

# The frequency of Palmaris Longus absence among female students in King Faisal University in Al- Ahsa, Saudi Arabia.

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## Abstract

**Background and objective**—Palmaris longus (PL) is one of the forearm muscles that lie between the flexor carpi ulnaris and the flexor carpi radialis muscles. PL action is flexion of the hand at the wrist and making the palmar aponeurosis tense. Plastic surgeons utilize the Palmaris longus in restoration of lip and chin defects. We sought to determine the frequency of the absence of the Palmaris longus in Saudi Arabia among female students in King Faisal University, Al-Ahsa.

**Materials and Methods**—Two hundred normal subjects were chosen randomly from King Faisal University female students. Subjects who had gone through a surgical procedure or have any deformities in the forearm were excluded. We have examined the presence or absence of palmaris longus using three tests. Subjects were asked to do standard test for the assessment of PL tendon. If PL cannot be detected by the standard test, two more tests were performed to confirm the absence.

**Results**—The overall prevalence of absence both unilaterally and bilaterally is 40.5%. Unilateral absence was 20.5%. The bilateral absence was 20%. The distribution on the right and left was 29% and 31.5% respectively.

**Conclusions**—The present study found Palmaris longus to be absent equally bilateral and unilateral in more than one third of the sample and significantly more common in the left side.

**Index Terms**— Palmaris longus, agenesis, forearm, Saudi Arabia.



## Introduction

The palmaris longus (PL) is a slender, spindle shaped weak flexor of the wrist and it is located medial to the flexor carpi radialis (FCR). The number and form of PL muscle is extremely variable [1]. The PL muscle may be absent, double, split, tendinous, digastric and may have various insertions. It may be inserted on the flexor retinaculum, the fascia of the forearm, the fascia and the muscles of the hypothenar, the short abductor of the thumb, near the metacarpophalangeal joints, the tendon of the flexor carpi ulnaris muscle, the pisiform bone or the scaphoid bone[2].

The presence of the PL can be determined through noninvasive and standard physical examination of the volar wrist[3].

Considering its dispensability, Surgeons agree that PL is the best choice for tendon grafts in tendon reconstruction, helping the function of paralyzed muscles used for repairing ptosis, treatment of facial paralysis, and urinary incontinence. Plastic surgeons also utilize the PL in lip augmentation and restoration of lip and chin defects. As its absence is immaterial to the function of the wrist, PL has the greatest variation in the human body and its most common variation is agenesis (PLA)[4]. However, this muscle variation can lead to median and/or ulnar nerve compression syndromes in some rare cases[5].

The rate of congenital absence of the PL is estimated to be 15% among individuals worldwide and its incidence is population-dependent ranging from 0.6% (in the Korean population) to 63.9% (in the Turkish population)[6][7].

A lot of studies have been made regarding the frequency of palmaris longus absence in Korea[8], Iran[9], Egypt[10], and East Africa[11] and others. However, the frequency of palmaris longus absence have not been studied yet in Alhasa.

Taking into account the large variability of Palmaris longus presence, the aim of this study is to investigate the frequency of Palmaris longus absence among female students in king Faisal university and to compare the results to the other studies worldwide. The results of our study are going to be useful for the surgeons working in our population.

## Materials and methods

A cross sectional study was designed to investigate the absence of Palmaris longus in both sides in a sample of normal population which was taken from female students

of king Faisal university included 200 students randomly. Their ages range between 18 to 25 years old. We excluded the subjects who have done any surgical procedure in the forearms or have any deformities in the forearms.

We have examined the presence of Palmaris Longus muscle using three tests. The subject was initially asked to do the standard test for the assessment of the PL tendon. If the tendon was not visualized, 2 additional tests were done to confirm the absence. The standard test is Schaeffer's test and the other tests are Thompson's test and Pushpakumar's test.

In Schaeffer's test ( figure 1 ) the subject is asked to oppose the thumb to the little finger and then flex the wrist [12].

Thompson's test ( figure 2 ) involves flexion of the fingers to form a fist followed by flexion of the wrist and finally the thumb is opposed and flexed over the fingers [13].

Pushpakumar's test ( figure 3 ) involves extension of the index and middle finger with flexion of the other fingers and the wrist followed by opposition and flexion of the thumb[14].

The presence or absence of the palmaris longus tendon was recorded for both sides.



Figure 1 [15]  
Schaeffer's test



Figure 2 <sup>[15]</sup>  
 Thompson's test



Figure 3 <sup>[15]</sup>  
 Pushpakumar's test

	Number of cases	percentage
total	200	100%
Overall absence	81	40.5%
Bilateral absence	40	20%
Unilateral absence	41	20.5%
Right side absence	58	29%
Left side absence	63	31.5%

Table 1: The frequency of palmaris longus absence.

