

Paper

# Prevalence of palmaris longus absence – a study in the Yoruba population

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Accepted 28 January 2009

## ABSTRACT

**Background:** Palmaris longus (PL) has received a growing interest for its role in constructive surgery. Since the agenesis of PL shows a strong racial variation, it is conceivable that its prevalence on the Yoruba ethnic population in Nigeria will further confirm this phenomenon.

**Methods:** A total of 600 subjects comprising 335 males and 265 females aged 8-60years were used to assess the prevalence of agenesis of the PL in Yoruba tribe.

**Results:** The overall prevalence of absence both unilaterally and bilaterally in the two sexes was 6.7%. In males, unilateral absence was 5.4%. The distribution on the right and left were 2.4% and 3.0% respectively. The bilateral absence was 1.5%. In females, unilateral absence was 6.0%. The distribution on the right and left were 2.6% and 3.4% respectively. Bilaterally, it was 0.4%. In one subject unilaterally, PL was observed to have differentiated from flexor carpi radialis.

**Conclusion:** Results of this finding suggested that the prevalence of PL agenesis as reported in standard anatomy texts is significantly different from our observation in this Yoruba population. The differentiation of PL tendon from flexor carpi radialis is indicative that both muscles may develop from the same muscle group as previously suggested.

**Key Words:** Palmaris longus; Agenesis; Yoruba tribe; Males; Females; Abnormal origin.

## INTRODUCTION

PL is a small vestigial muscle that is phylogenetically degenerating. It is a slender muscle that arises from the medial epicondyle by a common flexor tendon and from adjacent intermuscular septa. The characteristic of this muscle is shown by its short belly and long tendon<sup>1</sup>. The belly soon gives way to a long slender tendon of variable length<sup>2</sup> that inserts adherent across the front of the flexor retinaculum to the palmar aponeurosis<sup>1,3,4</sup>.

This muscle is one of the most variable muscles in humans. The variations include duplication (digastrics) and the presence of accessory palmaris longus<sup>5</sup>. The origin of this variation as illustrated by Humphrey<sup>6</sup>, suggested the presence of radial, intermediate and ulnar sectors in the superficial layers of the forearm flexor muscular angulus. Thus PL usually differentiates from the intermediate sector but differentiation from the other two sectors may also be possible. It is also reported to develop independently from the palmar aponeurosis and is associated only by anatomic proximity<sup>7</sup>.

PL, a weak flexor of the wrist is considered functionally negligible. However, there is a growing interest in the existence of the muscle because its tendon is reported to be most frequently harvested for reconstructive plastic and hand surgery<sup>8</sup>. Furthermore, PL tendon in various combinations is used to repair oncologic defects of head and neck, arthritis of the thumb and ptosis in children<sup>9</sup>. Besides, it had earlier been

noted as a stabilizer of superficial structures in the palm in preparation for the abduction of the thumb<sup>10,11</sup>.

The agenesis of PL has been reported in anatomy texts<sup>1,3,4</sup>. The prevalence of the agenesis of this muscle as reported in most standard anatomy texts is about 15%. A higher prevalence (24%) was reported in North American Caucasians<sup>12</sup>. A survey in Pennsylvania, USA, showed 23% prevalence of absence<sup>13</sup>. Ceyhan and Mavt<sup>14</sup>, reported a much higher prevalence of agenesis (63.9%) in the Gaziantep population in Turkey. Studies among the Asian population showed that the incidence is 3.4% in Japanese<sup>15</sup> and 4.6% in Chinese<sup>16</sup> respectively. Within Africa, studies have equally been conducted. Available information showed that the incidence is 1.02% in a Ugandan population<sup>17</sup>.

The Yoruba tribe located in southwestern part of Nigeria extends through Benin republic to Togo. It is the second largest ethnic group in Nigeria constituting about 30% of her entire population. Their lives are structured around agriculture being the largest producer of cocoa in Nigeria, a major cash crop. They equally engage in trading and handicrafts and enjoy lots of social activities like burial and birthday ceremonies that have become part of their socio-cultural lifestyle<sup>18</sup>.

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TABLE I:

*The distribution of palmaris longus absence on both sexes*

Number of subjects assessed	Total absence in both sexes	Total absence in males	Total absence in females
600	40 (6.7%)	23 (6.9%)	17 (6.4%)

Since the incidence of PL agenesis is highly variable and the figures used in most anatomy texts represent Caucasian populations, we thought it would be informative to report on the prevalence of this muscle in a non-Caucasian African Yoruba population, the second largest ethnic group in Nigeria.

