
CLINICAL ARTICLE

Prevalence of agenesis of flexor digitorum superficialis of the fifth digit in East Africa through clinical examination

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Abstract

Introduction

The flexor digitorum superficialis (FDS) is a flexor of the digits of the hand and has been reported to have varying rates of agenesis. We conducted a study to determine the prevalence of agenesis of the FDS in an East African population by clinical examination.

Materials and methods

A prospective study was conducted using three clinical tests among patients and students in a large teaching hospital in East Africa to determine the presence of the FDS in the fifth digit.

Results

The overall rate of absence was 2.5% with unilateral absence at 1.5% and bilateral absence at 1.0%. The overall difference between males and females was not statistically significant ($p=0.654$).

Discussion

Our findings are in contrast to many studies worldwide. There is a paucity of studies on the subject in Africa which hinders adequate comparison.

Conclusion

The prevalence of the absence of the FDS to the fifth digit in East Africa has been determined. Surgeons should acquaint themselves with prevalence in their areas of practice.

Key words: FDS, prevalence, clinical tests

Background

The flexor digitorum superficialis (FDS) is an extrinsic muscle that flexes the proximal interphalangeal joints and indirectly flexes the metacarpal phalangeal (MP) joints of the hand.¹ There is variation in the flexor digitorum superficialis to the fifth digit.¹⁻³ The absence of the FDS may influence clinical examination in injured

hands.⁴ The prevalence of agenesis of the FDS is unknown in many African populations. We sought to determine the prevalence of the tendon in East Africa and compare this with other areas documented in literature. These findings will be useful for surgeons working in this region.

Materials and methods

We conducted a prospective study of students of the paramedical and nursing schools and of patients attending the orthopaedic surgical outpatient clinic. Participants were randomly selected from these groups and informed that the study was being conducted. We administered the three tests on all subjects to detect the presence of the FDS on the fifth digit. First the subject's hands were taken through range of motion to detect the maximum joint motion. The standard test involved allowing the fifth digit to flex while preventing flexor digitorum profundus action by preventing flexion of the interphalangeal joints of the other fingers (**independent function**) (Figure 1). The modified test involves allowing the fifth and the fourth digit to flex together (Figure 2). The FDS is considered present if the proximal interphalangeal joint of the fifth digit is able to flex to within 20° of maximum joint motion (**dependent function**). The new test was conducted by asking the participant to press the pulps of all fingers against the proximal palm (Figure 3). Extension or hyperextension of the distal interphalangeal joint with full flexion of the proximal interphalangeal joint indicates presence of the FDS while flexion of the distal interphalangeal joint was taken to indicate absence.⁵ If the FDS function was demonstrated using any of the tests, the subject was deemed to have FDS function. Absence of FDS function on all the tests was required to declare the subject FDS deficient.

Patients with obvious hand and wrist deformities, previous hand and wrist injuries and previous surgery to the hand and/or wrist were excluded. Participants provided written informed consent and assent was sought from the next of kin in the case of those aged below 18 years. The study was approved by the hospital ethics board and permission was granted by the school authorities.

Data was collected by a questionnaire and entered into Epidata program and exported to SPSS v 11.5 (SPSS Inc., Chicago, Illinois).



Figure 1. A demonstration of the standard test for the FDS



Figure 2. A demonstration of the modified test for the FDS

Results

We examined 800 subjects, the majority (76.1%) of whom were students and right handed (94.4%). There were 391 (48.9%) males and 409 (51.1%) females. The subjects' ages ranged from 12 to 70 years with a mean age of 25 years.

The FDS is considered present if the proximal interphalangeal joint of the fifth digit is able to flex to within 20° of maximum joint motion

Table I: Overall agenesis of the FDS to the fifth digit in the study

Agenesis in right side	Agenesis in left side	Agenesis bilaterally	Total
5 (0.6%)	7 (0.9%)	8 (1.0%)	20 (2.5%)

Table II: Distribution of FDS absence between males and females and according to hand dominance

Agenesis of FDS	Right	Left	Dominant	Non-dominant	Bilaterally	Total
Male	2 (0.5%)	4 (1.0%)	2 (0.5%)	4 (1.0%)	5 (1.3%)	11 (2.8%)
Female	3 (0.7%)	3 (0.7%)	3 (0.7%)	3 (0.7%)	3 (0.7%)	9 (2.2%)



Figure 3. A demonstration of the new test for the FDS

The overall prevalence of agenesis was 2.5% with unilateral agenesis at 1.5% and bilateral agenesis at 1.6% (Table I).

In males the overall prevalence of agenesis was 2.8% with unilateral agenesis being 0.5% on the right and 1.0% on the left side. The bilateral prevalence of agenesis was 1.3% (Table II).

In females the overall prevalence of agenesis was 2.2% with unilateral agenesis at 1.4% and bilateral at 0.7% (Table II).

The differences between males and females and in handedness were not statistically significant ($p=0.654$).

Discussion

Absence of the FDS in the fifth digit in this study was 2.5%. This differs from the values of 6% in Singapore.¹ Figures in Ireland have been documented as low as 2%,² while in India it was 11%.⁵ A study in England had determined the prevalence as 21%.³ A literature search did not reveal any studies on the subject in African populations. Though some of the variation may be attributed to variation among the races, some of the differences may be due to the differences in the accuracy of the tests used.

A cadaveric study could also determine the presence of a muscle even if it is non-functional

The congenital absence of the FDS in the fifth digit can complicate the examination of the injured fifth digit.¹ This study informs surgeons working in this region of the likelihood of their finding the FDS in the fifth digit and helps the surgeon in the examination of the injured hand.

One of the weaknesses of this study was that the presence of the FDS in the fifth digit was determined by clinical examination which can be examiner-dependent as compared with a cadaveric study where presence of the FDS would be determined by visualising the actual muscle. A cadaveric study could also determine the presence of a muscle even if it is non-functional. Nevertheless, one of the strengths of this study was in the use of numerous tests to detect the presence of the FDS, thus increasing the likelihood that the tendons were detected. A strength of the study is the large sample size.

Conclusion

The prevalence of agenesis of the FDS in the fifth digit is determined in this East African population. Surgeons in this region should acquaint themselves with these local figures.

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