

Relation of Palmaris Longus agenesis with hand dominance

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Abstract: The prevalence of right-handedness in the general population is between 85 and 92%. This study was done to determine the relation of the Palmaris longus agenesis and the hand dominance. This study included 732 subjects (362 male and 370 female). They were initially asked to do the standard test (Schaeffer's test) for the assessment of the Palmaris longus tendon. Four tests (Thompson's test, Mishra's tests I and II, Pushpakumar's "two-finger sign" method) were done for confirmation of the absence of the tendon in the subjects. Then the subjects were asked to hand dominance. The data collected were analyzed by chi square test using SPSS software. Right hand dominance was recorded in 663 (91.4%) subjects. In right-handed subjects, the agenesis of Palmaris longus tendon was in 27 (4.1%) on the right side and in 44 (6.6%) cases on the left side. In left-handed subjects, this muscle was absent on the left side in four (6.5%) and on the right side in four (6.5%) cases. Although, bilateral absence of Palmaris longus tendon was more common in right handed subjects (20.2% in right-handed subjects, and 14.4% in left-handed subjects) but there was no significant difference. Our results show that hand dominance wasn't associated to agenesis of Palmaris longus muscle.

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1. Introduction

Dominance of right hand is most common than left hand dominance. About 70-90% of humans are right hand dominance (Holder, 2011). The prevalence of left handed is more common in males than in females. Researchers have shown that the prevalence of left-handedness was 9.4-13% in men and 5.4-11% in women (Milenkovic et al., 2008; Peters et al., 2006).

Palmaris longus muscle is not necessary for usual function of the hand. Thus it is often used in surgery (Sebastin et al., 2005b). Inversely, some researchers reported that the Palmaris longus muscle is essential for strength of thumb abduction and the existence of this muscle increased strength of thumb abduction (Gangata et al., 2010). These results are in difference with the usual idea that the muscle of Palmaris longus is an unnecessary muscle whose is used as grafting.

Results showed that the dominant hand were significantly associated with stronger grip (Wang, 2010). Also, the grip strength of non-dominant left handed subjects is comparatively weaker than the non-dominant right handed subjects (Crosby et al., 1994). But Sebastin et al showed that existence or absence of the Palmaris longus had no effected on the grip potency (Sebastin et al., 2005a).

The prevalence of Palmaris longus muscle agenesis in literature was reported 15% (Gangata et al., 2010). In two study conducted in Iran, the prevalence of PL muscle agenesis was reported as

22.8% (Ashouri et al., 2011) and 21.0% (Kamrani et al., 2005).

In the literature, we did not discover the data, but in studies, the prevalence of Palmaris longus muscle agenesis was related to the hand dominance (Eric et al., 2011). This study was conducted to establish the rate of the Palmaris longus agenesis in relation to the hand dominance.

2. Material and Methods

In present study, 732 subjects (362 male and 370 female) who lived in a southern region of Iran with mean age of 30.12 ± 19.47 years (7-86 years old) were investigated. Subjects who had any deformities, diseases or injury in the upper extremity were excluded from the present study. The presence or absence of PL was determined by series of tendon examination techniques described by Schaeffer's test (standard test) (Schaeffer, 1909), Thompson's fist (Thompson et al., 1921), Mishra's 1st and 2nd test (Mishra, 2001) and Pushpakumar's two finger sign (Pushpakumar et al., 2004). Each subject was initially asked to do the standard test for assessment of the Palmaris longus tendon. If PL tendon was not satisfactorily visualized, other tests (Thompson's, Mishra's and Pushpakumar's tests) were used to prove its absence. To be considered to have an absence of a PL, the person must have a negative test for all 5 tests. If a person had a positive result for any of the 5 tests who was considered to have a PL. A

single examiner checked all subjects. Then subjects were asked to hand dominance.

The data was recorded using SPSS 11.5 statistical software. The prevalence of the PL agenesis was presented with a 95% confidence interval. Data analysis was carried out using chi square test. Statistical significance was set at $P < 0.05$.

3. Results

Seven subjects had not reported their hand dominance. Out of 725 subjects, we found that 663 (91.4%) subjects were right-handed while 62 (8.6%) persons were left-handed. Although women was more right handed than men (92.7% vs. 90.2%; $p > 0.05$) but this difference was no statistical significant.