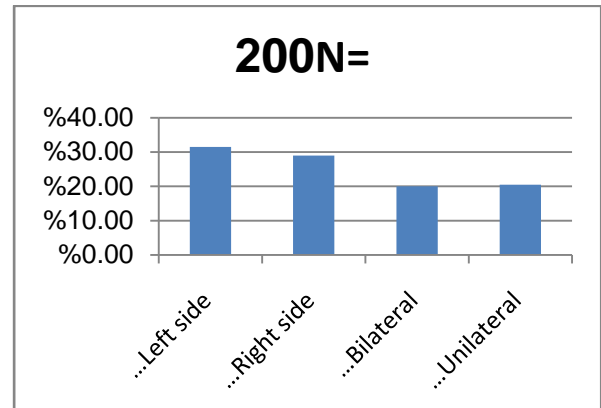


Figure 4 : Absence of Palmaris longus among female students in KFU.

### Statistics

Using the SPSS statistics 17.0, we've worked out the frequency of Palmaris longus absence in the right and left forearms and saw the differences between the two sides. We used the Chi-square test to see if there is a significant difference between them. A value of  $p < 0.05$  was considered to indicate a significant difference between two sides <sup>[16]</sup>.

### Results

We examined 200 female students in King Faisal University in Al-Ahsa. The overall frequency of Palmaris Longus absence, either bilaterally or unilaterally, was found to be 40.5 % (81 subjects). Palmaris Longus was absent unilaterally in 20.5% (41 subjects) and bilaterally in 20% (40 subjects). The overall difference between right and left in term of absence of Palmaris longus was statistically significant ( $P < 0.05$ ). Palmaris longus was absent in 29% (58 subjects) in the right side and in 31.5% (63 subjects) in the left side.

### Discussion

Palmaris longus (PL) is one of the forearm muscles that lie between the flexor carpi ulnaris and the flexor carpi radialis muscles <sup>[17]</sup>. The absence of the PL has been shown to vary based on body side, gender, and ethnicity in prior studies <sup>[18]</sup>. Most studies point out that the absence of PLM is most commonly encountered in women and in left arms<sup>[5]</sup>.

In Our study, it was found that the overall prevalence of Palmaris longus absence among female students of KFU to be 40.5%. This value is comparable to the high prevalence of PL absence in among females in the Andhra population of India (40.2%)<sup>[19]</sup>, Bahraini population (36.8%) <sup>[20]</sup>, and Serbian population (37.5%) <sup>[31]</sup>. On the other hand, the overall absence is found to be very high in relation to the prevalence of PL absence reported in Korean population (4.1%) <sup>[8]</sup> and Yoruba population (6.4%) <sup>[21]</sup>. Higher frequencies was found in Pakistani population ( 47.12%) <sup>[22]</sup> and Egyptian population (50.8%) <sup>[10]</sup>. This reaffirms that the prevalence of absence of the palmarislongus muscle shows a marked variation in different populations.

The high prevalence of Palmaris longus absence in our study coincides with high prevalence reported in middle

east as in Jordanian [23] and Bahraini population [20]. Also, the fact that our sample included only female subjects explains the high prevalence founded in the present study as many studies revealed the same result before [19][10][24].

On average, the prevalence of unilateral absence of Palmaris longus is higher than that of the bilateral absence accounting for 16% and 9%, respectively, of the population all over the world [25]. The present study revealed almost equal frequencies of unilateral (20.5%) and bilateral (20%) absence of PL. Similar results regarding the equality of the unilateral and bilateral absence was found in South Africa giving unilateral absence frequency of 6% and bilateral absence frequency of 5.5% [26]. Some of the studies that reported huge differences between the frequencies of unilateral (43.2%) and bilateral (20.6%) absence is the study in Indian population [25].

Our study found the difference in the prevalence of PL absence between the right and the left side to be significant which is the same result founded in Indian population [27] and Serbian population [3], whereas no significant difference was found in Bahraini population [20] and Korean population [8].

It has been documented that the absence of PLM is hereditary and HOX is the gene responsible for the regulation of its morphological development. Also, it has been proposed that a possible dominant expression of genes is responsible for PLM variations in family members [5]. However, we were not able to demonstrate that in our study since our subjects included college students who were randomly selected.

One of the weaknesses of the present work is that our study included only female subjects and we weren't able to compare the results based on gender. Another weakness is that the presence of Palmaris longus was determined by clinical exams which depend on the examiners to a large extent and is not considered as a definite conclusion. We tried to overcome this weakness by performing three tests to detect the presence of PL.

## Conclusion

In conclusion, this study demonstrates absence of palmarislongus (PL) muscle in more than one-third of the female Saudi population with almost equal bilateral and unilateral absence. Also, PL was absent on left side more than right one. As Palmaris longus is the first choice for tendon grafts and reconstructive surgeries, by the virtue of its structure and function, more researches should be done regarding its anatomy and variations. We suggest that more

studies need to be done regarding the use of palmarislongus muscle on reconstructive and plastic surgeries worldwide and here in Saudi Arabia and to compare the use of palmarislongus versus other muscles and their advantages and disadvantages.

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