



## Original Article

## Association between Achilles Tendon Injury and Daily Activities Performance in Athletes and Non-Athletes after 1 Month of Injury

Arsalan Tariq<sup>1</sup>, Sayed Alireza Mousavi Zadeh<sup>2</sup>, Seyedeh Kimia Nazarian<sup>3</sup>, Ahmed Ismail<sup>4</sup>, Waleed bin Waheed<sup>4</sup> and Mina Bayati Komitaki<sup>5</sup>

<sup>1</sup>University Institute of Physical Therapy, The University of Lahore, Lahore, Pakistan

<sup>2</sup>Department of Medical and Surgery, University of Rome Tor Vergata, Rome, Italy

<sup>3</sup>Fenerbahçe University of Vocational School of Health Services, Istanbul, Turkey

<sup>4</sup>Faculty of Medicine and Allied Health Sciences, Isra University, Karachi, Pakistan

<sup>5</sup>Università Torvergata, Rome, Italy

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**\*Corresponding Author:**

Arsalan Tariq  
 University Institute of Physical Therapy, The University of Lahore, Lahore, Pakistan  
 at81931@gmail.com

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## ABSTRACT

Achilles tendon injuries are significant because they affect the mobility of the lower extremities, which is important in both sports and daily life. This research aims to shed light on the more general effects of these injuries on people's functional capacities. **Objective:** To determine the association between Achilles tendon injury and daily activities performance in athletes and non-athletes after 1 month of injury. **Methods:** A cross-sectional analytical study was conducted at the university of Lahore and Punjab stadium Lahore over a four months periods from January to April 2019. A total of 30 subjects male were approached by the non-probability convenient sampling method. Fisher exact test was applied to identify the associated factors. P-value  $\leq 0.05$  counted as significant. **Results:** Results showed symptoms of Achilles tendon injury effect daily activities of athletes and non-athletes. Majority of athletes who participated in study have stiffness in foot as compared to non-athletes. According to results there is association between ankle/foot giving away during strenuous activity (p-value 0.0025), during moderate activity (p-value 0.005) and in light activity (p value-0.006) in both athletes and non-athletes. **Conclusions:** Both athletes and non-athletes were facing difficulties during activities and cause negative impact on activities of participants after one month of injury.

## INTRODUCTION

The thickest and strongest tendon in the human body is the Achilles tendon. It is the tendon that ruptures the most frequently despite its size [1]. The most common cause of Achilles tendon rupture (ATR) is tendon overload, which frequently happens in a sporting environment. Achilles tendinopathy manifests acutely as excruciating pain, the inability to carry weight, and weakness; these impairments can last for more than ten years after the initial injury [2]. Achilles tendinopathy is becoming more common

everywhere in the world. Elderly people, who are engaging in recreational physical activity more frequently than in the past, are those who are most noticeable for this increase [3]. The effects of Achilles tendon injuries transcend outside of the sports world and into regular life. The Achilles tendon is essential for performing these basic movements, such as walking, getting out of a chair, and climbing stairs. Therefore, when injuries do occur, they may interfere with these activities and result in a lower

