

## Digital Dermatoglyphics Patterns of the Kanuri Ethnic Group of North Eastern Nigeria

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**ABSTRACT:** Lack of adequate anthropological data on indigenous Nigerians as compared to Caucasian and mongoloids has opened the need to obtain such data for a section of the Nigerian population. Dermatoglyphic study of whorls, loops and arches were made on three hundred (300) subjects, consisting of 150 males and 150 females that were randomly selected from the kanuri ethnic group in the North-eastern region of Nigeria. The result obtained showed that Arch frequency was 7.07%, Whorls was 33.80% and Loops was 59.10%. The Pattern Intensity Index showed a slightly higher value in males (12.85) than in females (12.49). Ridge counting was also done for each finger, males showed higher ridge count (122.64) than females (115.45) and the right digit was found to have a higher ridge count than the left digits except for digits II, III and V in males. Dankmeijer's indices for Kanuris were lower in males (19.99) than in females (21.92), while the Furuhata's indices were higher in males (62.44) than in females (52.28). The results showed a similar pattern with other results obtained in the South-west and Eastern part of Nigeria.

**KEYWORDS:** Digital, Dermatoglyphics, Kanuri, Arches, Whorls.

### 1 INTRODUCTION

Dermatoglyphics is the scientific study of the patterns on the fingers and hands and it is believed to give an insight into someone's character. It comes from the Greek words *derma* and *glyphs* meaning skin and carve which refers to the friction ridge formations that appears on the palms of the hands and soles of the feet, it was first introduced by Cummins in 1926 [1]. Therefore digital dermatoglyphics deals with study of the ridge pattern of the fingers and thumb. The ridge pattern varies characteristically from one person to another and most at times in the fingers of the same person hand, these frictional ridges form pattern called finger prints. The ridging aids in prevention of slippage, serve well to enhance contact surface and also contained mechanoreceptors that plays a role in tactile perceptions [2], [3], [4]. The ridges begin to form during the 3rd and 4th months of intrauterine life and are permanent unless there is severe trauma to the hand [1], [5]. Dermatoglyphics has been found to be invaluable use in forensic science or medical jurisprudence which is commonly used to investigate crimes, positive identification of disease persons and disaster victims [6],[7],[8]. Some attribute interplay of genetic and environmental factors to development of digital ridges [9], [10], [11], [12].

Considering the number of ethnic groups in Nigeria, at present not much work has been carried out on the finger print patterns of the populations. Therefore this study aimed at obtaining a comprehensive indigenous digital database of dermatoglyphics pattern for the kanuris in the North-Eastern part of Nigeria and also to compare with findings of similar studies done in other parts of the country.

## 2 MATERIALS AND METHODS

### 2.1 SUBJECTS

This study was conducted on normal male and female pupils of two public schools located in Maiduguri Borno State, Nigeria. Prior informed consent was received from both the school authorities and pupils before the study was conducted. The study was conducted among pupils whose parents were both of the Kanuri ethnic group. A total of three hundred (300) pupils were randomly selected for the study consisting of 150 males and 150 females. Pupils showing any sign of hand or finger injury or deformity were excluded from the study. The research was conducted according to the local research ethics committee guide lines relating to the use of human subjects for research purposes.

### 2.2 PRINTS IMPRESSION

Bilateral fingerprints prints Impression were obtained using endorsing ink and plain duplicating paper while Screening was done on the white duplicating paper containing the prints with the aid of magnifying glass and the different patterns were identified and according to methods of Cummins and Charles [6],[11] as follows:

1. Whorls which is subdivided into Pocket Whorl, Central pocket loop, Double loop and Accidental whorls.
2. Loops subdivided into Ulna loop and Radial loop.
3. Arches subdivided into Tented Arch and Plane Arch.

### 2.3 DATA ANALYSIS

The Total Ridge count, Dankmeijer Index, Furuhata Index and Pattern Intensity Index were evaluated between the two sexes while other data obtained from each subject was recorded in a special form and data was transferred into a computer and analyzed using statistical package (SPSS version 11.0).

## 3 RESULTS

The most predominant fingerprint pattern configuration in the kanuris was Loop (59.14%), followed by Whorls (33.80%) and the Arch (7.07%). It was observed that the kanuri's males had 57.20% as Loops,35.67% as Whorls and 7.13% as Arches while the females kanuri's had Loops 61.07%,31.93% as Whorls and 7.00% as Arches. Males had more abundant Whorls and Arches than females, while the females had more abundant Loops than males (Table I).