### MATERIALS AND METHODS

A total of 600 subjects comprising 335 males and 265 females aged 8-60 years were used to assess the prevalence of agenesis of PL. Systematic random sampling was used to select subjects from amongst members of the university community, primary and secondary schools and business community. The exercise was conducted with four different methods of assessment; standard test (Schaeffer's test), Thompson's test, Mishra's test I and Pushpakumar's "two-finger sign" method<sup>19</sup>. Each subject was initially asked to do the standard test. Where palmaris longus tendon was not sufficiently visualized due to inability to manoeuvre the technique, Thompson's, Mishra's and Pushpakumar's "two-finger sign" tests were used to confirm its absence.

In Schaeffer's test, volunteers were made to steady their forearm at 90° before opposing the thumb to the little finger



Fig 1. Thompson's test; (A) palmaris tendon and (B) flexor carpi radialis tendon

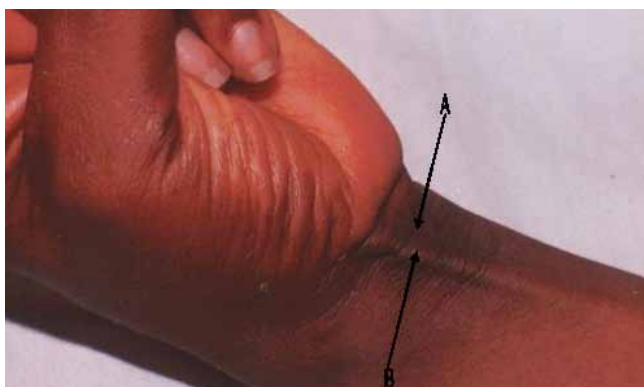


Fig 2. Pushpakumar's "two-finger sign" method showing (A) palmaris tendon and (B) flexor carpi radialis tendon.

TABLE II:

*The distribution of palmaris longus absence on both limbs*

Absence of palmaris longus	Right	Left	Bilaterally
Male	8 (2.4%)	10 (3.0%)	5 (1.5%)
Female	7 (2.6%)	9 (3.4%)	1 (0.4%)
Both sexes	15 (2.5%)	19 (3.2%)	6 (1%)

with the wrist partially flexed. In Thompson's test, a fist was made followed by flexing the wrist against resistance with the thumb flexed over the fingers. In Mishra's test I, the subjects were asked to abduct the thumb against resistance with the wrist partially flexed. In Pushpakumar's "two-finger sign" method, the subjects were made to fully extend the index and middle finger while the wrist and other fingers were fully flexed with the thumb opposed and flexed.

The incidence of agenesis of this muscle in both sexes and on the two sides of upper limbs was analyzed using SPSS. Correlation and percentage score were used to assess the association of its agenesis in both sexes unilaterally and bilaterally.

### RESULTS

The overall prevalence of absence was 6.7% (40 subjects) (Table I). In males, PL was found to be absent unilaterally in 18 subjects (5.4%); the distribution on the right and left were 8 (2.4%) and 10 (3.0%) respectively. Bilaterally (Table II), this muscle was absent in 5 subjects (1.5%). The overall prevalence of absence in males was 6.9% (23). In females, PL was absent unilaterally in 16 subjects (6.0%); the distributions on the right and left were 7 (2.6%) and 9 (3.4%) respectively (Table II). Bilaterally, it was 1 (0.4%). The overall prevalence of absence for females was 6.4% (17) (Table I). The unilateral prevalence of absence between the males and females showed no significant difference ( $p > 0.05$ , Table II). However, bilateral prevalence of absence in males was comparatively higher than in females.

The correlation analysis showed that the agenesis on male right was strongly correlated to male left. Likewise, female right agenesis was strongly correlated to its left side. The incidence of absence on male right and left was more strongly correlated than that of the females.

In a single subject (Figures 1 and 2) unilaterally, PL differentiated from the distal part of flexor carpi radialis tendon close to the wrist joint as could also be seen from the illustration in Fig 3.

### DISCUSSION

The findings in this Yoruba ethnic population showed the overall prevalence of absence of PL to be 6.7%. This observation differs markedly from most reports in standard

TABLE III:  
Correlation coefficient of palmaris longus absence

	Male right	Male left	Female right	Female left
Male right	1	.910	.	.
Male left	.910	1	.	.
Sig. (2-tailed)	.000	.	.	.
Female right	.	.	1	.891
Female left	.	.	.891	1
Sig.(2-tailed)	.	.	.000	.
Number	335		265	

Correlation is significant at 0.01 levels (2-tailed)

