"The Prevalence of Absence of The Palmaris Longus Muscle Tendon: A Study On First Year MBBS Students"

Dr. Manjula Singh¹, Dr. Pravallika K², Hari Narayan Yadav³

¹HOD, Department of anatomy, Government Medical College, Kannauj ^{2,3}Demonstrator, Department of anatomy, Government Medical College, Kannauj ¹Corresponding Author: Dr Manjula Singh. Mobile No.-+917379359973,

ABSTRACT:-

Introduction: Palmaris longus muscle (PL) is one of the most superficial flexor muscle of the forearm. It is a slender and fusiform in shape which lies medial to flexor carpi radialis muscle.

Material and method: One hundred first-year MBBS students (50 males, 50 females) aged between 18 to 25 years was included after their consent and examined for the prevalence of absence of the PL muscle tendon. Each subject was initially asked to do the Schaeffer's test if not visible then simultaneously followed by Thompson's test, Mishra's test and Pushpakumar's "two-finger sign" for the assessment of the PL tendon. It was palpated and seen at inspection.

Results: The overall prevalence of absence of PL muscle was 37%. Out of 50 males, PL muscle was absent unilaterally in 8% (4 subjects) and bilaterally in 18% (9 subjects). Therefore, the overall prevalence of absence of PL muscle in males was 26%. Out of 50 females, PL muscle was absent unilaterally in 12% (6 subjects) whereas bilaterally in 36% (18 subjects). The overall prevalence of absence of PL muscle in females was 48% (24 subjects).There was no significant difference between the unilateral and bilateral tendon agenesis and gender by above-mentioned tests (p>0.05).

Conclusion: PL muscle is very useful in plastic and orthopaedic surgeries. The unilateral prevalence of absence of PL muscle in females was comparatively higher than males. However, the bilateral prevalence of absence in females was comparatively double than in males.

KEYWORDS:- Palmaris longus, forearm, Kannauj, the prevalence of absence.

I. INTRODUCTION

The Palmaris longus muscle (PL) is the superficial muscle of the flexor compartment of the forearm. It is one of the most variable muscle in both number and form. It originates from the medial epicondyle of the humerus & inserted on the flexor retinaculum & palmar aponeurosis and innervated by the median nerve. The action of this muscle is to help the flexor of the wrist. There is little functional use of this muscle to the human. In tendon grafting; it assumes great importance when used as a donor's tendon. It is reported that the congenital absence of the PL muscle occurs in 15% among the individuals [1&2]. Its absence appears to be hereditary but genetic transmission is not clear [3].

The Palmaris muscle tendon is usually about 10-12 cm long & 4-4.5 mm width [4]. Ebrahim Nasir et. al. reported the overall prevalence of right, left, the bilateral & total absence of the Palmaris longus were 4.1%, 5.2%, 3.9% and 13.2% respectively[28]. Abdolahzadeh Lahiji F et al reported the prevalence of the PL agenesis was estimated to be 22.8%; 10.2% agenesis on the right side, 5.9% on the left side and 6.7% bilateral Palmaris longus agenesis were left handed [24].In another study, the prevalence of absence of the PL muscle 30.7% in the south of Iran[27]. Ashouri K et. al. reported the prevalence of PL Muscle agenesis in Tehran as 22.8% in medical students[21].Ceyhan O, Mavt A et al. reported that in girl, unilateral PL muscle agenesis was found to be 23%. Bilateral PL muscle agenesis was 45.3% where as in boys, unilateral & bilateral PL muscle agenesis was found to be 19.5% and 42% respectively. The overall highest percentage of agenesis in the total number of individual was 63.9% [10].The aim of this study was to determine the prevalence of unilateral and bilateral absence of palmaris longus for the subjects in the medical students, Kannauj, India.

II. MATERIALS AND METHODS

This study was conducted in the Department of Anatomy, Government Medical College, Kannauj (India). The subjects for the study consists of 100 medical students (50 males & 50 females) belonging into aged group from 18 to 25 years after taking their consent. These students have come from different places. For examining the Palmaris longus muscle tendon, some standard clinical methods were used. After explaining the procedure to the students, they were asked to lay their thumb against their little finger and at the same time flex

their wrist assessed by the Schaeffer's test[5] (fig I. A). I n this test, the Palmaris longus tendon in the front of the wrist will be raised under the skin (fig. I). It was palpated and seen at inspection. The Individuals with a history of injury, operation, disease, or abnormality of the upper limb, which would preclude the examination for the presence of PL muscle tendon, were excluded from the study. If the tendon of PL muscle was not palpable or visualized then, there are four more tests were done to confirm the absence. The following tests were used;

- Thompson's test (figI.B), the subjects were asked to make a fist, then flex the wrist and finally the thumb is opposed and flexed over the fingers [6].
- Mishra's test I (figI.C): the metacarpophalangeal joints of all fingers are passively hyperextended by the examiner and the subjects were asked to actively flex the wrist[7].
- Mishra's test II: the subjects were asked to abduct the thumb against resistance with the wrist in slight palmar flexion [7].
- Pushpakumar's "two-finger sign" (fig.D) method: the subjects were asked to fully extend the index finger and middle fingers, the wrist and other fingers are flexed, and finally the thumb is fully opposed and flexed [8].

