

Original Research Article

## Morphological Study of the Plantaris Muscle

Sandeep Mohite<sup>1\*</sup>, Hemalata Mohite<sup>2\*</sup>, Raghunath More<sup>3\*\*</sup>

<sup>1</sup>Associate Professor, <sup>2</sup>Tutor, <sup>3</sup>Assistant Professor,

\*Dept. of Anatomy, Krishna Institute of Medical Sciences Deemed University, Karad, Maharashtra.

\*\*Department of Anatomy, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh.

Corresponding Author: Raghunath More

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### ABSTRACT

**Introduction:** The plantaris muscle has been given little attention in the reviewed literature. It is most commonly mentioned only when absent from a specimen. Aim of the study was to document the normal anatomy and its variations. Because of the less information concerning the plantaris muscle, the anatomical and functional understanding of this muscle is limited.

**Materials and Methods:** Cadaveric specimens (n=40, 20 right and 20 left) were dissected with the ethical approval of the institutional ethical committee. Length of belly, Length of tendon, the sites of proximal and distal attachments were observed. Any variations in the muscle, its attachment, or relationship to surrounding tissues were noted and photographed using a digital camera.

**Results:** In total 9 cases (22.5%) plantaris fibers have common origin with lateral head of gastrocnemius, length of belly was 8.91.cm and that of the tendon was 35.14 cm. The muscle belly tendon ratio was 1:4. Muscle is attached to lateral supracondylar line but in 9 cases (22.5%) it was seen common with lateral head of gastrocnemius. Flabella were present in 5 cases.

**Conclusion:** The knowledge of the morphology of plantaris and its variations is useful for surgeons in reconstruction of hand tendons and lateral ankle ligament as it is used as graft material.

**Key words:** plantaris, lateral head of gastrocnemius, fabella.

### INTRODUCTION

Plantaris lies in the posterior superficial compartment of leg together with soleus and gastrocnemius. [1] The muscle has short fusiform belly and long slender tendon which was previously mistaken as the nerve so called as freshman's nerve. [2] It was considered as a vestigial muscle in humans but now a day it is helping to maintain the stability of knee joint. [2] The plantaris muscle contributes plantar flexion of the ankle and flexion at knee joint. It might be absent in 7-10 % cases. As this muscle tendon is used as a graft material, the knowledge of morphology of plantaris and its variations are useful for surgeons in reconstruction of hand tendons, lateral ankle

ligament and for repairs of atrio-ventricular valves.

### MATERIALS AND METHODS

For the present study 40 lower extremities (20 rights and 20 left) from the adult cadavers were dissected in the Department of Anatomy Krishna Institute Of Medical Sciences Deemed University, Karad, and Maharashtra, India. Sex and occupation of each specimen was noted. But no notable correlations could be found and hence will not be discussed. The posterior aspect of the knee was dissected using standard surgical equipment and dissection techniques. The plantaris muscle was isolated and carefully traced to the proximal

attachment, preserving any connections with surrounding tissue. Any variations in the muscle, its attachment, or relationship to surrounding tissues were noted and photographed using a digital camera. Important measurements were taken using standard measuring tape- Length of belly, Length of tendon, the sites of proximal and distal attachments were observed.

