delvaux F, Oppong-Kyei J, Dardenne N, Beaudart C, et al. (2016) Validity and reliability of the French translation of the VISA-A questionnaire for Achilles tendinopathy, Disability and Rehabilitation 20.
22. Docking SI, Rio E, Cook J, Orchard J, Fortington LV (2018) The prevalence of Achilles and patellar tendon injuries in Australian Football players beyond a time-loss definition. Scand J Med Sci Sports 28: 2016-2022.
23. Obst SJ, Barrett RS, Newsham-West R (2013) Immediate effect of exercise on achilles tendon properties: Systematic review. Med and Sci Sports and Exer 45: 1534-1544.
24. Joshua OR, Adeoye OO, Ibrahim O (2013) Social Cultural Factors Influencing Women's Participation in Sports as Perceived by Female Students of the University of Ilorin. Makerere Journal of Higher Education 4: 159-167.
25. Longo UG, Rittweger J, Garau G, Radonic B, Gutwasser C, et al. (2009) No influence of age, gender, weight, height, and impact profile in Achilles tendinopathy in masters track and field athletes. Am J Sports Med 37: 1400-1405.
26. van der Vlist AC, Breda SJ, Oei EHG, Verhaar JAN, de Vos RJ (2019) Clinical risk factors for Achilles tendinopathy: a systematic review. Br J Sports Med 53: 1352-1361.
27. Wezenbeek E , Willems T , Mahieu N, Muynck MD, Bossche LV, et al. (2018) The role of the vascular and structural response to activity in the development of Achilles tendinopathy: a prospective study. Am J Sports Med 46: 947-954.
28. Barge-Caballero E, Crespo-Leiro MG, Paniagua-Martín MJ, Muñiz J, Naya C, et al. (2008) Quinolone-related Achilles tendinopathy in heart transplant patients: incidence and risk factors. J Heart Lung Transplant 27: 46-51.
29. Owens BD, Wolf JM, Seelig AD, Jacobson IG, Boyko EJ, et al. (2013) Risk factors for lower extremity tendinopathies in military personnel. Orthop J Sports Med 1: 232596711349270.
30. Franceschi F, Papalia R, Paciotti M, Franceschetti E, Martino AD, et al. (2014) Obesity as a Risk Factor for Tendinopathy: A Systematic Review. Int J Endocrinol 2014: 670262.
31. Aiyegbusi A.I, Okafor UA, Leke OP (2016) Prevalence of Achilles tendinopathy and it's association with physical characteristics in recreational sports participants in Lagos, Nigeria. Journal of Clinical Science 13: 163-166.
32. Frey C, Zamora J (2007) The effects of obesity on orthopaedic foot and ankle pathology. Foot Ankle Int 28: 996-999.
33. Mahieu NN, Witvrouw E, Stevens V, Tiggelen DV, Roget P, et al. (2006) Intrinsic risk factors for the development of achilles tendon overuse injury: a prospective study. Am J Sports Med 34: 226-235.
34. Milgrom C, Finestone A, Zin D, et al. (2003) Cold weather

training: a risk factor for Achilles paratendinitis among recruits. Foot Ankle Int 24: 398-401.

35. Van Ginckel A, Thijs Y, Hesar NG, Mahieu N, Clercq DD, et al. (2009) Intrinsic gait-related risk factors for Achilles tendinopathy in novice runners: A prospective study. Gait Posture 29: 387-391.

36. Taunton JE, Ryan MB, Clement DB, McKenzie DC, Lloyd-Smith DR, et al. (2002) A retrospective case control analysis of 2002 running injuries. Br J Sports Med 36: 95-101.