

Variations of Peroneus Tertius Muscle: Cadaveric Study**Rekha Hiremath¹, Shradha Iddalgave², Ashwini Mutalik³, Anandagouda Naikanur⁴,
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Abstract:**Introduction:** The peroneus tertius is a muscle of extensor compartment of leg. It is a unipennate muscle originating from lower third of fibula, anterior surface of interosseous membrane and anterior intermuscular septum, insertion of the muscle is on dorsal surface of base of fifth metatarsal. The peroneus tertius acts as dorsiflexor and evertor of foot. The presence of peroneus tertius is important for dorsiflexion and extension of the foot in swing phase of the gait.**Aims and Objectives:** Presence of peroneus tertius in human and absence of it in other primates is an evidence of evolution and supports its function of terrestrial bipedalism, so the knowledge of presence or absence of peroneus tertius is imperative from clinical and academic point of view.**Material and Methods:** This study was carried out between 1st October 2019 to 31st October 2020. A total of 25 cadavers (50 lower limbs) were studied. Dorsum of the foot was dissected following standard incisions and dissection procedures.**Results:** Out of the 25 cadavers (A total 50 lower limbs) peroneus tertius was found to be absent in 7 lower limbs, bilaterally in 2 of the cadavers and absent unilaterally in 3 of the cadavers.**Conclusions:** Peroneus tertius provides proper aid to the lateral border of sole and its absence may weaken the support given by the muscle. Also its tendon can be used for transplant in foot drop surgeries.**Keywords:** Absence of Peroneus Tertius, Grafting, Bipedalism, Evolution of Foot.

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Introduction

The peroneus tertius / fibularis tertius is a muscle of extensor compartment of leg. [1] The peroneus tertius acts as dorsiflexor and evertor of foot.

The presence of peroneus tertius is important for dorsiflexion and extension of the foot in swing phase of the gait. [2] These two strength parameters have been identified as important parameters in the development of ankle ligament injuries. [3]

Also it has a special proprioceptive role in sensing sudden inversion and then contracting reflexively to protect the anterior tibio-fibular ligament which is the most commonly sprained ligament of the body. [4] Presence of peroneus tertius in human and absence of it in other primates is an evidence of

evolution and supports its function of terrestrial bipedalism. The frequency of presence of peroneus tertius has increased up to 95% in the human population. [5] so the knowledge of presence or absence of peroneus tertius is imperative from clinical and academic point of view and our study aims to emphasize this.

Material and Methods

A Cadaveric study was conducted in dept of Anatomy, at SN Medical College Bagalkot to study the presence or absence of peroneus tertius, in routine anatomy dissection between 1st October 2019 to 31st October 2020. A total of 25 cadavers (50 lower limbs) were studied. Dorsum of the foot

was dissected following standard incisions and dissection procedures, extensor tendons on the dorsum of the foot were dissected meticulously. In those cases where the peroneus tertius was absent, we carefully checked for anomalous origin of peroneus tertius in the distal half of fibula, the tendon of extensor digitorum longus going to the little toe was also observed for thickening and the lower part of the medial surface of the fibula was also dissected properly.

The lower limbs studied were apparently free from disease, no scar marks were found on the limbs. Admittedly no information of cadaver was available regarding history of foot dysfunction. In those cases where the peroneus tertius was absent, we carefully checked for anomalous origin of peroneus tertius in the lower half of distal end of fibula, no origin of peroneus tertius could be found.

So in the absence of peroneus tertius the relations of muscle tendons in the anterior compartment of leg from medial to lateral were: tibialis anterior, extensor hallucis longus, anterior tibial artery, deep peroneal nerve, and extensor digitorum longus.

Results

In current study, the presence or absence of peroneus tertius was studied in routine anatomy dissection between 1stOctober 2019 to 31st October 2020. A total of 25 cadavers (50 lower limbs) were studied.

Dorsum of the foot was dissected following standard incisions and dissection procedures, extensor tendons on the dorsum of the foot were dissected meticulously and the following observations made.

