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Dermatoglyphic Patterns of Congenital Lame Adults in a Southern Nigerian Population

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Authors' contributions

This work was carried out in collaboration between all authors. Author EAO designed the study, performed the statistical analysis and wrote the first draft of the manuscript. Authors EJO and NKM managed the analyses of the study. Author NKM managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aim: This study is aimed at determining the dermatoglyphic patterns of the congenital lame subjects in a southern Nigerian population.
Study Design: This is designed to identify the congenital lame subjects through their palmar and digital prints.
Place and Duration of Study: The subjects were recruited from special schools in Owerri and Borikiri in Southern part of Nigeria. The study was conducted between the month of April to July, 2010.
Materials and Method: A total number of 150 congenital lame subjects (comprising 100 males and 50 females) were recruited for this study. The parameters studied include the digital pattern, A-B ridge counts, ATD and DAT angles. Digital and palmar print patterns were obtained by using the ink method.
Results: Results of this study showed that ulnar loops were the most predominant in both sexes.

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This was followed by whorls and arches. There was a significant difference (*P*=.05) in the A-B ridge counts and ATD angles in both hands in males and females while the DAT angles showed no significant difference (*P*=.05) in the left hand but significant in the right hand.
Conclusion: The results of this study could be useful to anthropologists, clinicians and forensic scientists.

Keywords: Dermatoglyphics; congenital; lame; Southern Nigeria.

1. INTRODUCTION

Dermatoglyphics is the study of naturally occurring ridges on the surface of the hands and feet of primates and other mammals [1]. These ridges and grooves found on the epidermal surface are specialized for increased friction during grip, comparable to what is obtained on the ridges of an automobile type [2]. Details of ridges are permanent hence they serve as an excellent tool for population studies, personal identification, and criminology, morphological and genetic research [1]. Dermatoglyphic patterns have positive correlation in a number of genetic diseases, such as those associated with organic mental retardation [3]. In a study conducted on the dermatoglyphic patterns of congenital profound sensorineural hearing loss subjects with delayed development of speech and language, results showed that no definite pattern existed in a constant fashion and there was a great degree of variation [4]. Significant differences have been observed in the A-B ridge count of the left hand and ATD angles of the right hand in patients with prostate cancer [5]. Studies have revealed that the finger prints pattern of paucibacillary leprosy patients studied showed an increase in the whorls and decrease in loops while in multibacillary leprosy patients, there was a decrease in whorls and increase in loops. These differences were observed to be significant [6]. A study to assess the relationship of dermatoglyphic patterns of the hands of women with breast cancer or at risk of developing breast cancer has been conducted. The researchers observed that there were significant changes in the ridge count and finger tip pattern in cases of carcinoma of the breast as compared to the control subjects [7]. Fingertip dermatoglyphic patterns of forty-five patients with atopic dermatitis were compared to those of sixty nonatopic patients, twenty-one of whom had hand dermatitis. The average number of digits in which linear grooves were detected was significantly higher in the atopic group than in the nonatopic controls. There was a significant increase in the whorl patterns as observed in the females but not in the male atopic patients [8]. Four dermatoglyphic regions with pattern frequencies differing from those of the controls were observed in 173 victims of sudden infant death syndrome [9]. There was an increase in Sydney crease, hypothenar patterns, open fields (with fewer vestiges) in the interdigital region IV and arches of females only [9]. Congenital lameness is an abnormality of the lower limb which begins in the embryonic period (first trimester of pregnancy) that is, it is present at birth. They may be genetic or not but the determining factor of it is that it immediately demonstrates its effect on the skeleton, also called limb reduction [10]. Different factors may be associated with it and they include diastrophic dysplasia an autosomal recessive disorder which leads to severe short-limbed dwarfism, progressive spinal and joint problems [11] and environmental factors. Many additional substances (teratogens) have been found capable of producing limb reduction defects (thalidomide a drug that causes limb reduction).

This study is aimed at determining if there is a characteristic dermatoglyphic pattern associated with congenital lame subjects in southern Nigeria.

