

# Clinical Assessment of Agenesis of Palmaris Longus and Flexor Digitorum Superficialis in Indian Population

Tejaswi H. L.<sup>1\*</sup>, Shilpashree Y. D.<sup>2</sup>

<sup>1</sup>Assistant, Department of Anatomy, Adichunchanagiri Institute of Medical Sciences, BG Nagar, Nagamangala, Karnataka-571448, INDIA.

<sup>2</sup>Post Graduate, Department of Biochemistry, JSS Medical College, Mysore, Karnataka-570015, INDIA.

\*Corresponding Address:

[drtejaswihl@gmail.com](mailto:drtejaswihl@gmail.com)

## Research Article

**Abstract:** Palmaris longus (PL) is a slender, long and fusiform muscle of the forearm and suggested to be a phylogenetically degenerate muscle with weak action. Prevalence of agenesis of PL varies between 6-25%. Flexor digitorum superficialis (FDS) is the largest superficial flexor muscle of the forearm. Variations exist in the tendon of FDS to the little finger and this may influence clinical examination in injuries of the hand. The study was conducted in Adichunchanagiri Institute of Medical Sciences. In total 266 medical students (143 females and 123 males) aged between 17-20 years were evaluated in this cross sectional study. The overall prevalence of absence of PL was 27.44% (table 1). Unilateral absence was noted in 16.19 % and was more predominant than bilateral absence which was noted in 10.52% of the individuals. None of the subjects showed agenesis of FDS to the little finger. However in 14 (5.2 %) function FDS tendon to little finger was dependent on FDS to the ring finger. Even though prevalence of agenesis of PL in Indian population is quite high agenesis of FDS to little finger is a rare phenomenon.

**Keywords:** Agenesis, Forearm muscles, Variations, Hand surgeries.

## Introduction

Palmaris longus (PL) is a slender, long and fusiform muscle of the forearm which lies medial to the flexor carpi radialis. Palmaris longus is often absent on one or both sides. PL is suggested to be a phylogenetically degenerate muscle with weak action. It is a metacarpophalangeal joint flexor. Clinically the presence of PL can be tested by flexing the wrist against resistance; the taut tendon of palmaris longus will be visible in the midline of the flexor wrist crease as the tendon passes superficial to the flexor retinaculum. When testing palmaris longus, opposing the thumb to the middle fingertip while the wrist is flexed accentuates the contraction of PL [1]. Congenital absence of PL is seldom associated with significant physical or functional limitations as demonstrated by multiple studies. However, PL may add to the strength of thumb abduction, thus providing an advantage in sports and professions that make use of hand grip [2]. Agenesis of PL muscle is affected by various factors like race, genetic, hereditary

and environment. Prevalence of agenesis of PL varies between 6-25% [3]. Owing to the paucity of data regarding the prevalence of PL in Indian population the present study was undertaken. Flexor digitorum superficialis (FDS) is the largest superficial flexor muscle of the forearm and arises by two heads. Humero-ulnar head arises from the medial epicondyle of humerus, ulnar collateral ligament, intermuscular septa and medial side of coronoid process. the radial head arises from the anterior border of the radius extending from the radial tuberosity to the insertion of pronator teres [1]. FDS acts as a flexor of proximal interphalangeal (PIP), metacarpophalangeal and wrist joint. Independent action of FDS to a finger is tested by flexing that finger keeping other three fingers in full extension [1]. Variations exist in the tendon of FDS to the little finger and this may influence clinical examination in injuries of the hand [4] [5]. Hence an attempt was made to assess the prevalence of agenesis of FDS tendon to little finger and to determine correlation between absence of PL and agenesis of FDS.

## Material and Methods

Approval for conducting the study was granted by the institutional ethical board prior to conducting the study. Written informed consent was taken from each participant before conducting the study. In total 266 medical students (143 females and 123 males) aged between 17-20 years were evaluated in this cross sectional study. Participants with history of injury, any surgery or any disease of the upper limbs were excluded from the study. Each subject was asked to fill an information sheet to collect the demographic data such as age and sex. After recording the handedness, the presence or absence of Palmaris longus muscle and flexor digitorum superficialis tendon to the little finger was identified by clinical examination and the findings were recorded. Presence or absence of Palmaris longus muscle was identified by using the