The overall prevalence of the absence of the PL tendon was $30.7 \pm 3.34\%$ (225 subjects) in our population study. The absence of Palmaris longus tendon in the hand dominance groups is presented in Table 1.

Table 1: Palmaris Longus agenesis in related to hand dominance

Agenesis	Hand Dominance		p value
	Right Number (%)	Left Number (%)	
Total	205 (30.9)	17 (27.4)	0.567
Bilateral	134 (20.2)	9 (14.4)	0.312
Right sided	27 (4.1)	4 (6.5)	0.459
Left sided	44 (6.6)	4 (6.5)	0.887
Unilateral	71 (10.7)	8 (13.0)	0.735

In right-handed subjects, Palmaris longus tendon was absent on the right side in 27 (4.1%) and on the left side in 44 (6.6%) cases; the difference was no statistically significant. Bilateral absence of Palmaris longus tendon was recorded in 134 (20.2%) right-handed subjects. In left-handed subjects, Palmaris longus muscle was absent on the left side in four (6.5%) and on the right side in four (6.5%) cases; the difference was no statistically significant. Bilateral absence of Palmaris longus tendon was found in nine (14.4%) left-handed subjects. Hence, right-sided and left sided absence was not related to hand dominant.

Although, total and bilateral agenesis of Palmaris longus tendon was higher in right handed subjects than in left hand dominance but there was no statistical significant ($p > 0.05$). Adversely, unilateral absence of Palmaris longus tendon was higher in left hand dominance without statistically significant.

The difference in overall absence of the Palmaris longus tendon (unilateral and bilateral) between right-handed and left-handed subjects was 3.5%. Hand dominance difference in the overall absence of the Palmaris longus was not statistically significant ($p = 0.567$).

4. Discussions

There are several documents on agenesis of Palmaris longus tendon in different populations but in these works, the differences between right-hand and left-hand dominant are not mentioned. While, there is a theory that the absence of Palmaris longus muscle is different between right handed and left-handed people.

The presence or absence of Palmaris longus muscle and hand dominance appears to be inherited (Sebastin et al., 2005b). Although, Palmaris longus muscle has slight functional use to the human upper limb, assumes great significance when used as a donor tendon for transfer or transplant (Kleinert et al. 2007).

Some authors distinguished that the power of thumb abduction was greater on the hand include Palmaris longus muscle than the hand not including this muscle (Gangata et al., 2010). These results are in difference with the recent belief that Palmaris longus is a redundant muscle whose uses only as grafting matter. Alternatively, agenesis of this muscle is not related to a decrease of grip or pinch strength (Sebastin et al., 2005a).

In our study, the overall absence of the Palmaris longus was 30.9% that it was higher than two studies performed in Iran (Ashouri et al., 2011; Kamrani et al., 2005).

Bilateral absence was more common in right handed subjects (20.2%) than in left handed person (14.4%), opposite to result of other studies (Eric et al., 2011; Kigera and Mukwaya, 2011). In right-handed subjects, the prevalence of Palmaris longus absence on the right and left side was slightly different (4.1 vs. 6.6%) that similar to finding of Eric et al (Eric et al., 2011) and Kigera et al (Kigera and Mukwaya, 2011). In left-handed persons showed similar prevalence of the right and left-sided Palmaris longus absence (6.5% on each of left-sided and right-sided), whereas Eric et al reported that right sided Palmaris longus absence significantly more common than left sided absence (Eric et al., 2011). But in a study conducted by Kigera et al, the Palmaris longus muscle wasn't absent on right side of left handed subjects (Kigera and Mukwaya, 2011). Similar to other results (Eric et al., 2011), right-sided absence of the Palmaris longus was more common in left-handed persons (6.5% left-handed vs. 4.1% right-handed) that it was opposite to result of Kigera et al (Kigera

and Mukwaya, 2011). Left-sided absence of the Palmaris longus was similar in two groups (6.5% left-handed vs. 6.6% right-handed) that it was to converse of the other results (Eric et al., 2011; Kigera and Mukwaya, 2011).

Similar to other studies in Serbia (Eric et al., 2011), America (Holder, 2011), Turkey (Hiz et al., 2011), Northern Ireland (Thompson et al., 2001), China (Sebastin and Lim, 2006), and Africa (Kigera and Mukwaya, 2011), the most people were right handed. Also, other researchers reported that the hand dominant was no related to gender (Kigera and Mukwaya, 2011) that it was similar to our result.