2. MATERIALS AND METHODS

A total number of 150 congenital lame subjects comprising 100 males and 50 females with age range of 20-50 years were recruited for this study. The subjects were gotten from special schools in Owerri and Borikiri in Southern part of Nigeria. Subjects were allowed to participate if their lameness was congenital. Sample selection was based on cluster sampling. The study was conducted between the month of April to July, 2010. The parameters studied include; digital patterns, A-B ridge counts, ATD and DAT angles. After informed consent has been obtained from the subjects verbally, palmer and digital prints were obtained by the ink method. The ATD angle is the angle formed by axial triradius situated near the base of the 5^{th} metacarpal and the digital triradii. The A-B ridge count is the count from the ridge to the triradii locations on the

palms while DAT angle is the angle connecting D, A and T triradii points. A cotton wool was soaked in an endorsing ink which was spread on the entire surface of the palm. The hand was extended at the wrist with the fingers fully abducted. The subjects then made impressions of their palms by placing it on the duplicating paper starting with the proximal part of the hand and lowering it until the digits came in contact with the paper. A little pressure was applied to ensure good palmar print. The ink was removed from the palm using soap and water.

A magnifying hand lens was used to magnify the ridges of the prints for easy identification of the different finger print patterns. The angles on the palm were measured with the aid of a protractor.

2.2 Data Analysis

Data was analyzed using the Z-test and results presented in tables.

3. RESULTS

The result of this study is presented in the tables below. Table 1 shows the total percentage (%) frequency distribution of digital ridge patterns of both hands of male and female congenital lame subjects. The ulnar loops had the highest percentage 56.40 and 53.80 while for females it was 63.60 and 63.40 in the right and left hands respectively. The radial loops were 2.95 and 2.85 while for the females it was 4.70 and 4.80 in the right and left hands respectively. The whorls for males were 32.80 and 32.40 while for females it was 21.30 and 19.60 in the right and left hands respectively. Arches for males were 9.20 and 13.8 while for the females it was 10.40 and 12.20 in the right and left hands respectively. There was a significant difference in both hands of the males and females. Table 2 shows the mean standard deviation and range for A-B ridge counts, ATD and DAT angles for male and female subjects. There was a significant difference (P=.05) in the A-B ridge counts and ATD angles in both hands in males and females while the DAT angles showed no significant difference (P=.05) in the left hand but significant in the right hand.

4. DISCUSSION

This study has given an insight into the dermatoglyphic patterns of congenital lame subjects in the southern part of Nigeria. The result of this study has shown that ulnar loops had the highest percentage frequency of occurrence followed by whorls, arch and radial loops. This is in line with the observation of some authors in their study such as on sickle cell patients [12], on coronary heart disease [13] and on children with congenital hearing loss [14] as ulnar loop had the highest percentage of occurrence. A test of significance for digital patterns shows that males had lower values than the females and so there was a significant difference observed. The ATD angle in this study showed a significant difference with the males having higher values as compared to the females. This is not in line with the research work done by some researchers in which the ATD angles for normal Okirika people was 43.98° for the left hands and 43.75° for the right [15]. The mean DAT angle in both hands of both sexes in this study as seen in the result was found to be higher than what was obtained for normal individuals [5,15]. This indicates that congenital lame subjects have a characteristic larger DAT angle which is associated with them. In this study, the A-B ridge counts of both hands in both sexes were observed to be lower than what was obtained in other studies there was a significant difference in both male and female congenital lame subjects (P=.05). Results from other studies did not find any significant difference in the ridge count of subjects with congenital hearing loss, deaf and mute and normal population [14,16]. The values obtained in this study do not have much difference in the parameters determined as compared with the normal subjects. Dermatoglyphics can not be used as an indicator for the identification of congenital lame subjects.

Table 1. Total percentage (%) frequency distribution of digital ridge patterns of both hands of male and female subjects

Parameter	Ulnar loop	Radial loop	Whorls	Arches
Males (right hand)	56.40	2.95	32.80	9.20
Males (left hand)	53.80	2.85	32.40	13.80
Females (right hand)	63.60	4.70	21.30	10.40
Females (left hand)	63.40	4.80	19.60	12.20

Table 2. Mean and standard deviation of A-B ridge counts, ATD and DAT angles of male and female subjects

Parameter	A-B ridge count	ATD angle	DAT angle
Males (right hand)	26.25±0.28	49.43±0.39	67.79±0.44
Males (left hand)	26.33±0.39	48.08±0.50	69.12±0.64
Females (right hand)	26.06±0.26	44.42±0.52	70.61±0.73
Females (left hand)	24.30±0.38	43.88±0.71	69.11±1.32

5. CONCLUSION

This study has provided an insight into the digital and palmer print patterns of congenital lame subjects in southern part of Nigeria. Ethnic or tribal considerations were not determined in this study. This study could be of immense importance to anthropologists, forensic scientists and clinicians.

ETHICAL APPROVAL

Ethical approval was obtained from the ethics committee of the college of health sciences and international standards of conducting such studies were strictly adhered to.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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