Schaeffer's test, where in the each participant was asked to oppose the thumb to the little finger and then to flex the wrist. Failure to visualize or palpate the prominence produced by the tendon of PL just below the wrist was taken as absent PL. The function of tendon of FDS tendon to the little finger was tested by asking the participant to keep the wrist in full supination and all fingers in extension and then flex little finger. Flexion of only the proximal interphalangeal joint (PIP) was considered as positive for independent function of the tendon of FDS for little finger. In case of flexion of both PIP and distal interphalangeal joint (DIP) of little finger a modified test was used. Here the participant was asked to flex little and ring finger keeping the other fingers extended. Flexion of PIP of little finger with PIP of ring finger was taken as dependent function of FDS tendon to little finger. Failure to flex PIP of little finger even along with the ring finger was taken as absent tendon of FDS to the little finger.

### Observation and Results

The overall prevalence of absence of PL was 27.44% (table 1). Unilateral absence was noted in 16.19 % and was more predominant than bilateral absence which was noted in 10.52% of the individuals. PL was absent in 21.95% of males and 32.16% of females and the difference was statistically significant ( $p < 0.05$ ). Bilateral absence was more common in females (11.88%) compared to males (8.94). Even unilateral absence was more common in females (20.27 %) than males (13%). In male subjects with unilateral absence, prevalence was 8.94 % in right upper limb and 4.06 % in left. In female subjects with unilateral absence, prevalence was 9.7% in right upper limb and 10.48 % in left.

**Table 1:** Frequency of absence of Palmaris Longus

Absence of Palmaris Longus	Right upper limb	Left upper limb	Bilateral	Total
Males (n=123)	11 (8.94%)	05(4.06%)	11(8.94%)	27 (21.95%)
Females (n=143)	14(9.7%)	15 (10.48%)	17(11.88%)	46 (32.16%)
<b>Total</b>	<b>25 (9.39%)</b>	<b>20 (7.51%)</b>	<b>28 (10.52%)</b>	<b>73 (27.44%)</b>

Out of 266 subjects examined only 3(1.1%) were left handed. Out of 73 subjects with absent Palmaris longus only 1 was left handed and the rest were right handed. Out of 266 subjects none of the subjects showed agenesis of FDS to the little finger. However in 14 (5.2 %) function FDS tendon to little finger was dependent on FDS to the ring finger. Prevalence of unilateral dependent function was 2.4% and bilateral dependent function was 2.8%. In males the overall prevalence of the dependent

function was 4.06 % with unilateral dependent function being 1.62% on right side and 2.44% on left side. In females the overall prevalence was 6.29% with unilateral dependent function being 2.1% on right side and 4.19 on left. There was no correlation between absence of PL and absence of FDS tendon to little finger

### Discussion

Numerous studies have been done till date in different geographical regions of the world to elicit the prevalence of absence of PL. In the present study prevalence of PL along with agenesis of FDS to the little finger was determined. Quoted by many authors as dispensable muscle with no active function in the hand movements, PL serves as the sought after choice for tendon grafts and reconstructive procedures in plastic surgery [3] . In the present study the overall prevalence of PL agenesis was 27.44% which is in agreement with studies done by Devishankar et al [6] and Saxena S [7]. The lowest reported prevalence of PL is in North Korea (0.6%), followed by Uganda (1.02%), Africa (1.5%) [8]-[10]. Highest reported prevalence is in Nigeria (30%) [11]. Hence PL agenesis is definitely varies with ethnicity. Since PL forms one of the foremost tendon used in graft surgeries awareness of these variations is very essential to the operating surgeon. Prevalence of agenesis of FDS tendon to little finger is reported to be 15-21% in Caucasian population [12]. However in our study we did not find a single case of agenesis of FDS tendon to the little finger. But in 5.2 % of the study group, function of FDS tendon to little finger was dependent on FDS tendon to the ring finger. There was no concomitant absence of PL and FDS to little finger. Agensis of FDS to little finger has no correlation with agenesis of PL.

### Conclusion

We conclude that the prevalence of agenesis of PL in Indian population is quite high. Since PL is one of the preferred tendon in graft surgery, Plastic surgeons should be well aware of variations of PL and the same should be confirmed by ultrasound examination before planning for surgeries using PL. Compared to agenesis of PL, agenesis FDS to the little finger is a rare phenomenon in Indian population and has no correlation with agenesis of PL.

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