

The Prevalence of the Palmaris Longus Agenesis: A Study in Afghan Population

Palmaris Longus Agenezisinin Prevalansı: Afgan Toplumunda Yapılan Bir Çalışma

Yunus DOĞRAMACI, MD,^a
Aydın KALACI, MD,^a
Nazan SAVAŞ, MD,^b
Erdoğan ESEN, MD,^c
Edip UÇAR, MD,^d
İ. Gökhan DUMAN, MD,^a
Ulunay KANATLI, MD,^c
A. Nedim YANAT, MD^a

Departments of
^aOrthopaedics and Traumatology,
^bCommunity Medicine,
^cInternal Medicine,
Mustafa Kemal University
Faculty of Medicine, Hatay
^dDepartment of
Orthopaedics and Traumatology,
Gazi University Faculty of Medicine,
Ankara

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Yazışma Adresi/Correspondence:
Erdoğan ESEN, MD
Gazi University Faculty of Medicine,
Department of
Orthopaedics and Traumatology,
Ankara,
TÜRKİYE/TURKEY
erdincesen@gmail.com

ABSTRACT Objective: Palmaris longus (PL) is a structure often used in reconstructive surgery mainly in the setting of tendon grafting. The palmaris longus agenesis varies depending on the race/ethnicity. Awareness of the prevalence in the treated population or ethnic group is important. The prevalence of palmaris longus agenesis has, to the best of the authors' knowledge, not been reported in Afghan population. **Material and Methods:** Four-hundred and thirty healthy Afghan subjects (215 males and 215 females) were clinically examined for the presence or absence of palmaris longus. The examination entailed observation of the volar aspect of the wrist, looking for the palmaris longus tendon using Schaeffer's test and Mishra's second test. **Results:** PL tendon was found to be absent unilaterally in 7.7% and bilaterally in 14.2% of study participants. The overall prevalence of absence of PL (unilateral or bilateral) was 21.9%. Bilateral absence of PL was statistically more frequent than the unilateral absence. The prevalence of absence of PL was statistically similar between the genders and the sites. **Conclusion:** The prevalence of the palmaris longus agenesis in the Afghan subjects was found to be much higher than the reported average prevalence in the Asian population.

Key Words: Tendons; abnormalities; Afghanistan

ÖZET Amaç: Palmaris longus (PL) başta tendon greftleme üzere rekonstrüktif cerrahide sıkça kullanılan bir yapıdır. Palmaris longus agenezisi çalışılan ırk/etnisiteye bağlı olarak değişkendir. Bu durumun tedavi edilen popülasyon ya da etnik gruptaki prevalansını bilmek önemlidir. Yazarların bildiği kadarıyla Afgan toplumunda palmaris longus agenezisi prevalansı daha önce bildirilmemiştir. **Gereç ve Yöntemler:** Dört yüz otuz sağlıklı Afgan bireyde (215 kadın ve 215 erkek) klinik olarak palmaris longusun bulunup bulunmadığının muayenesi yapılmıştır. Muayene bileğinin volar yüzünün incelenmesi, Schaeffer testi ve Mishra'nın ikinci testi kullanılarak palmaris longus tendonuna bakılmasından oluşmuştur. **Bulgular:** Bu tendonun katılımcıların %7.7'sinde tek taraflı ve %14.2'sinde iki taraflı olmadığı bulunmuştur. PL yokluğunun toplam prevalansı (tek ya da iki taraflı) %21.9 olmuştur. İki taraflı PL yokluğu istatistiksel olarak tek taraflı yokluğundan daha sık bulunmuştur. PL yokluğunun prevalansı cinsiyetler ve vücut tarafları arasında istatistiksel olarak benzer bulunmuştur. **Sonuç:** Afgan bireylerde palmaris longus agenezisinin prevalansı Asya popülasyonunda bildirilen ortalama prevalanstan çok daha yüksek bulunmuştur.

Anahtar Kelimeler: Tendonlar; anormallikler; Afganistan

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The prevalence of palmaris longus agenesis among various ethnic groups is widely variable.¹⁻⁵ Awareness of this prevalence in the treated population is of great clinical importance when one attempts use it as a donor tendon for transfer in orthopedic and reconstructive surgery of

the hand.⁶ The problem in using the palmaris longus tendon is that there are many anatomical variations, the most common being an absence of the palmaris longus tendon⁷ and the plantaris tendon.⁸ In addition, the variation of the superficial palmar arch or cases in which the muscle and tendon parts are switched and the muscle part exists distally might be the cause of carpal tunnel syndrome.^{9,10}

PL acts as a weak flexor of the wrist, plays a role in stabilization of the palmar fascia and contributes to antepronation and pronation of the thumb.¹¹

The aim of this study was to elicit the prevalence of PL agenesis in the Afghan population and to compare the results with the previously reported literature. The association of palmaris longus agenesis with the side and sex was also analyzed statistically.

