

Agensis of Palmaris Longus Muscle in Selected Population of School Children in Nigeria

Agnesia del Músculo Palmar Largo en una Población Seleccionada de Niños en Edad Escolar de Nigeria

***Sunday Adeyemi Adejuwon; **Oyetunde Timothy Salawu & **Bosede Ajibola**

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SUMMARY: The aim of this study is to evaluate the prevalence of agensis of palmaris longus muscle tendon among school children in Ogun state, Southwestern Nigeria and also, to verify the symmetry of the agensis of the muscle in relation to sex. The presence of the palmaris longus muscle tendon was determined in 564 individuals, 285 male and 279 female, with age varying from 2 to 20 years old. Four different tests were used; Schaeffer's test, Thompson's test, Mishra's test 1 and Pushpakumar's "two-finger sign" method. The data obtained were further analyzed statistically and the agensis of palmaris muscle was found to be 26.7% (unilateral 13.0%; bilateral 13.7%). Prevalence was higher in female (32.3%) than male (21.4%) ($P>0.05$). Besides, we observed higher agensis in the left side in female individuals. High prevalence of agensis of palmaris muscle observed in the study population is similar to other previous reports in Southwestern Nigeria.

KEY WORDS: Agensis; Children; Palmaris longus muscle; Prevalence.

INTRODUCTION

The palmaris longus muscle (PL) muscle lies on the anterior anatomical compartment of the forearm; it is functionally more active in non-human primates (Vanderhooft, 1996). In humans, PL is a weak flexor of the hand at wrist; it tenses the palmar aponeurosis (Ito *et al.*, 2001) and is one of the most variable muscles in the body.

This muscle is often absent on one or both sides, and is much subject to variation. It may have a proximal tendon, or be reduced to a tendinous strand. It may be digastric or reduplicated. It may end in the antebrachial fascia, tendon of flexor carpi ulnaris, or the pisiform and scaphoid bones etc (Koo & Roberts, 1997). It is innervated by the median nerve. The Palmaris longus flexes the wrist, and may act as a tensor of the palmar fascia.

The muscle was first reported absent in 1559 by Colombos in *De Re Anatomica Libri* (Schaeffer, 1909; Thompson *et al.*, 2001). The agensis of the muscle has been described as ranging from as high as 25% to 16% in Caucasians (Troha *et al.*, 1990; Thompson *et al.*, 2001) to as low as 4% in mongoloids (Sebastin *et al.*, 2005). One study has shown the prevalence of palmaris longus agensis in 500

Indian subjects to be 17.2% (8% bilateral and 9.2% unilateral) (Sebastin *et al.*, 2005). In Africa, studies have equally been conducted. Available information showed that the incidence is 1.02% in a Ugandan population (Igbigbi & Ssekitoleko, 1998). Palmaris longus muscle receives the attention of the surgeons for its use in reconstructive plastic and hand surgery as tendon graft, in lip augmentation or escalation (Davidson, 1995), ptosis correction (Naugle & Faust, 1999), and also in some facial paralysis management (Troha *et al.*, 1990).

This study aims to verify the prevalence of the palmaris longus muscle tendon in school age children in two Local Government Areas of Ogun State, Nigeria, and also, observe the agensis symmetry in relation to sex.

MATERIAL AND METHOD

In this work we examined 564 individuals of both sexes; 285 male and 279 female, with age varying from 2 to 20 years old. The subjects included school pupils randomly

*Department of Anatomy, College of Medicine, University of Ibadan, Ibadan, Nigeria.

**Department of Zoology, University of Ibadan, Ibadan, Nigeria.

selected from two primary schools from Owode/Obafemi and Yewa North Local Government Areas (LGA) of Ogun State, Nigeria. Approvals were obtained from the school authorities and parents. Participation of children was based on the dual consent of the parents and pupils. Children that were not residing in the study area and visitors were excluded from the study. The following four tests; standard test (Schaeffer's test), Thompson's test, Mishra's test I and Pushpakumar's "two-finger sign" method were used to accomplish the examinations (Sebastin *et al.*, 2006).

In Schaeffer's test, the subjects were asked to oppose the thumb to the little finger and then flex the wrist (Schaeffer). Where palmaris longus tendon was not sufficiently visualized due to inability to maneuver the technique, Thompson's, Mishra's and Pushpakumar's "two-finger sign" tests were used to confirm its absence. 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 1, 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 (Fig. 1a-c) (Mbaka & Ejiwunmi, 2009).

Statistical analysis. All the data compiled from the occurrence of agenesis of this muscle in both sexes and on the two sides of upper limbs was analyzed using SPSS for Windows (version 17.0, SPSS Inc, Chicago, USA). All data were expressed as Mean±SD. The level of significance was considered at P<0.05. The test of significance in the prevalence of palmaris longus muscle in the two sexes was determined using Chi-square analysis. Correlation analysis was used to determine the nature of relationship between the presence of palmaris longus muscle and ages; and between the left and the right hands in both sexes.