quality of life [4]. Age, level of physical activity, and general health are all factors that can affect how susceptible the Achilles tendon is to damage [5]. Athletes are particularly prone, especially those who participate in sports that call for abrupt acceleration or jumping. As a result of the tendon and surrounding muscles' lack of training, inactive people may also be at danger [6]. Achilles tendon rupture, which can be a crippling injury requiring medical attention, and Achilles tendonitis, which is characterized by inflammation and pain, are both common ailments [7]. Both athletes and non-athletes regularly experience discomfort and incapacity from achilles tendon problems such as tendinopathy and rupture. These injuries are challenging to treat, take a long time to recover from, and recur frequently [8]. The most often injured area of a tendon is its middle; calcaneal insertion ethereal illness is less frequent. The development of tendon disease is influenced by a number of variables, including the impact of exercise, overuse, hereditary predisposition, and aging [9]. While it is well known that inflammatory mediators play a role in the development and progression of tendon disease in the shoulder, the relative importance and function of inflammation in energy-storing tendons like the Achilles, where disease was once frequently labeled as "degenerative," is hotly contested [10]. A thorough history taking and physical examination serve as the main foundations for the diagnosis of acute Achilles tendon rupture [11]. Patients typically present with an abrupt inability to walk and severe pain when running or leaping. They are typically in their third or fourth decade of life. Patients who have an acute rupture of the tendon frequently remember hearing or feeling like they were being kicked in the back of the ankle when their ankle is dorsiflexed at the back of the leg. Plantar flexion weakness, trouble with weight-bearing ambulation, and limping are all indications of a torn tendon [12]. Rest, physical therapy, and, in some circumstances, surgical intervention are all used to treat Achilles tendon injuries [13]. In order to avoid persistent problems and promote optimum healing, early diagnosis and effective treatment are essential [14]. In order to promote preventive and efficient rehabilitation for people with different levels of activity, it is crucial to understand the mechanisms, risk factors, and management techniques linked to Achilles tendon injuries [15]. The purpose of study was to describe the occurrence of disease, rate/frequency of disease and its effects in athletes and non-athletes which will help physicians and physiotherapists to prevent or decrease the ratio of disease in athletes and non-athletes. The finding of this study will rebound to the benefit of society considering that this study will help in prevention of disease. For researcher the study will help them uncover critical areas of the disease. This study will able to train physiotherapists in recognizing the effects of the disease. It will help

physiotherapists to improve the performance of athletes and non-athletes.

## METHODS

This Observational cross-sectional study was conducted in Lahore among male individuals aged 22 to 30. We employed the Epitool calculator software to determine the sample size required for robust statistical analyses, considering a Confidence Interval Strength of 95%. Total of 30 participants 23 were athletes and 7 were non-athletes recruited from the Punjab stadium. The study was completed within 4 months from January to April 2019. Non-probability Convenient Sampling was used to collect sample size. Achilles tendon injury was identified by looking at participants past health history. Subjects asked questions about activities performed after one month of Achilles tendon injury from a standardized questioner Victorian Institute of Sport Assessment Achilles (VISA.A). Individuals aged 18 to 60 with diagnosed Achilles tendon injuries (such as tendonitis and partial tears) within the past month were eligible. Both athletes and non-athletes were included. Participants with chronic lower limb conditions, recent surgeries, neurological disorders affecting limb function, incomplete data, or significant medication use were excluded. Data were analyzed by SPSS software 24.0 version. Frequency and percentage of Qualitative variables such as age, BMI were analyzed including physical complaints and symptoms, work related concerns, life style activities, attitudes and feeling related to Achilles tendon injury. The Fisher exact test was used to assess the association between variables and parameters. In adherence to ethical standards, this study obtained approval with reference number 161-10-2023, as confirmed by the official letter received on October 16th, 2023.

## RESULTS

30 individuals were participated in which there are 7 were non-athletes (23.33%) and 23 athletes (76.67%). The mean age of participants was  $24.25 \pm 3.63$  BMI was normal in majority of individuals ranging from 18.2 to 19.4.

Results of table 1 showed that during any strenuous activity like exercise, heavy weight lifting or during any sports did your ankle/foot give way. 3 non-athletes told not at all, 2 said partially, 2 said the ankle/foot gave way fully. In athletes 4 said not at all, 14 said partially gave way, 3 said it gave way completely while 2 said they were not able to do any activity due to that. In this result 53.3 % participant's ankle/foot partially gave way. Fishers exact showed association between foot/ankle give away during strenuous activity. Fisher exact test showed (p-value 0.0025). According to the results there is association between participants Ankle or foot gave way during strenuous activity.