MATERIAL AND METHODS

During a health screening programme, 430 immigrant Afghan person (215 males, 215 females) aged between 12 and 89 years were randomly selected from a population consisting of 6000 Afghan immigrants. Individuals with a history of injury, surgery, disease or abnormality of the upper limb were excluded from the study. Hand dominance was recorded for each subject. To elicit the PL, Schaeffer et al. described a method which involves flexion of the wrist with the thumb and little finger opposed tightly.¹² Mishra et al. described two other techniques which examine different actions of the PL.¹³ Mishra's second test involves resisted abduction of the thumb, which increases the tension on the PL tendon and demonstrates the PL tendon more prominently.

Both Schaeffer's test and Mishra's second test, were used to assess the presence of the PL tendon.^{12,13} If both tests were negative, it was considered absent. To minimize the interobserver bias, the absence of PL was confirmed by two other examiners as well. The absence of the PL tendon on both sides, results of the first and second examination tests, age, gender and dexterity were recorded.

The associations between absence of the PL and body side and gender were analyzed using Chi-square test. Statistical significance was set at $p < 0.05$.

RESULTS

In the study population, the mean age was 32 years (range, 12-89 years). Fifteen subjects were left-hand dominant (3.5%).

The PL tendon was absent unilaterally in 33 subjects (7.7%), while it was absent bilaterally in 61 subjects (14.2%). The overall prevalence of the absence of the PL tendon (unilateral or bilateral) was 21.9% (Figure 1, Table 1).

Among 215 men, PL tendon was absent on the right side in nine (4.18%), on the left side in six (2.79%) and bilaterally in 25 (11.62%) subjects.

Among the 215 women, PL tendon was absent on the right side in eight (3.72%), on the left hand in 10 (3.98%) and bilaterally in 36 (16.74%) subjects.

The overall prevalence of absence of PL (unilateral or bilateral) was 18.6% ($n = 40$) in men and 25.11% ($n = 54$) in women. The summary of data is presented in Table 2.

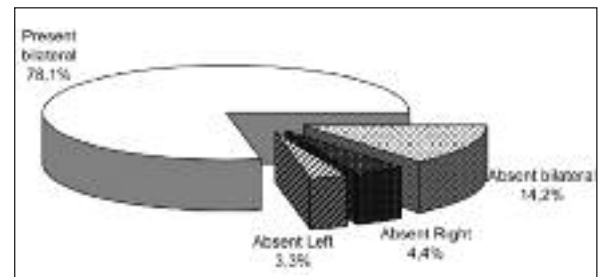


FIGURE 1: The prevalence of palmaris longus agenesis in Afghan population.

TABLE 1: Frequency of absence of palmaris longus in Afghan population.

Palmaris longus muscle	Number	(%)
Absent bilaterally	61	(14,2)
Absent unilaterally	33	(7,7)
Present bilaterally	336	(78,1)
Total	430	(100,0)

TABLE 2: Frequency of absence of palmaris longus with respect to genders.

Sex (number of subjects)	Absent palmaris longus			Overall prevalence
	Right	Left	Bilateral	
Male (215)	9 (4.1%)	6 (2.7%)	25 (11.6%)	40 (18.6%)
Female (215)	8 (3.7%)	10 (3.9%)	36 (16.7%)	54 (25.1%)
Total (430)	17 (3.9%)	16 (3.8%)	61 (14.2%)	94 (21.9%)

χ^2 Test, $p=0.613$.

The prevalence of PL tendon absence was statistically similar when the body sides were concerned ($p=0.06$). There was no statistically significant difference in the prevalence of PL absence between the male and female subjects ($p=0.613$) (Table 2). Bilateral absence of PL was more frequent than its unilateral absence ($p=0.011$).

Mishra’s second test demonstrated the presence of PL in 11 extremities (female subjects) which was initially evaluated as absent with Schaeffer’s test.

DISCUSSION

As a result of the war in Afghanistan, a large number of the citizens of this country had immigrated to different countries. In our province, Hatay-Turkey, we have a pure ethnic population of 6000 Afghan immigrants with a high rate of occupational hand trauma, and most of the case are complicated and require reconstructive surgical interventions. To the best of our knowledge, the prevalence of palmaris longus agenesis in Afghan population has not been reported before.