RESULT AND DISCUSSION

The overall prevalence of absence was 26.7% (151 subjects). In males, palmaris longus (PL) muscle was found to be absent unilaterally in 32 subjects (11.2%); the distribution on the right and left fore-limbs were 16 (5.6%) each. Bilaterally, this muscle was absent in 29 subjects (10.2%). The overall prevalence of agenesis of palmaris longus in males was 61(21.4%). In females, palmaris longus muscle was absent unilaterally in 42 subjects (15.1%); the distributions on the right and left were 17(6.1%) and 25(9.0%) respectively (Table I). Bilaterally, it was 48(17.2%). The overall prevalence of absence for females was 90(32.3%). The prevalence of absence between the males and females varied significantly (p>0.05, with the female subjects showing higher prevalence of agenesis of PL in all groups.

Table I. Prevalence of palmaris longus muscle on both fore-limbs.

| Prevalence of Agenesis | Unilateral Right (%) | Unilateral Left (%) | Bilateral (%) |
|------------------------|----------------------|---------------------|---------------|
| Male | 16 (5.6) | 16 (5.6) | 29 (10.2) |
| Female | 17 (6.1) | 25 (9.0) | 48 (17.2) |
| Both sexes | 32 (5.7) | 41 (7.3) | 77 (13.7) |

The correlation analysis showed that the agenesis of PL muscle generally showed negative relationship with age of the children (r=-0.198; p>0.05) (Fig. 2). However, agenesis of PL in right and left hands of both sexes was positively correlated (Figs. 3 and 4).

Palmaris longus muscle is one of the most variable muscles in the body whose morphology, nerve supply and functions have been extensively discussed. Some authors suggest that apart from its ethnic variations, its absence is more common in women, bilateral absence is more common, and that unilateral absence occurs more frequently on the left side (Schaeffer). The present study fits in perfectly into the latter suggestions. Although it is vestigial in humans, it served varied use in



Fig. 1a. Thompson's test; (A) palmaris tendon and (B) flexor carpi radialis tendon. b. Pushpakumar's "two-finger sign" method showing (A) palmaris tendon and (B) flexor carpi radialis tendon. c. Mishra test I showing (A) palmaris tendon. Taken from Mbaka & Ejiwunmi (2009).

orthopedics, reconstructive, plastic and ophthalmologic surgery (Bachelor & Jobe, 1980) as well as in the otolaryngology (Song & Bromberg, 1974). Many surgeons concluded that the palmaris longus tendon is the first choice as a donor tendon because it fulfills the necessary prerequisites of length, diameter and availability (Salgado *et al.*, 2012), and can be used without producing any functional deformity (Troha *et al.*).

The overall prevalence (26.7%) of agenesis of PL muscle among the school children in this study was higher than the reported 6.7% and 12.7% prevalence reported in Ago-Iwoye, Ogun State and Lagos State, Nigeria respectively (Mbaka & Ejiwunmi; Enye *et al.*, 2010). A related prevalence's value 26.5% was reported in a study with the Turks (Kose *et al.*, 2009). Despite the considerably high value observed in this study, it is highly inferior to the 63.9% prevalence reported in Ceyhan & Mavt (1997)'s study in the Turk population and the 28% reported by Sankar *et al.* (2011) among a group of Indian medical students. Generally, agenesis of PL increases with age and a higher occurrence is therefore expected in population comprising higher age group cadres. This is supported by the positive relationship between agenesis of PL muscle and ages of children recruited for this study.

The unilateral absence observed to be higher in females 15.1% than in males 11.2% was in consonance with most previous reports (Troha *et al.*; Ceyhan & Mavt; Mbaka & Ejiwunmi). The higher frequency of bilateral agenesis of PL (13.7%) compared with the unilateral type (13.0%) have also been reported in several studies (Ceyhan & Mavt; Kose *et al.*; Enye *et al.*). However, Kayode *et al.* (2008), Mbaka & Ejiwunmi and Alves *et al.* (2011) observed significant higher prevalence of unilateral agenesis of PL muscle.

In conclusion, the prevalence of agenesis of PL muscle in our study is closely related to some reports in Southwestern Nigeria (Kayode *et al.*), but largely deviated from other studies in the same region (Mbaka & Ejiwunmi; Enye *et al.*), contradicting its probable racial dependency as often suggested by some studies. It is therefore recommended that other intrinsic factors like socio-cultural background, the presence of weakly developed tendons and incidence of subclinical muscular neuropraxia among the population under study and ages of the subjects should be put into consideration before drawing at conclusion on the agenesis of PL muscle in a particular ethnic group.

