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Comparison of Finger Ridge Counts in Acquired Idiopathic Blindness in Some Selected Schools for the Blind in Nigeria

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Abstract: Dermatoglyphics is defined simply as the study of patterns of the skin (dermal) ridges present on human fingers, toes and the soles. The finger ridge counts as a parameter could be used as an investigative tool in forensics. The study was aimed at investigating whether there is a characteristic finger ridge count difference in acquired idiopathic blindness and comparing with non-blind subjects. The design of the study was non-experimental analytical and cross-sectional. The study had 72 subjects which were 14 female blind, 22 male blind, 18 female non-blind and 18 male non-blind subjects recruited for the study. The fingers ridge counts were determined using a classical scanner type, Hp G3110 Scanjet Scanner (9000x4800 dpi resolution) to obtain a clear and visible print. One–way Anova and Kruskal-Wallis Test using Statistical Package for the Social Sciences (SPSS 20.0 version). The blind male subjects had the highest mean value [66.42± 5.73, 64.36±3.28] on the right index finger and left middle finger respectively. The least mean value [46.63±4.21; 55.15± 2.67] right little finger and the left thumb respectively. The Non-blind subjects had the highest mean value [73.05± 5.30; 72.10±1.86] the right middle finger and left index finger respectively. The least mean value [61.45±2.16; 55.05± 4.67] right thumb and left little finger respectively. It has been established that there is a characteristic finger ridge distribution that could be used to differentiate blind males from non-blind males. This information will be very helpful in forensics.

Keywords: Blind, Non-blind, Finger, Ridge counts, Southern, Nigeria

INTRODUCTION

Dermatoglyphics is defined simply as the study of patterns of the skin (dermal) ridges present on human fingers, toes and the soles. The finger ridge counts as a parameter could be used as an investigative tool in forensics. Several studies have been carried out on dermatoglyphics with respect to diverse health conditions such as Diabetes mellitus type 2,Mental retardation, E-beta thalassemia, Cystic Fibrosis, Dental arch forms, Cancer, Polydactly, Autism, Bruxism, Malocclusion, Interpopulation affinities [1-10]. It has been speculated that there is a possibility of Blindness having manifestation in the fingers via dermatoglyphic patterns but this is yet to be validated.

Aim

The study was aimed at investigating whether there is a characteristic finger ridge count difference in acquired idiopathic blindness and comparing with non-blind subjects. *Scope of the Study*: This study was specifically done on the fingers prints of the subjects. *Justification:* The estimated population of the blind in Nigeria was 1,100,000 as at 2012 taking into account the growth rate (Gr.) per year which is estimated to be 2.5/10 or (¼) of the previous figure. What this implies is that adequate proactive measures has to be adopted and implemented to curb the growth of blindness by 2020 otherwise, the figure would be outrageous. This was the brain behind the WHO & International Agency for the prevention of blindness (IAPB) bringing global Initiative for the elimination of avoidable blindness. If finger ridge count is significantly different in blindness has as have been speculated, it then means that blindness can be predictive as such proactive measures could be initiated to curb the prevalence by 2020.

MATERIAL AND METHODS

Research Design

The design of the study was non-experimental analytical and cross-sectional used to compare finger ridge counts in acquired idiopathic blindness and in non-blindness in Southern Nigerian population. The study had 72 subjects which were 14 female blind, 22 male blind, 18 female non-blind and 18 male non-blind subjects recruited for the study. The blind subjects selected were blind on both eyes with intact fingers and hands whose cause of blindness is unknown. Individuals with foreign nationality, with distorted finger prints that were not visible enough were excluded. Study duration was September 2015-June 2016.

Convenience purposive sampling technique was used and ethical clearance was sort from the ethics committee of the University of Port Harcourt.

DATA COLLECTION

The fingers ridge counts were determined using a classical scanner type, Hp G3110 Scanjet Scanner (9000x4800 dpi resolution) to obtain a clear and visible print which was transferred to the laptop via a USB cord. The prints were zoomed for clarity after thoroughly examined and counted. Hands were cleaned from dirt before taking prints and a little pressure was put to press the fingers on the scanner for adequate contact between the fingers and the scanner to have a clear image of the print and the prints were taken twice. The process was done twice and repeated for the blind and non-blind subjects.

Statistical Analysis

This was done with one–way Anova and Kruskal-Wallis Test using Statistical Package for the Social Sciences (SPSS 20.0 version).

RESULTS

In table 1 the blind male subjects had the following mean distributions: on the right hand, the highest mean value was 66.42± 5.73 on the index finger and on the left hand, 64.36±3.28 which occurred on the middle finger. The least mean value on the right hand was 46.63±4.21on the little finger and on the left hand 55.15± 2.67 which occurred on the thumb. The Non-blind subjects had the following mean distributions: on the right hand, the highest mean value was 73.05± 5.30 on the middle finger and on the left hand, 72.10±1.86 which occurred on the index finger. The least mean value on the right hand was 61.45±2.16 on the thumb and on the left hand 55.05± 4.67 which occurred on the little finger.

Table−1: Mean and Standard Deviation of right and left finger ridge count of Blind and Non-blind Male Subjects.