The Statistical Package for the Social Sciences (SPSS) analyses were carried out for all data analyses. The outcome variables were expressed as the absolute number (percentage). The categorical variables were compared using the chi-squared test. Statistical significance p < 0.05 was considered as statistically significant.



A. Schaeffer's test B. Thompson's test C. Mishra's test I D. Pushpakumar's test

III. RESULTS

In the present study, we observed that the overall prevalence of absence of PL muscle was 37% (table 1) & presence in 63% in both sexes which is statistically significant. Out of 50 males, PL muscle was absent unilaterally in 8% (4 subjects) (table 3); the distribution on the right was 2% (1 subject) fig.II (b) and on the left side was 6% (3 subjects) fig.II (a) whereas bilaterally in 18% (9 subjects) (table 2) fig.II (c). The overall prevalence of absence of PL muscle in males was 26% (13 subjects) (table 1).

Out of 50 females, PL muscle was absent unilaterally in 12% (6 subjects) (table 3); the distribution on the right & left was 4% (2 subjects) (fig.II (b) and 8% (4 subjects) fig.II (a) respectively whereas bilaterally in 36% (18 subjects) (table 2) fig.II (c). The overall prevalence of absence in females was 48% (24 subjects) (table 1). We concluded that the unilateral prevalence of absence in females was comparatively higher than males. However, the bilateral prevalence of absence in females was comparatively higher than males. Bilateral agenesis of the PL muscle was more common in 27% (27 subjects) than unilateral agenesis of (10%) 10 subjects.

Table 1. The distribution of absence of Palmaris longus muscle in both sexes.					
Number of subjects assessed	Overall absence of Palmaris longus	Overall presence of Palmaris longus	Chi square Value	p-Value	
Male (50)	13 (26%)	37 (74%)	5.1909	0.022705	
Female (50)	24 (48%)	26 (52%)			

Table 1. The distribution of absence of Palmaris longus muscle in both sexes.

Table2. The distribution of bilateral presence or absence of Palmaris longus muscle in males & females

Palmaris longus muscle	Male (%)	Female (%)	Total (%)	Chi square	p-Value
tendon				Value	
Bilateral absence	9 (18%)	18 (36%)	27 (27%)	5.3968	0.144941
Left sided absence	3 (6%)	4 (8%)	7 (7%)		
Right sided absence	1 (2%)	2 (4%)	3 (3%)		
Bilateral presence	37 (74%)	26 (52%)	63 (63%)		
Total	50 (100%)	50 (100%)	100 (100%)		

Table3. The distribution of unilateral absence of Palmaris longus muscle in males & females.

Palmaris longus muscle tendon	Male (%)	Female (%)	Total (%)	Chi square value	p-Value
Unilateral absence	4 (8%)	6 (12%)	10 (10%)	0.4444	0.504985

Fig. II: Showing the unilateral and bilateral agenesis of palmaris longus muscle tendon.



Fig. II (a): Left agenesis of PL Fig. II (b): Right agenesis of PL Fig. II (c): Bilateral agenesis of PL

IV. DISCUSSION

The Palmaris longus muscle is one of the most variable muscles in the body. Its little functional use to the human upper limb assumes great importance when used as a donor tendon for transplant.

Various studies have shown (table 4) that absence of the palmaris longus muscle in living and deceased people, and the occurrence percentage was variable in different populations and races. In the current research, absence of the PL muscle, both unilaterally and bilaterally, in the North Indian population in the GMC, Kannauj has been studied. In addition, the prevalence of absence of the muscle was compared between the two genders. In this study, the overall prevalence of absence of the PL muscle was 37% which was lower than one studies performed by Ceyhan O et al. [10] i.e. 63.9%. Compared to other studies, the prevalence of PL absence in Serbia 22.4% in this studies [19], America (25.0%), [6], Turkey (26.6%), [15], India (17.2% to 28.0% in three studies in Indian population [7, 17, 22] and Bahrain (36.4%), [18] was lower than our result. Other studies showed a lower value such as 4.1% in Korea [23], 6% in Chinese subjects [11], 7.1% in Native American subjects [2], 11.3% in Malaysia [13] and 11.5% in a South African population [26]. In the present study, we

found that the overall prevalence of absence of PL muscle was 37% subjects which are similar to the study done by Sater MS et al [27] & Eric M et al. [28]. Therefore, it can be said that the study of one population cannot be considered for another population, and absence of the PL muscle is dependent on race [11].