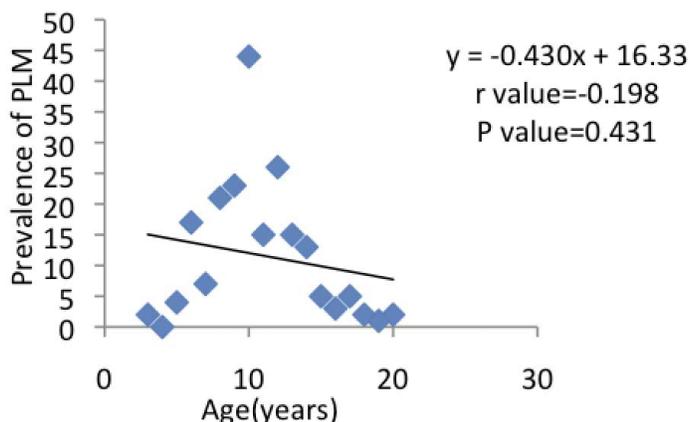


Fig. 2. Relationship between prevalence of PL muscle and ages of school children.

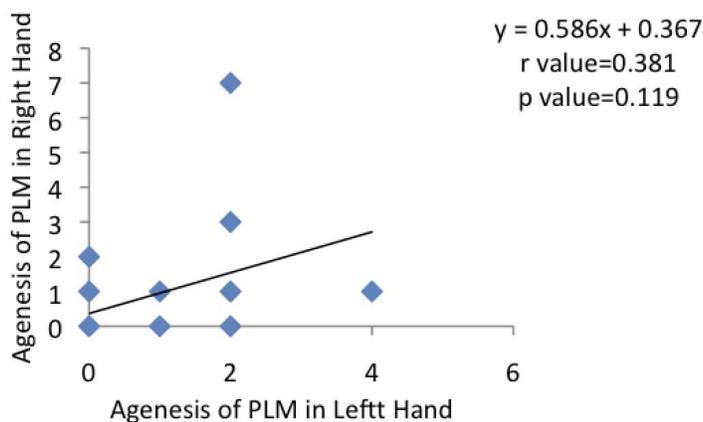


Fig. 3. Relationship between agnesis in PL muscle of the right and left hands of male subjects.

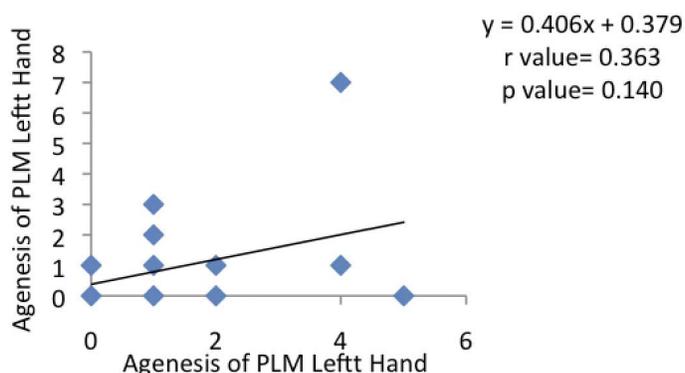


Fig. 4. Relationship between agnesis in PL muscle of the right and left hands of female subjects.

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RESUMEN: El objetivo de este estudio fue evaluar la prevalencia de agenesia del tendón del músculo palmar largo entre niños en periodo escolar del Estado de Ogun, sudoeste de Nigeria, y verificar además, la simetría de la agenesia del músculo en relación al sexo. La presencia del tendón del músculo palmar se determinó en 564 individuos, 285 hombres y 279 mujeres, con edades que variaban entre 2 y 20 años de edad. Se utilizaron cuatro ensayos diferentes; prueba de Schaeffer, prueba de Thompson, prueba de Mishra 1 y método de Pushpakumar "signo de dos dedos". Los datos obtenidos fueron analizados estadísticamente, donde se encontró que la agenesia del músculo palmar fue de 26,7% (13% unilateral; 13,7% bilateral). La mayor prevalencia fue en el sexo femenino (32,3%), siendo hombres (21,4%) ($p > 0,05$). Además, se observó mayor agenesia de respecto al lado en mujeres. La alta prevalencia de agenesia del músculo palmar largo observada fue similar a la encontrada en informes en el Suroeste de Nigeria.

PALABRAS CLAVE: Agenesia; Niños; Músculo palmar largo; Prevalencia.

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Correspondence to:
Adejuwon, Sunday Adeyemi
Department of Anatomy
College of Medicine
University of Ibadan
Ibadan
NIGERIA

Email: yemade60@yahoo.com

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