## RESULTS AND DISCUSSION

The plantaris muscle was observed for the variations of proximal attachment, most commonly the muscle is attached to lateral supracondylar line but in total 9 cases (22.5%) plantaris fibers have common origin with lateral head of gastrocnemius. The muscle was also observed for its distal attachment. According to Gray's Anatomy it is attached to the medial margin of middle 1/3 of posterior surface of calcaneus. In the present study similar findings were observed. In the present study length of belly was 8.91cm and that of the tendon was 35.14 cm. The muscle belly tendon ratio was 1:4. Fabella was present in 5 cases. The plantaris muscle was known to exhibit variations. It may be absent or double. In 5 cases (12.5%) the muscle was absent. In Freeman AJ [3] study muscle was absent in 13% cases. The absence of the plantaris muscle may cause weakness in initial flexion of the knee and an increased laxity of the knee during medial and lateral rotation, subsequently increasing the risk of injury to the primary stabilizing ligaments of the knee. [4] Traditionally described plantaris muscles are described with a small, almost circular, attachment site superior to the lateral femoral condyle. Present study the muscle was attached to lower 2/3 of lateral supra condylar line in 80 % of cases and in 87 % cases the fibers are attached to oblique popliteal ligament and capsule of knee joint which suggest the increased influence of the muscle over knee function. 22.5 % of cases the muscle interdigitated with lateral head of gastrocnemius which is co-relating with the study of Freeman AJ. He found it in 19.6 % of cases, it suggest an

increased interaction between these two muscles and possible shearing of functional control over posterolateral aspect of the joint. [3] According to Aragoa JA [5] the mean length of the plantaris was 43.25 cm mean length of the belly is 11.38 cm and that of tendon is 33.26 cm. While in present study the length of muscle is 44.05 cm, the mean length of belly is 8.91 cm and that of tendon is 35.14 cm.

Table No. 1: Showing parameters and measured values of plantaris muscle

Parameters	Measured Values
Mean length of belly	= 8.91 cm
Mean length of tendon	= 35.14 cm
Mean total length of muscle	= 44.05 cm
Belly : muscle ratio	= 1:5
Tendon : muscle ratio	= 4:5
Belly : tendon ratio	= 1:4

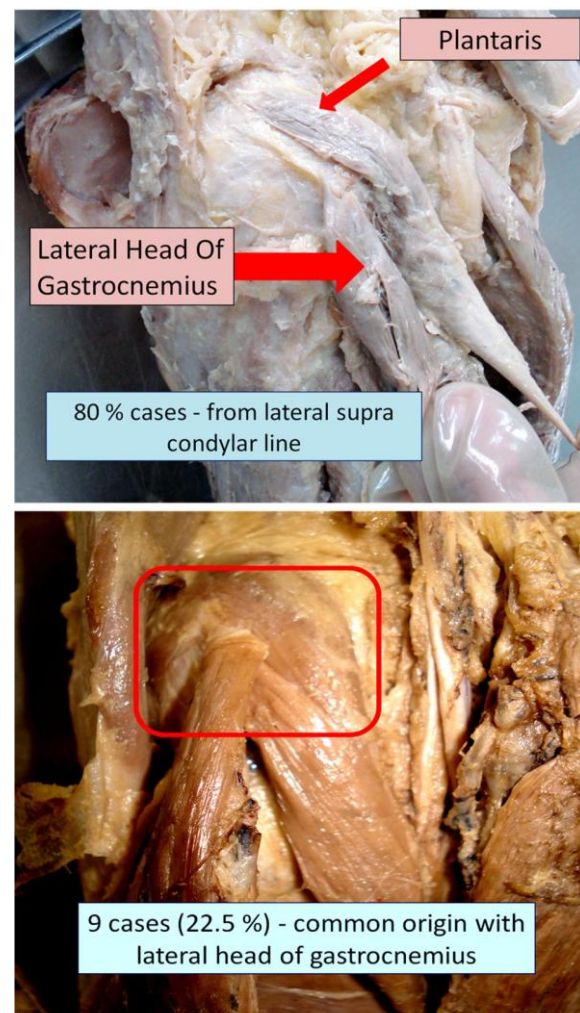


Fig. 1: Showing origin of the fibers of the plantaris muscles

## CONCLUSION

The plantaris muscle exhibit wide variations and has a short fusiform belly and

long tendon. The knowledge of the morphology of plantaris and its variations is useful for surgeons in reconstruction of hand tendons and lateral ankle ligament as it is used as graft material. It may have a more important role in knee dynamics than previously thought and thus a greater role in knee injuries.

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