**Table 1:** Association between Achilles tendon injury and strenuous activity

Participants	Did not give way at all	Partially gave way	Complete gave way	Could not do the activity	Total	p-value
Non athlete	3(42.9)	2(28.6)	2(28.6)	0	100%	0.0025
Athlete	4(17.4)	14(60.9)	3(13.0)	2(8.7)	100%	
Total	7(23.3)	16(53.3)	5(16.7)	2(6.7)	100%	

Table 2 shows Results of moderate activities such as physical working like jogging and running which had less side effects as compared to strenuous activities 71.4% 5 patients of not athletes had nothing in doing activities 28.6% (2) patients ankle foot partially gave way. In athletes 13 patients felt nothing 7 patients ankle partially gave away, 2 patients' foot and ankle completely gave way while 1 was unable to continue work. Fisher exact test showed p-value 0.005 and showed there was association in participants Ankle or foot gave way during moderate activity. According to the results there is association between participants Ankle or foot gave way during Moderate activity.

**Table 2:** Association between Achilles tendon injury and moderate activity

Participants	Did not give way at all	Partially gave way	Complete gave way	Could not do the activity	Total	p-value
Non athlete	5(71.4)	2(28.6)	0	0	7(100%)	0.005
Athlete	13(56.5)	7(30.4)	2(8.7)	1(4.3)	23(100%)	
Total	18(60)	9(30)	2(6.7)	1(3.3)	30(100%)	

Result of table 3 showed that non-athletes showed no symptoms of Achilles tendon injury during light activities on the other hand 82.6% athletes were comfortable in doing work, 3 patient's foot partially gave away whereas 1 patient's foot completely gave way. Fisher exact test showed no association between foot/ ankle gave away during light activities (p-value 0.006). According to the results there is association between participants Ankle or foot gave way during Light activity.

**Table 3:** Association between Achilles tendon injury and light activity

Participants	Did not give way at all	Partially gave way	Could not do the activity	Total	p-value
Non athlete	7(100)	0	0	7(100%)	0.006
Athlete	19(82.6)	3(13.0)	1(3.3)	30(100%)	
Total	26(86.7)	3(10)	1(3.3)	30(100%)	

## DISCUSSION

This study examined the significant association between Achilles tendon injuries and everyday activity performance in both athletes and non-athletes within a month after injury. Our results highlight a strong correlation between Achilles tendon injuries and decreased performance in daily tasks at both activity levels. With a p-value of less than 0.005, this study identified a strong relationship between variables. Achilles tendon injuries significantly influence

people's capacity to engage in normal activities regardless of their degree of activity, according to the striking stability of this association across groups of athletes and non-athletes. Our research is consistent with those that have shown a connection between Achilles tendon injury and decreased performance in daily activities. A weakened Achilles tendon presented significant difficulties for athletes, who are known for their higher levels of physical activity and demands on their lower limbs. This result is in line with earlier studies that emphasize the Achilles tendon's critical function in movements like running, jumping, and rotating, which are common in many sports. Our results highlight how severely an Achilles tendon injury affects an athlete's capacity to do even regular tasks in the initial phases of recuperation. We found a similar correlation in the non-athlete group as well, which is interesting because it suggests that the effects of an Achilles tendon injury go beyond only athletics. Even though non-athletes might not exert themselves to the same degree, their daily activities nonetheless strongly depend on appropriate lower limb function. The Achilles tendon plays a universal role in preserving mobility and function across a wide range of populations, as is highlighted by the fact that athletes share this disability. In previous study, patients reported worse Quality of life in the physical aspects of SF-12 and SF-36, and also showed low VISA-A scores [16]. Lower Quality of life was seen in AT patients, with some factors having a more pronounced detrimental effect than others. For instance, age and gender are two demographic factors that affect quality of life [17]. Scores of Quality of life was decreased significantly, particularly in the areas of mobility, typical activities, and pain/discomfort, are linked to Achilles tendon. A low rate of work absences (reported in 9% of patients) and a higher percentage of patients (38%) reported lower productivity at work as a result of AT [18]. Patients with AT frequently had lower job productivity, which had a negative impact on their performance at work [19]. Similarly, our findings are consistent with earlier research in the field when compared to earlier studies in the field. In their study of athletes and non-athletes, Brorsson et al., found a comparable correlation between Achilles tendon injury and decreased performance in daily activities [20]. Additionally, Johns et al., study looked exclusively at the effects of Achilles tendon injuries on athletes [21]. Similar to the results of our investigation, their research showed a significant impairment in athletes' performance in daily activities within the first month after injury. Patients with Achilles Tendonitis are more likely to experience sadness, kinestophobia, and pain catastrophizing. This pessimism may considerably or moderately decrease their ability to do daily tasks. Some studies suggest that factors like fear and self-efficacy may