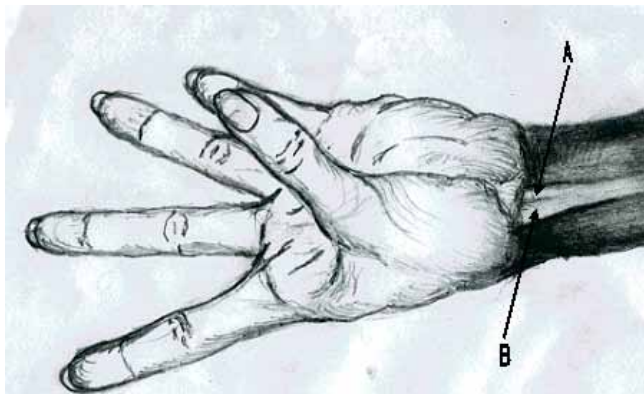


Fig 3. Illustration of the abnormal origin of palmaris longus from flexor carpi radialis. (A) Palmaris tendon and (B) flexor carpi radialis tendon.

anatomy texts (15%) believed to represent Caucasian population. The assumption is strengthened by a similar high prevalence of absence (24.4%) reported in North American Caucasians<sup>12</sup>; Pennsylvania (23%)<sup>13</sup>; Gaziantep population (63.9%)<sup>14</sup>; and Germans (20.4%)<sup>20</sup>. However, our observation tallied with the reports on Asian population which according to Adachi<sup>15</sup> and Sebastin *et al.*<sup>16</sup> were 3.4% and 4.6% for Japanese and Chinese subjects respectively. It differs from the report of 17.2% in a recent survey of an Indian population<sup>21</sup>. A black population report on Ugandans subjects<sup>16</sup> showed a much lower value of 1.02%. This is indicative of strong racial variation of agenesis of the muscle.

The unilateral absence observed to be higher in females (6.0) than in males (5.4%) correlated with most previous reports<sup>12, 14</sup> except for the report on Ugandans<sup>16</sup>. The difference between the unilateral and bilateral absence of the muscles was marked. The much lower incidence of bilateral agenesis is consistent with other accounts<sup>22, 16</sup> but differs markedly from Ceyhan and Mavt,<sup>14</sup> report on a Turkish population. There was no significant difference in the unilateral absence in both sexes. But bilaterally, the difference was marked. A strong correlation of agenesis was observed between the right and left limbs of the males and the females.

#### Abnormal differentiation of palmaris longus from flexor carpi radialis

In one subject unilaterally, PL was observed to have differentiated from the distal part of the flexor carpi radialis

tendon. Because the flexor carpi radialis tendon was more prominently displayed, the different assessment tests for PL could not clearly demonstrate the diverging PL tendon. The obscurity was more apparent in tests (figs 1 and 2) involving the opposition of the thumb to the other fingers. Therefore, Mishra test 1 (fig 4) in which the thumb is retained in the lateral abducted position best demonstrated the tendon. This observation appears to be in consonance with the earlier report<sup>19</sup> that Mishra test 1 seemed the best method of clinically assessing the presence of PL. As shown in figures 1 and 2, the tendon appeared as a low ridge at the ulnar side of flexor carpi radialis tendon and together they formed a triangular shaped prominence that tapered towards the ulnar side, close to the wrist joint. PL is believed to differentiate from the intermediate sector of forearm flexor muscular angulus, but this unusual occurrence might not be unconnected with Humphry's observation that the muscle occasionally differentiates from the radial sector<sup>6</sup>.

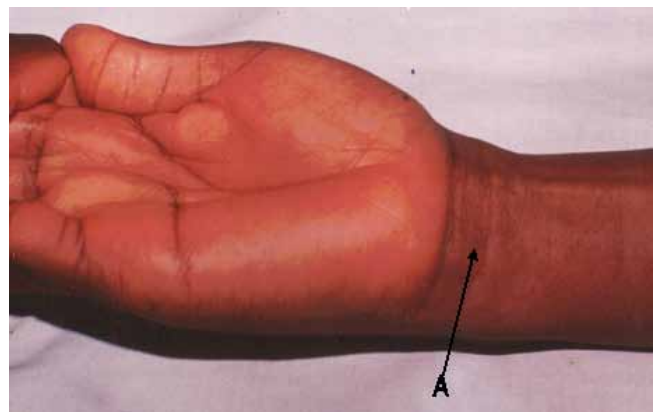


Fig 4. Mishra test I showing (A) palmaris tendon

We conclude from these results that there is a low prevalence of agenesis of PL among the Yoruba tribe in Southwest Nigeria and perhaps generally in non-Caucasian populations. The reason for this strong racial variation is not clear. It may be due to a higher prevalence of manual labour in Asian and African populations. It should therefore be necessary to investigate the prevalence of PL in other African ethnic groups and perhaps by socio-economic strata in such populations. The case of unusual differentiation of PL tendon from flexor carpi radialis observed in one of the subjects was confirmatory to Humphry's observation that the muscle could

occasionally differentiate from the radial sector of forearm flexor muscular angulus.

The authors have no conflict of interest.

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