Our study revealed that the overall prevalence of absence of PL (unilateral or bilateral) in the Afghan population was 21.9%. This value was higher than that reported in most standard textbooks of hand surgery (15%) and was the highest reported value for an Asian population.³

We statistically compared our results with those reported in the literature (Table 3). The Afghan population had a significantly higher prevalence of PL agenesis when compared to reported values for Asian population ($p<0.0001$). Further comparison showed that the Afghan population had significantly higher prevalence of palmaris longus agenesis when compared to Malay ($p<0.01$), Indian ($p<0.003$) and Chinese ($p<0.0001$) populations.

Variable prevalence of the PL agenesis have been reported in different populations in the literature. Roohi et al. in a multi-racial population study of 450 subjects in Malaysia, reported the incidence of bilateral, unilateral and overall absence of the palmaris longus tendon as 2.9%, 6.4%, and 9.3%, respectively.¹⁶ In this study, the Malays had a prevalence of palmaris longus absence as 11.3% followed closely by the Indians with 10.7% whilst the Chinese had the lowest absence rate with 6.0%. On the other hand, Sebastian et al.³ Reported that the incidence of bilateral and unilateral absence was 1.2% and 3.3%, respectively in 320 Chinese subjects. Our study is similar to the above mentioned study in that we used the Schaeffer’s test to examine the palmaris longus.

Reimann et al.⁷ studied 1600 cases and reported that approximately 21.8% of patients had anatomical abnormalities, the most common being the absence of the palmaris longus tendon (in up

TABLE 3: Statistical comparison of the prevalence of palmaris longus agenesis in the Afghan population with other Asian populations.

	Chinese (Total= 150) Present/Absent 141/9	Malay (Total= 150) Present/Absent 133/17	Indian (Total= 150) Present/Absent 134/16	Asian (Total= 5332) Present/Absent 5073/259
Afghan (Total= 430)	$\chi^2= 19.154$	$\chi^2= 7.96$	$\chi^2= 9.067$	$\chi^2= 200.028$
Present/ Absent 336/ 94	$P<0.0001$	$P<0.01$	$P<0.003$	$P<0.0001$

12.8% of cases). Thompson et al. investigated 300 Caucasian subjects using the Schaeffer's test, and found the incidence of bilateral and unilateral absence of PL as 9% and 16%, respectively.⁵ The overall absence was as high as 25%.

The results of aforementioned studies suggest that there are significant anatomical variations between Asians and Caucasians with respect to the palmaris longus tendon a genesis. In Caucasian population, the average prevalences of palmaris longus agenesis have been reported as 22.4% and 21.5% in *in vivo* and *in vitro* studies, respectively. On the other hand, the average prevalences of palmaris longus agenesis in Asian subjects have been reported as 4.8% and 4.3% in *in vivo* and *in vitro* studies, respectively.³ Our values, however, were statistically higher than the reported prevalences in Asian population and Asian ethnic subgroups (Table 3).

In the literature, the highest prevalence of absence of the PL tendon was 63.9%, and reported in Turkish population.¹ However in a recent study of Turkish population, the overall prevalence of the absence of the PL either unilaterally or bilaterally was found as 26.6%, which is similar to Caucasian populations.¹⁴

Most of the studies reported that females lacked the palmaris longus tendon on the left side more.^{2,4,7,12,15} Furthermore some of these studies showed that bilateral absence was more common when compared to unilateral absence.^{2,4,7} However, some other studies demonstrated that there were no significant differences in the presence of the palmaris longus tendon between genders or left and right sides.^{3,8,16}

Results of this study revealed that bilateral absence was statistically more common when compared to unilateral absence. In our study, females were found to have a higher incidence of absence of palmaris longus, however this was not statistically significant ($p= 0.613$).

Our results are in accordance with that of Kose et al.¹⁴ since we found that Mishra's second test was more sensitive in detecting palmaris longus tendon, particularly in female subjects. Kose et al. in a study on 1250 patients, reported that Mishra's second test elicited the PL tendon in 35 extremities, where Schaeffer's test failed. Of the 35 extremities, 23 belonged to women with feeble PL tendons. Therefore, they recommended using at least one further examination test for determination of the agenesis to increase the reliability, particularly, in female subjects. In our study, we recognized the PL tendon in 11 female subjects with Mishra's second test where Scheaffer's test failed.

A limitation of this study is that we used the clinical examination to detect the palmaris longus agenesis without using the radiological investigations like MRI and ultrasonographic assessments. However this limitation was attributable to the expensiveness of such investigations.

CONCLUSION

The overall prevalence of the absence of the PL tendon (unilateral or bilateral) was 21.9% in Afghan population, the highest among the Asian people. Bilateral absence of PL was statistically more frequent than unilateral absence. The prevalence of PL tendon absence was statistically similar between the body sides and genders.

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