have an impact on tendinopathy [22]. Our investigation highlights the complex relationship between Achilles tendon injuries and decreased daily activity performance in both athletes and non-athletes. The significant statistical significance not only supports our findings but also emphasizes the necessity for a thorough knowledge of the wider ramifications of such injuries. This underlines the significance of specialized rehabilitation strategies that take into account the intricate interactions between impairments and functional results.

## CONCLUSIONS

In conclusion, our study underscores a significant association between Achilles tendon injuries and compromised daily activities, impacting both athletes and non-athletes. The results reveal a notable vulnerability in ankle and foot stability during light, moderate, and strenuous activities one month post-injury. These findings emphasize the pervasive influence of Achilles tendon injuries on daily activity performance across diverse activity levels.

## Authors Contribution

Conceptualization: AT, WBW

Methodology: AT, SAMZ

Formal analysis: AT

Writing-review and editing: SKN, AI, MBK

All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

The authors declare no conflict of interest.

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## REFERENCES

- [1] Maffulli N. Current concepts review-rupture of the Achilles tendon. *JBJS*. 1999 Jul; 81(7): 1019-36. doi: 10.2106/00004623-199907000-00017.
- [2] Holm C, Kjaer M, Eliasson P. A chilles tendon rupture-treatment and complications: a systematic review. *Scandinavian Journal of Medicine & Science in Sports*. 2015 Feb; 25(1): e1-0. doi: 10.1111/sms.12209.
- [3] Erickson BJ, Cvetanovich GL, Nwachukwu BU, Villarroel LD, Lin JL, Bach Jr BR, et al. Trends in the management of Achilles tendon ruptures in the United States Medicare population, 2005-2011. *Orthopaedic Journal of Sports Medicine*. 2014 Sep; 2(9): 2325967114549948. doi: 10.1177/2325967114549948.
- [4] Verges J, Martínez N, Pascual A, Bibas M, Santiña M, Rodas G. Psychosocial and individual factors affecting Quality of Life (QoL) in patients suffering from Achilles tendinopathy: a systematic review. *BMC Musculoskeletal Disorders*. 2022 Dec; 23(1): 1114. doi: 10.1186/s12891-022-06090-2.
- [5] Kongsgaard M, Aagaard P, Kjaer M, Magnusson SP. Structural Achilles tendon properties in athletes subjected to different exercise modes and in Achilles tendon rupture patients. *Journal of Applied Physiology*. 2005 Nov; 99(5): 1965-71. doi: 10.1152/jappphysiol.00384.2005.
- [6] Möller A, Åström M, Westlin NE. Increasing incidence of Achilles tendon rupture. *Acta Orthopaedica Scandinavica*. 1996 Jan; 67(5): 479-81. doi: 10.3109/17453679608996672.
- [7] Gibbon WW, Cooper JR, Radcliffe GS. Sonographic incidence of tendon microtears in athletes with chronic Achilles tendinosis. *British Journal of Sports Medicine*. 1999 Apr; 33(2): 129-30. doi: 10.1136/bjism.33.2.129.
- [8] Nistor LA. Surgical and non-surgical treatment of Achilles Tendon rupture. A prospective randomized study. *JBJS*. 1981 Mar; 63(3): 394-9. doi: 10.2106/00004623-198163030-00012.
- [9] Bhandari M, Guyatt GH, Siddiqui F, Morrow F, Busse J, Leighton RK, et al. Treatment of acute Achilles tendon ruptures a systematic overview and metaanalysis. *Clinical Orthopaedics and Related Research*. 2002 Jul; 400: 190-200. doi: 10.1097/00003086-200207000-00024.
- [10] Dakin SG, Newton J, Martinez FO, Hedley R, Gwilym S, Jones N, et al. Chronic inflammation is a feature of Achilles tendinopathy and rupture. *British Journal of Sports Medicine*. 2018 Mar; 52(6): 359-67. doi: 10.1136/bjsports-2017-098161.
- [11] Järvinen TA, Kannus P, Paavola M, Järvinen TL, Józsa L, Järvinen M. Achilles tendon injuries. *Current Opinion in Rheumatology*. 2001 Mar; 13(2): 150-5. doi: 10.1097/00002281-200103000-00009.
- [12] Kvist M. Achilles tendon injuries in athletes. *Annales Chirurgiae et Gynaecologiae*. 1991 Jan; 80(2): 188-201.
- [13] Maffulli N and Ajjis A. Management of chronic ruptures of the Achilles tendon. *JBJS*. 2008 Jun; 90(6): 1348-60. doi: 10.2106/JBJS.G.01241.
- [14] Childress MA and Beutler A. Management of chronic tendon injuries. *American Family Physician*. 2013 Apr; 87(7): 486-90.
- [15] Periasamy M, Venkatramani H, Shanmuganathan RS. Management of chronic Achilles tendon injuries—review of current protocols and surgical options. *Indian Journal of Plastic Surgery*. 2019 Jan; 52(01): 109-16. doi: 10.1055/s-0039-1687923.
- [16] Marshall S, Haywood K, Fitzpatrick R. Impact of

