

Short Communication: The Prevalence and Patterns of Palmaris Longus Muscle Absence in an Iranian Population



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ABSTRACT

Palmaris Longus (PL) is a muscle of the forearm, i.e., not functionally necessary and does not exist in all people. It is a choice for tendon graft and investigating its prevalence is of clinical importance. During April-October 2009, 102 cadavers (78 males, 24 females) were bilaterally necropsied for PL exploration in Zanjan City, Iran. PL Absence (PLA) was observed in 37 (36.3%) cases (28 males, 9 females). PLA prevalence was similar in men (36%) and women (37.5%). Of PLA cases, 19 (51%) were unilateral (14 males, 5 females), and 18 (49%) were bilateral (14 males, 4 females). In conclusion, PLA prevalence of 36.3% in our population was similar to other studies conducted in Iran. We found no gender difference in PLA prevalence and its patterns. Due to geographical variability in PLA rate, future regional and national studies with more magnificent sample sizes are recommended to determine the prevalence and gender-specific patterns of PLA.

1. Introduction

Palmaris Longus (PL) is a superficial muscle of the forearm, i.e., mainly tendinous and just a small portion of its length is composed of abdomen [1]. Its primary role is the augmentation of palmar fascia and serves as an accessory flexor of the wrist and abductor of the thumb [2]. The presence of this muscle is not necessary for hand function; it is naturally absent in some people [2]. Due to the easy surgical accessibility of PL, its anatomical characteristics, and negligible functional role, this muscle's tendon is used as a graft for various plastic and reconstructive surgeries [1]. Thus, Determining the prevalence of PL Absence (PLA) is of

clinical significance, especially for surgeons who transplant the tendon of this muscle [3].

Referral textbooks report the rate of 15% for PLA in general populations [1]; however, a meta-analysis of relevant studies from different ethnicities calculated a general rate of 25% in this regard [4]. In this meta-analysis, the overall rate of PLA for different ethnicities was calculated as follow: 41.7% for Middle Eastern Arabs, 34.13% for Turks, 26.3% for Caucasians, 19.79% for South and Southeast Asians (including Iranians), 11.3% for Africans, 4.5% for East Asians, and 3.7% for South Americans Amazon [4]. Associations between PLA and gender and body side have also been reported [5]. Commonly, research studies have used noninvasive physical

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tests to determine the presence of PL; however, these tests are not as accurate as of the direct observation of the muscle during necropsy [5].

We investigated the prevalence rate of PLA by the necropsy of a series of cadavers in Zanjan City, Iran, during April-October 2009. Zanjan City is the capital of Zanjan Province at Northwest of Iran, and most of its inhabitants are of Azari ethnicity. Cadavers with the unnatural or doubtful causes of death from all regions of Zanjan Province are referred to the Central Legal Medicine Organization for necropsy. During the study period, 102 cadavers (78 males and 24 females) without any evidence of surgery, injury, or deformity in the forearm and hand were selected by convenience sampling method. After obtaining written informed consent from their guardians, they were bilaterally explored for PL. Cadavers with the evidence of decomposition and those referred after 24 hours of death were excluded from the study. Moreover, a horizontal incision with about 1-centimeter length was made in the central part of the proximal fold of both wrists; after skin and fascia dissection, areas above-median nerve as well as between the tendons of “Flexor Carpi Radialis” and “Flexor Digitorum Superficialis” were directly observed to find PL. After exploration, incisions were closed by sutures. The study was conducted by three experienced Forensic Medicine specialists. The age of study samples ranged from 8 to 69 years with the Mean (SD) of 35.87(11.77). Generally, PL was absent in 37 [36.3% (95% CI: 26.5%-46.1%)] cadavers (28 males and 9 females). The rates of unilateral and bilateral PLA were similar [18 (49%) were bilateral, and 19 (51%) were unilateral ($P>0.9$)]. The rate of overall PLA was 36% for males and 37.5% for females. The anatomical characteristics of PLA according to the cadavers’ gender are summarized in Table 1.

Our PLA prevalence rate of 36.3% was comparable with this rate in other regions of Iran [6, 7]. The literature suggested several diverse monographs and PLA rates revealed wide regional and ethnical variability, from 0.6%

in Korea [8] to 69.5% in Turkey [9]. Comparing the findings of these monographs, variations in sample sizes, age of the study participants, and study methods should be regarded. The majority of studies have used clinical tests to find PL muscles that are prone to bias and usually overestimate the rate of PLA, compared to necropsy, i.e., objective and more accurate [10]. Of the study, participants’ age also varies in these monographs; however, as PL develops at birth [11], we assumed that age is not a confounder of PLA prevalence. This assumption was also confirmed in a study in Africa [12].

We found no significant gender difference in the prevalence of PLA, which is consistent with the other monographs of Iran [13] and other countries [14]. Some studies have reported a greater prevalence of PLA in females [5, 15]; however, some have also demonstrated opposing results [2, 3]. Pooling findings of these reports in a meta-analysis highlight a slightly higher prevalence of PL absence in females, which is not statistically significant [4].

Rates of unilateral and bilateral PLA were the same in our study population and the type of absence (unilateral or bilateral) was not associated with gender. These two findings are in line with the results of a recent meta-analysis [4]. Descriptive studies have demonstrated the predominance of both bilateral [15] and unilateral [5] PLA; however, studies that have applied statistical analysis reported no statistically significant lateral predominance of PLA [14].

We generally found the right-side dominance of PLA, which was due to this pattern among females (there was no side dominance in males). Furthermore, in this descriptive study, only 5 females with unilateral absence were included and the observed pattern among such small sample sizes is not generalizable. Studies with greater sample sizes in Iran and other countries have reported equal rates of PLA in left and right sides [6, 14, 15]. A meta-analysis of relevant studies from various

Table 1. The anatomical characteristics of PLA according to the studied cadavers’ gender

Sex	Types of PLA			Total	P
	Unilateral		Bilateral		
	Right-sided	Left-sided			
Male: N (%)	7 (25)	7 (25)	14 (50)	28 (100)	>0.9*
Female: N (%)	4 (44.5)	1 (11.1)	4 (44.5)	9 (100)	

* Fischer’s exact test for comparing the rate of unilateral and bilateral absence between genders

ethnicities demonstrated the predominance of left side PLA which was not gender-related [4].

2. Conclusion

Overall, the absence of PL in this cadaveric study was calculated as 36.3%, and this rate was equal in both genders. Half of PLAs were unilateral, and half were bilateral, and this pattern was not associated with the cadavers' gender. Due to the ethical considerations and study limitations, we failed to include more cadavers; therefore, further studies with higher sample sizes could declare the general and gender-specific patterns of PLA in the Iranian population.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of Zanjan University of Medical Sciences, Zanjan, Iran, and the Ethics Committee of Legal Medicine Research Center of Iran.

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Author's contributions

Conceptualization: Mehdi Forouzesh, Abdolrazagh Barzegar; Methodology: All authors; Investigation: Mehdi Forouzesh.

Conflicts of interest

The authors declared no conflicts of interest.

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