The current knowledge is that PL muscle absence is more common in female and on the left side. The previous studies concluded that PL absence is more common in females [15, 18, 20 and 22] which are similar with present study and only a few studies concluded that PL absence is more common in males [9]. According to the side of the body where PL muscle absence is more frequent, there have been six studies that examined this connection. PL muscle agenesis was more frequent on the left hand in five studies [2, 10, 19, 22 and 24] which is similar with present study and on the right hand in one study [9]. In contrast with these results, these studies concluded that statistically there was no statistical difference between the two sides of the body. The PL muscle absence may appear on one side or on both sides of the body. There have been eight studies that examined the laterality in the PL muscle absence. Bilateral agenesis of the PL muscle was more common in five studies [10, 18, 22, 23 and 25] and unilateral agenesis was more common in nine studies [20, 13, 16, 28, 29, 24, 25, 26 and 19], with no statistical difference.

 Table 4: Summary of the percentage of the PL Muscle agenesis in each study [9-30].

Authors/year	Overall agenesis of PL (%)	In population
Thompson NW et al.1921[9]	25	American
Ceyhan O et al. 1997[10]	63.9	Turkish
Sebastin SJ et al. 2005[11]	4.6	Chinese
Kamrani RS et al.2005[12]	21	Iranian
Roohi SA et al. 2007[13]	9.3	Malaysian
Mbaka GO et al. 2009[14]	6.6	Yoruba
O. Kose et al.2009[15]	26.6	Turkean
Enye LA et al.2010[16]	12.6	Lagos
Agarwal Pawan;2010 [17]	20.2	Indian
MS Sater et al.2010[18]	36.8	Baharain
Eric M et al.2010[19]	37.5	Serbian
Kigera JWM et al. 2011[20]	4.4	East African
Ashouri K et al.2011[21]	22.8	Iranian
Sankar KD et al.2011[22]	28	Indian
Kyung DS et al. 2012[23]	4.1	South Korean
Abdolahzadeh Lahiji F et al 2013[24]	22.8	Iranian
Berhe T et al.2014 [25]	15.3	Ethiopian
Venter G et al.2014[26]	26.49	South African
Karimi-Jashni H et al.2014[27]	30.7	southern of Iran
Ebrahim Nasiri et al. 2016[28]	13.2	North of Iran
Reddy P. Raji et al.2016 [29]	18.5	Urban
Nikola Vučinić et al.2016[30]	52.3	Serbian
In present study[2018]	37	North Indian

V. CONCLUSION

The present study concluded that the unilateral prevalence of absence of PL muscle in females was comparatively higher than males. However, the bilateral prevalence of absence of PL muscle in females was comparatively double than in males. It is very useful and important for the surgeon, plastic surgeon, ophthalmologist as well as the otolaryngologist.

ACKNOWLEDGEMENT

I am thankful to the Principal of Government Medical College, Kannauj (India) for the permission to perform this original research work at this institute as well as to the students who were participated in this study.