- patient-reported outcome measures on routine practice: a structured review. *Journal of Evaluation in Clinical Practice*. 2006 Oct; 12(5): 559-68. doi: 10.1111/j.1365-2753.2006.00650.x.
- [17] López-López D, Becerro-de-Bengoa-Vallejo R, Losa-Iglesias ME, Palomo-López P, Rodríguez-Sanz D, Brandariz-Pereira JM, et al. Evaluation of foot health related quality of life in individuals with foot problems by gender: a cross-sectional comparative analysis study. *BMJ Open*. 2018 Oct; 8(10): e023980. doi: 10.1136/bmjopen-2018-023980.
- [18] Visser TS, Van Der Vlist AC, Van Oosterom RF, Van Veldhoven P, Verhaar JA, de Vos RJ. Impact of chronic Achilles tendinopathy on health-related quality of life, work performance, healthcare utilisation and costs. *BMJ Open Sport & Exercise Medicine*. 2021 Mar; 7(1): e001023. doi: 10.1136/bmjsem-2020-001023.
- [19] Martimo KP, Shiri R, Miranda H, Ketola R, Varonen H, Viikari-Juntura E. Self-reported productivity loss among workers with upper extremity disorders. *Scandinavian Journal of Work, Environment & Health*. 2009 Jul; 35(4): 301-8. doi: 10.5271/sjweh.1333.
- [20] Brorsson A, Grävare Silbernagel K, Olsson N, Nilsson Helander K. Calf muscle performance deficits remain 7 years after an Achilles tendon rupture. *The American Journal of Sports Medicine*. 2018 Feb; 46(2): 470-7. doi: 10.1177/0363546517737055.
- [21] Johns W, Walley KC, Seedat R, Thordarson DB, Jackson B, Gonzalez T. Career outlook and performance of professional athletes after Achilles tendon rupture: a systematic review. *Foot & Ankle International*. 2021 Apr; 42(4): 495-509. doi: 10.1177/1071100720969633.
- [22] Vitaloni M, Botto-van Bemden A, Sciortino Contreras RM, Scotton D, Bibas M, Quintero M, Monfort J, et al. Global management of patients with knee osteoarthritis begins with quality of life assessment: a systematic review. *BMC Musculoskeletal Disorders*. 2019 Dec; 20(1): 1-2. doi: 10.1186/s12891-019-2895-3.