*Table I: Frequency of Pattern and Indices for Males and Females Kanuri's*

Sex	Whorls	Loops	Arches	PI- Index	D- Index	F-Index	Mean TRC
Males (N=)	35.67	57.13	7.13	12.85	19.99	62.44	122.64
Females (N=)	31.93	61.07	7.00	12.49	21.92	52.28	115.45
M + F	33.80	59.10	7.07	12.67	20.92	57.19	119.05

*PI=Pattern Intensity ;D= Dankmeijer's ;F= Furuhata's TRC= Total Ridge Count*

The percentage frequency of ulna Loops in males (56.13%) is less than females (59.87%), Radial Loop was also slightly higher in females (1.20%) than in males (1.07%).

The Pattern Intensity Index (PII) was seen to be slightly higher for males (12.85) than for females (12.49), the Furuhata's Index also followed same trend with values for males (62.44) higher than values for females (52.28),while the reverse trend was seen in Dankmeijer's Index , 21.92 for females and 19.99 for males.Other breakdown of the results obtained, see tables II-IV below.

Table II: Frequency of Fingerprint Pattern in Kanuri's

	Whorls				Loops		Arches	
	Accidental	Central Pocket	Double	Pocket	Radial	Ulnar	Plane	Tented
Males	0.20	5.27	4.20	26.00	1.07	56.13	6.13	1.00
Females	0.47	3.93	3.93	21.87	1.20	59.87	6.00	1.00

Table III: The Mean, Standard Deviation (SD) and Coefficient Variation (CV) of the ridge counts on individual digits in Kanuri males

Digits	Right Hand		Left Hand		P-Value
	Mean ± SD	CV	Mean± SD	CV	
I	14.71± 6.14	41.74	13.11±7.19	54.84	0.04*
II	10.35±5.39	52.08	10.40±5.93	57.02	0.94
III	10.64±5.06	47.56	11.19±5.97	58.35	0.39
IV	14.32±4.74	33.10	14.08±5.50	39.06	0.69
V	11.63±4.54	39.04	12.21±4.78	39.15	0.28

Table IV: The Mean, Standard Deviation (SD) and Coefficient of Variation (CV) of ridge counts on individual digits in Kanuri females

Digits	Right Hand		Left Hand		P-Value
	Mean ± SD	CV	Mean± SD	CV	
I	13.43±6.40	47.65	11.59±6.51	56.17	0.01*
II	09.97±5.08	50.60	09.96±5.52	55.42	0.99
III	10.58±5.27	51.26	10.26±5.81	56.63	0.98
IV	13.72±5.84	42.57	13.50±5.78	42.81	0.74
V	11.62±4.87	41.91	11.34±5.03	44.36	0.62

#### 4 DISCUSSION

Digital dermatoglyphics has been found to be significant use in anthropology as a means of personal identification of individual or groups for signing of legal documents as far back as 3000BC in China [11]. Racial differences in fingerprint pattern has been studied extensively in the developed world[12],these led to its use in forensic investigation and diagnosis of genetic diseases [6],[7],[9].The results thus obtained showed that the Kanuri's fingerprint patterns of 33.80% as whorls, 59.10% as loops and 7.07% which is similar to the findings by different workers[13],[14],[15],[16],[17],[18],[19],[20]. when compared with dermatoglyphic data in Tibetans [21] which had whorl frequency of 54.46%, loop frequency of 44.06% and an Arch frequency of 1.48%,while Bolognese in Italy [22] had a whorl frequency of 31.20%, loop frequency of 63.33% and arch frequency of 5.47%,also in Australian Aborigines whose fingerprint frequency of whorl of 64.79%, loop frequency of 32.25% and Arch frequency of 1.42%, while the Japanese had a whorl frequency of 45.95%, loop frequency of 52.38% and Arch frequency of 1.82% [23],[24] this disparity in dermatoglyphic data, could be attributed to racial variations. The Pattern Intensity Index (PII) was seen to be slightly of higher values in Kanuris than to the Igbos and Yorubas [18],[19],[25]. The mean total ridge count (MTRC) was highest on digits I and digits IV, with only digit I having a level of significance in individual digits in both sexes. Therefore it could be due to presence of more whorls and larger loop frequencies in males than their female counterparts.

#### 5 CONCLUSION

The digital dermatoglyphic fingerprint pattern so obtained has showed a similarity with other studies conducted here in Nigeria and tallies with the much common expected distributions of higher pattern of loops followed by whorls and finally Arch patterns.

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