Present clinical study may have some limitations. The presence of PL muscle was determined by physical examination that may lead to misinterpretation of an existing muscle as absent. These variations can correctly validate using ultrasonography or MRI, but it is neither cost effective nor time saving (Kose et al., 2009).

The results of our study show a relatively high incidence of tendon absence in general population. The prevalence of muscle agenesis was similar in right handed and left handed subjects.

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References

- Holder MK. 2011. Why are more people right handed? URL: <http://www.scientificamerican.com/article.cfm>. [Accessed April 20, 2011].
- Milenkovic S, Rock D, Dragovic M, Janca A. 2008. Season of birth and handedness in Serbian high school students. *Ann Gen Psychiatry* 7:2.
- Sebastin SJ, Puhaindran ME, Lim AY, Lim II, Bee WH. 2005b. The prevalence of absence of the palmaris longus--a study in a Chinese population and a review of the literature. *J Hand Surg Br.* 30:525-527.
- Gangata H, Ndou R, Louw G. 2010. The contribution of the palmaris longus muscle to the strength of thumb abduction. *Clin Anat.* 23:431-436.
- Wang CY. 2010. Hand dominance and grip strength of older Asian adults. *Percept Mot Skills* 110:897-900.
- Crosby CA, Wehbe MA, Mawr B. 1994. Hand strength: normative values. *J Hand Surg Am* 19:665-670.
- Sebastin SJ, Lim AY, Bee WH, Wong TC, Methil BV. 2005a. Does the absence of the palmaris longus affect grip and pinch strength? *J Hand Surg Br.* 30:406-408.
- Ashouri K, Abdollahzade-Lahiji F, Esmailijah AA, Hoseini-Khameneh SM, Madadi F, Bagheri F, Rahimi M, Zandi R, Safdari F. 2011. Palmaris Longus Agenesis. *Iran J Orthop Surg* 9:18-21.
- Kamrani RS, Abasszadeh MR, Jafari SM. 2005. Variations Palmaris Longus and Superficial Flexor of the Fifth Finger. *Iran J Orthop Surg* 11:21-24.
- Eric M, Koprivic I, Vucinic N, Radic R, Krivokuca D, Leksan I, Selthofer R. 2011. Prevalence of the palmaris longus in relation to the hand dominance. *Surg Radiol Anat.* 33:481-484.
- Schaeffer JP. 1909. On the variations of the palmaris longus muscle. *Anat Rec* 3:275-278.
- Thompson JW, McBatts J, Danforth CH. 1921. Hereditary and racial variations in the musculus palmaris longus. *Am J Phys Anthropol* 4:205-218.
- Mishra S. 2001. Alternative tests in demonstrating the presence of palmaris longus. *Indian J Plast Surg* 34:12.
- Pushpakumar SB, Hanson RP, Carroll S. 2004. The 'two finger' sign: Clinical examination of palmaris longus (PL) tendon. *Br J Plast Surg* 57:184-185.
- Kleinert HE, Pulvertaft RG, Smith DJ. Flexor tendon grafting in the hand In: Jupiter JB (ed) Flynn's hand surgery, Williams & Wilkins, Baltimore:283-299.
- Kigera JW, Mukwaya S. 2011. Frequency of agenesis Palmaris longus through clinical examination--an East African study. *PLoS One.* 6:e28997.
- Hiz O, Ediz L, Ceylan MF, Gezici E, Gülcü E, Erden M. 2011. Prevalence of the absence of palmaris longus muscle assessed by a new examination test (Hiz-Ediz Test) in the population residing in the area of Van, Turkey. *J Clin Exp Invest* 2:254-259.
- Thompson NW, Mockford BJ, Cran GW. 2001. Absence of the palmaris longus muscle: a population study. *Ulster Med J.* 70:22-24.
- Sebastin SJ, Lim AY. 2006. Clinical assessment of absence of the palmaris longus and its association with other anatomical anomalies-- a Chinese population study. *Ann Acad Med Singapore.* 35:249-253.
- Kose O, Adanir O, Cirpar M, Kurklu M, Komurcu M. 2009. The prevalence of absence of the palmaris longus: a study in Turkish population. *Arch Orthop Trauma Surg.* 129:609-611.