	Right Finger Ridge Count			Left Finger Ridge Count	
Finger	Category	Mean	±STD.	Mean	±STD.
Thumb	B	53.68	3.48	55.15	2.67
	NB	61.45	2.16	62.65	2.96
Index Finger	B	66.42	5.73	64.15	2.31
	NB	65.75	5.30	72.10	1.86
Middle Finger	B	62.68	2.86	64.36	3.28
	NB	73.05	5.30	65.40	5.18
Ring Finger	B	61.63	4.76	59.00	3.71
	NB	64.25	2.98	59.90	7.18
Little Finger	B	46.63	4.21	56.78	4.36
	NB	64.60	3.26	55.05	4.67

(P<0.05), B-Blind, NB – Non-blind

In table 2 the blind female subjects had the following mean distributions: on the right hand, the highest mean value was 73.25± 2.33 on the middle finger and on the left hand, 75.00 ±2.44 which occurred on the ring finger. The least mean value on the right hand was 62.05±2.94 on the little finger and on the left hand 62.25± 2.38 which occurred on the index finger. The Non-blind subjects had the following mean distributions: on the right hand, the highest mean value was 63.55± 3.53 and on the left hand, 65.75±3.46 which occurred both on the middle finger. The least mean value on the right hand was 62.30±2.57 on the thumb and on the left hand 60.90± 1.97 which occurred on the little finger.

Table−2: Mean and Standard Deviation of right and left finger ridge count of Blind and Non-blind Female Subjects.

	Right Finger Ridge Count			Left Finger Ridge Count	
Finger	Category	Mean	±STD.	Mean	±STD.
Thumb	B	63.05	2.79	63.55	2.48
	NB	62.30	2.57	65.65	2.58
Index Finger	B	66.55	3.80	62.25	2.38
	NB	67.25	3.66	63.70	2.63
Middle Finger	B	73.25	2.33	68.95	7.45
	NB	63.55	3.53	65.75	3.46
Ring Finger	B	72.55	7.00	75.00	2.44
	NB	63.50	2.89	62.80	4.69
Little Finger	B	62.05	2.94	63.40	4.40
	NB	68.95	5.78	60.90	1.97

(P<0.05), B-Blind, NB – Non-blind

In table 3 the test for differences in the finger ridge counts for both the right and left hands of all blind and non-blind subjects. The test revealed significant differences (P<0.05) between the distribution in all except right index finger and left middle finger (P >0.05) for all categories.

Table−3: Summary of Kruskal-Wallis Test for the blind and non-blind subjects

S/N	Null Hypothesis	Test	Significance	Decision
1.	The distribution of ridges on the right Thumb is the same across categories of population	Independent-samples Kruskal-Wallis Test	0.001	Reject the null hypothesis
2.	The distribution of ridges on the right Index Finger is the same across categories of Population.	Independent-samples Kruskal-Wallis Test	0.418	Retain the null hypothesis
3.	The distribution of ridges on the right Middle Finger is the same across categories of Population.	Independent-samples Kruskal-Wallis Test	0.001	Reject the null hypothesis
4.	The distribution of ridges on the right Ring Finger is the same across categories of Population.	Independent-samples Kruskal-Wallis Test	0.001	Reject the null hypothesis
5.	The distribution of ridges on the right Little Finger is the same across categories of Population.	Independent-samples Kruskal-Wallis Test	0.001	Reject the null hypothesis
6.	The distribution of ridges on the left thumb is the same across categories of population	Independent-samples Kruskal-Wallis Test	0.001	Reject the null hypothesis
7.	The distribution of ridges on the left Index Finger is the same across categories of population	Independent-samples Kruskal-Wallis Test	0.001	Reject the null hypothesis
8.	The distribution of ridges on the left Middle Finger is the same across categories of Population.	Independent-samples Kruskal-Wallis Test	0.141	Retain the null hypothesis
9.	The distribution of ridges on the left Ring and Little Finger is the same across categories of Population.	Independent-samples Kruskal-Wallis Test	0.001	Reject the null hypothesis

The significant level is 0.05

DISCUSSION

The trend in the distribution of finger ridge counts among the blind and non-blind males indicated that the non-blind males had mean values for the different fingers than the males except for the right index finger and the right little finger. This suggests that the genetic make-up of the blind subjects differed greatly and resulted in the lower mean value seen across the fingers. It implies that when two unidentified finger ridges are presented for the blind and non-blind, the finger ridge with fewer ridge distributions is likely the blind finger ridge whereas the one with higher ridge distribution can be assumed to be for the non-blind. It could be mentioned that the right index and little fingers where the blind subjects had higher mean values than the non-blind subjects may happened by chance. It again could be assertive that the blind when compared with the non-blind have a characteristic low distribution of finger ridges which could serve as a diagnostic tool for them. This trend in distribution of ridges negates the trends that have been established by previous authors [11-19].

This is a unique presentation and could pose some difficulties in differentiating between blind and non-blind females. It could be assumed that the blind females have higher distribution of the ridges than the females but it must be noted that this is not a characteristic pattern.

The test revealed significant differences (P<0.05) between the distribution in all except right index finger and left middle finger (P >0.05) for all categories. From the results, it appears like there is a marked difference in the finger ridge counts between the blind and non-blind subjects.

CONCLUSION

It has been established that there is a characteristic finger ridge distribution that could be used to differentiate blind males from non-blind males and the females as well though cannot be totally considered as a characteristic pattern for the females. This information will be very helpful in forensics.

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AUTHORS' CONTRIBUTIONS

'Author A' (Paul Chikwuogwo Wokpeogu) designed the study, wrote the protocol, reviewed the design, protocol and the write-up, 'Author B' (Paul John Nwolim) managed the analyses of the study, wrote the first draft of the manuscript and managed the literature searches. All authors read and approved the final manuscript.

Conflict of interest

The authors declare that there is no Conflict of interest.

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