Table 1:

Total limbs dissected	PT* present	PT absent	%
50	43	7	14

*PT-Peroneus tertius. Peroneus tertius was found to be absent in 7 lower limbs. Out of the 25 cadavers dissected peroneus tertius was absent bilaterally in 2 of the cadavers and absent unilaterally in 3 of the cadavers

Table 2:

Dissected cadavers	PT present	PT absent bilaterally	PT absent unilaterally	% of absence
25	20	2	3	25



Figure 1: Absence of peroneus tertius in the right lower limb

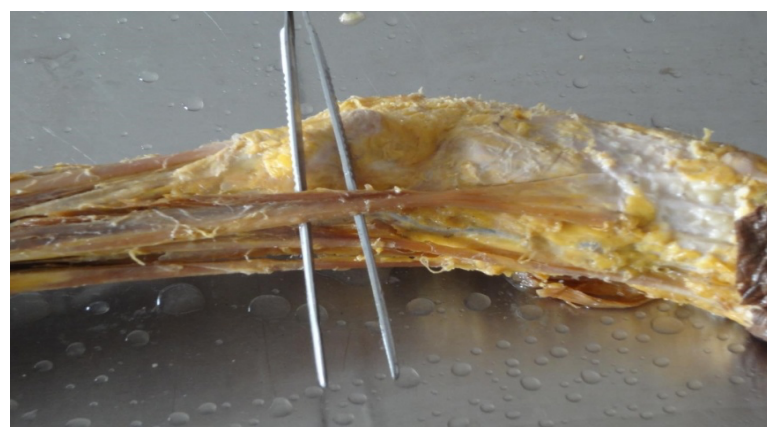


Figure 2: Presence of peroneus tertius in the left lower limb

Discussion

The Peroneus tertius muscle is present in humans with much variation. Rarely it is found in apes and monkeys but its presence is increased in gorillas.[6]

Variations of this muscle suggest that it may be a primitive condition for anthropoids.[7] The frequency of peroneus tertius has increased with evolution and probably that is the reason why it might be found in 95% of the human population.[6]

In the present study, the Peroneus tertius muscle has been absent in 13% cases which is in line with the Joshi et al. [8]

Studies have been designed to determine the exact time of earliest appearance in humans so as to know the nature of early bipedalism [9]. In foot drop, the tibialis posterior tendon manipulation might be required. There are past reports of the tibialis posterior tendon being transferred to the anterior compartment and anastomosed to the peroneus tertius -tendon. [10]

Peroneus tertius causes dorsiflexion and eversion of the foot during the swing phase of gait and assist in bipedal walking. The attachment of the peroneus tertius to the fifth metatarsal might define its role in

providing proper support to the outer aspect of the sole of the foot.

The absence of the peroneus tertius as seen in the present study, the support along the lateral border would be weakened. It should not be forgotten that both Jones' fractures and stress fractures involve the proximal fifth metatarsal and the insertion of the peroneus tertius might play an important role in imposing torsional stress. [11]

Under such circumstances, the absence of the peroneus tertius might be considered a boon to individuals who would be less vulnerable to such stress fractures. The peroneus tertius may be considered as an accessory muscle for eversion and dorsiflexion thereby making its excision compatible for normal walking procedures. Eversion or dorsiflexion may not be decreased in the absence of the peroneus tertius and this fact has already been studied earlier. [3]

Thus, the absence of peroneus tertius would not cause much clinical problems as thought earlier but its absence in any individual might perplex the operating surgeons planning a transplant or resection. We as anatomists would surely advocate prior imaging techniques to prove its existence before any surgical operation on the foot.

Table 3: Comparison of our study with other studies

Author	Country	No. of lower limbs n	% of absence of PT
Present study	India	50	14
Jadhav et al [12]	India	100	13
Domagala et al [13]	Poland	193	16.84
Rourke et al [14]	UK	41	6.1
Krammer et al [15]	Austria	169	7.8
Witvrouw et al [3]	Belgium	200	18.5
Ramirez et al [16]	Chile	168	50.89
Joshi et al [8]	India	110	10.45

From the above table we can deduce that the percentage of absence of peroneus tertius coincides with that of Jadhav et al [12], Domagala et al [13], Witvrouw et al [3], and Joshi et al [7]. Whereas the study in Chile by Ramirez et al [16] shows absence of peroneus tertius in 50.89 % of population, this difference may be due to racial differences of the population studied.

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Conclusion

In the present study, it was found that the peroneus tertius might be absent in human population.

Anthropologically, the peroneus tertius muscle has been found to be evolutionary in nature with its role in bipedal walking. Some clinical aspects like those stress component exerted on the fifth toe would certainly be altered in cases where it is absent.

Absence of this muscle is a rare incidence in human beings, and this may be considered an advantage because of decreased risk of Jones fracture. The absence of Peroneus tertius is an interesting finding, which could be important for academicians, anthropologists, surgeons and orthopedic surgeons.

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