REFERENCES

- [1]. Williams PL, Banni ster LH, Berry MM, et al. Gray's Anatomy. 38th Edition. Elsevier: Churchill Livingstone, 2005:876–877.
- [2]. Kapoor SK, Tiwari A, Kumar A, Bhatia R, Tantuway V, Kapoor S. Clinical relevance of palmaris longus agenesis: common anatomical aberration. *Anat Sci Int.* 2008; 83(1):45–48.
- [3]. Wehbé MA. Tendon graft donor sites. J Hand Surg Am. 1992;17:1130-2. [PubMed]
- [4]. Masaaki MI, Mitsuhiro A, Masahiko YK, Seiichi I, Katsuji K, Shingenori T. Length and width of the tendinous portion of the palmaris longus: A cadaver study of adult Japanese. *J Hand Surg* 2001; 26:706–709.
- [5]. Schaeffer JP. On the variations of the palmaris longus muscle. Anat Rec 1909;3:275-8.
- [6]. Thompson NW, Mockford BJ, Cran GW. Absence of the palmaris longus muscle: a population study. *The Ulster Med J*; 2001; 70(1): 22 24.
- [7]. Mishra S. Alternative tests in demonstrating the presence of Palmaris longus. *Indian J Plast Surg* 2001; 34: 12-14.
- [8]. Pushpakumar SB, Hanson RP, Carroll S. The 'two finger' sign. Clinical examination of palmaris longus (PL)tendon. *Br J Plast Surg* 2004; 57: 184-185.
- [9]. Thompson JW, McBatts J, Danforth CH. Hereditary and racial variations in the musculus palmaris longus. *Am JPhys Anthrop* 1921; 4: 205-220.
- [10]. Ceyhan O, Mavt A. Distribution of agenesis of the palmaris longus muscle in 12 to 18- year- old age groups. *Indian J Med Sci.* 1997; 51(5): 156 160.
- [11]. Sebastin SJ, Puhaindran ME, Lim AYT, Lim IJ, Bee WH. The prevalence of absence of the palmaris longus A study in a Chinese population and a review of the literature. *J Hand Surg Br.* 2005; 30(5): 525 527.
- [12]. Kamrani RS, Abasszadeh MR, Jafari SM. Variations palmaris longus and superficial flexor of the fifth finger. *Iran J Orthop Surg.* 2005; 11:21–24.
- [13]. Roohi SA, Choon-Sian L, Shalimar A, Tan GH, Naicker AS, Rehab M. A study on the absence of palmaris longus in a multiracial population. *Malaysian Orthopaedic Journal*. 2007; 1(1):26-28.
- [14]. Mbaka GO, Ejiwunmi AB. Prevalence of palmaris longus absence: A study in the Yoruba population. *Ulster Med J.* 2009; 78:90–93.
- [15]. O. Kose, O. Adanir, M. Cirpar, M. Kurklu, and M. Komurcu. "The prevalence of absence of the palmaris longus: a study in Turkish population," *Archives of Orthopaedic and Trauma Surgery*; 2009; 129(5): 609–611.
- [16]. Enye LA, Saalu LC, Osinubi AA. The prevalence of agenesis of Palmaris longus muscle amongst students in two Lagos-Based Medical schools. *Int J Morphol.* 2010; 28(3):849-854.
- [17]. <u>Agarwal</u> P. Absence of the palmaris longus tendon in Indian population; *Indian J Orthop*. 2010 Apr-Jun; 44(2): 212–215.
- [18]. Sater MS, Dharap AS, Abu-Hijleh MF. The prevalence of absence of the palmaris longus muscle in the Bahraini population. *Clin Anat.* 2010;**23**(8):956–961.
- [19]. Eric M, Krivokuca D, Savovic S, L eksan I, Vucinic N. Prevalence of the palmaris longus through clinical evaluation. *Surg Radiol Anat.*; 2010; 32(4): 357 361.
- [20]. Kigera JWM, Mukwaya S. Frequency of Agenesis Palmaris Longus through Clinical Examination An East African Study; *plos one;* December 2011: 6(12).
- [21]. Ashouri K, Abdollahzade-Lahiji F, Esmailijah AA, Hoseini- Khameneh SM, Madadi F. Palmaris longus agenesis. *Iran J Orthop Surg.* 2011; 9:18–21.
- [22]. Sankar KD, Bhanu PS, John SP. Incidence of agenesis of palmaris longus in the Andhra population of India. *Indian J Plast Surg.* 2011; 44(1):134–138.
- [23]. Kyung DS, Lee JH, Choi IJ, Kim DK. Different frequency of the absence of the palmaris longus according to assessment methods in a Korean population. *Anat Cell Biol*; 2012; 45(1):53-56.
- [24]. Abdolahzadeh Lahiji F, Ashoori K, Dahmardehei M. Prevalence of palmaris longus agenesis in a hospital in Iran. Arch Iran Med. 2013; 16(3):187-188.
- [25]. Berhe T, Bekele A .Agenesis of Palmaris Longus Muscle among Selected Ethiopian Students. *Anat Physiol*; 2014; 4(2): 136.
- [26]. Venter G, Van Schoor AN, Bosman MC. Degenerative trends of the palmaris longus muscle in a South African population; *Clin Anat*;2014 Mar; 27(2):222
- [27]. Karimi-Jashni H, Rahmanian K, Sotoodeh-Jahromi A. Agenesis of palmaris longus in southern of Iran: A population based study. *Online J Biolog Scie*. 2014; 14:8–11.
- [28]. Ebrahim Nasiri, Mohsen Pourghasem, and Hassan Moladoust. The Prevalence of Absence of the Palmaris Longus Muscle Tendon in the North of Iran: A Comparative Study. *Iran Red Crescent Med J.* 2016 March; 18(3).

- [29]. Reddy P. Raji. Prevalence of Palmaris Longus Agenesis in a Semi Urban Population: A Study In a Tertiary Care Hospital; *Int J Anat Res 2016, Vol 4(3):2513-17.*
- [30]. Nikola Vučinić, Mirela Erić, Mirjana Savić. How often absence of palmaris longus and functional deficiency of flexor digitorum superficialis occurs? *Acta Orthop. Belg.*, 2016, 82(1):413-419.

¹Corresponding Author: Manjula Singh. Mobile No.-+917379359973 ¹HOD, Department of anatomy, Government Medical College, Kannauj