A study of fingerprint pattern and gender distribution of fingerprint in and around Bijapur

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Abstract: *Objective:* This study was undertaken to determine the Predominant fingerprint pattern and Gender distribution of fingerprint pattern in and around Bijapur. *Materials and Methods:* The present study was conducted at department of Forensic Medicine Al-Ameen medical college, Bijapur from 1st Jan to 31st Dec 2009. *Results:* Total subjects included were 500 Males and 500 Females. Among male age group ranged from 18-60 years mean age was 30.88$\pm$9.93 and female age group ranged from 18-60 years. Mean age was 33.9$\pm$11.79.The predominant pattern among both Male and Female was Ulnar loop (38.42%) in Male and (44.56%) in Female. Followed by Plain whorl (24.04%) in Male and (18.24%) in Female respectively. Mean ridge count in Male was 12.4 and in Female were 12. *Conclusion:* The predominant pattern among both Male and Female is ulnar loop. The ridge count in Male was slightly more than in Female.
Keywords: Fingerprint, ridge count.

Introduction

Identification means determination of individuality of a person. It may be complete (absolute) or incomplete (partial). The most successful approach utilizes a combination of more than one method [1]. Out of which fingerprint system is the best and it has been estimated that chances of two persons having identical finger impressions is about one in sixty four thousand million population of the world. And even the fingerprints of identical twins are not similar [2]. Dactylography is the process of taking the impressions of papillary ridges of the fingertips for the purpose of identification of person. Identification by this method is absolute, without any chance of error [3].

The present study was undertaken

1. To determine the predominant fingerprint pattern in and around Bijapur.
2. To determine the possibility of gender distribution in ridge count.

Material and Methods

Total subjects included were 500 Males and 500 Females. Subjects where there was any evidence of injury of fingertips that leads to change in the fingerprint pattern, Students and staff who were

not from Bijapur were excluded from the study. Informed written consent was obtained prior to taking the fingerprints with proper procedure explained to the subjects.

Glass slab-Inking Roller method [4]: The materials which were used for this study were as follows:

1. Printer black Ink-Kores quick drying duplicating ink.
2. Glass plate (12x12inches)
3. Ink roller
4. A foldable magnifying lens
5. Measuring scale, pencil
6. Proforma.

The subject was asked to wash and dry their hands to remove dirt and grease. Then the finger bulbs were rolled on the glass slab the thumbs were rolled towards the subjects body and the fingers were rolled away from the body i.e. thumb in fingers out method. For each individual entire print of ten fingers were prepared.

Statistical methodology: The frequency of each fingerprint pattern was tabulated and the percentage of each pattern was calculated. The Chi square (X^2) was applied to the test. Ridge

count calculation was done by calculating Mean of each finger both in Male and Female. Unpaired 't' test was applied and 'p' value was noted.

Results

In the present study, among Male age group ranged from 18-60 years. Mean age group was 30.88 ± 9.93. In Female age group ranged from 18-60 years. Mean age was 33.9 ± 11.79. The predominant pattern among both Male and Female was Ulnar loop (38.42%) in Male and (44.56%) in Female respectively ($p<0.05$ significant). Followed by Plain whorl (24.04%) in Male and (18.24%) in Female respectively. Central pocket loop whorl in Male was (14.8%) and in Female was (14.68%) respectively. Least noted pattern among both was Exceptional arch [Table1].

Table-1: Showing frequency and percentage of different patterns in Male and Female				
	Patterns			
	Male		**Female**	
	Frequency	**Percentage**	**Frequency**	**Percentage**
Tented Arch	148	2.96	124	2.48
Central pocket loop whorl	740	14.8	734	14.68
Exceptional Arch	26	0.52	12	0.24
Plain Whorl	122	24.04	912	18.24
Radial loop	44	0.88	84	1.68
Simple Arch	374	7.48	38	6.16
Twinned loop	359	7.18	32	6.04
Ulnar loop	1921	38.42	2228	44.56
Accidental	186	3.72	296	5.92
Total	5000	100	5000	100

Table-2: Showing Mean ridge count of Ulnar and Radial loops of all ten fingers in both Male and in Female						
Ridge count	**Male**		**Female**		**t-value**	**p-value**
	Mean	**SD**	**Mean**	**SD**		
Left little finger	11.88	3.1	11.14	3.25	3.7	<0.05
Left ring finger	13.03	3.4	12.36	3.49	3.1	<0.05
Left middle finger	11.39	3.72	11.82	3.55	-1.95	>0.05
Left index finger	12.01	6.88	11.17	3.31	7.6	<0.05
Left thumb	15.93	4.32	13.39	4.29	9.4	<0.05
Right little finger	9.65	3.34	11.48	3.58	-5.7	>0.05
Right ring finger	11.69	4.20	11.77	3.82	-0.32	>0.05
Right middle finger	11.11	4.16	12.66	4.22	-5.9	>0.05
Right index finger	11.78	4.20	10.54	3.64	5.1	<0.05
Right thumb	15.55	4.25	14.63	4.54	3.4	<0.05

In the present study ridge count of Ulnar loop was highest and Radial loop was least. Mean ridge count in Male was 12.4 and in Female was12. The ridge count in Male was slightly more than in Females [Table 2].

Discussion

The present study showed the Ulnar loop was the most frequently observed pattern followed by Plain whorl, in the total subject population in all ten digits (Table 1). The least frequently observed pattern in the total population were simple arches, twinned loops, tented arches, radial loops, accidental types and exceptional in both Male and Female. Igbigbi P.S., Msamati BC reported that Ulnar loops were the most predominant digital pattern type in both sexes, followed by whorls in males and arches in females [5].Similar findings were noticed in the present study except arches in Females as stated in the above study. In contrast to this it was found in the present study that the frequency of arches is more in Males.

Gangadhar.M.R, Rajashekara Reddy.K reported in a study that the basic pattern type loops (57.11%) were common followed by whorls (27.89%) and arches (15.00%) in the general population with significant sex difference and insignificant bilateral difference [6]. Purkait R,observed in his comparative study , a tribal group of Midnapur district in West Bengal where Mundas exhibit higher frequency of whorl and loop patterns while loops are more frequent among Lodhas [7]. These findings are almost in consistent with the present study findings loops followed by whorls. Nithin V reported in his study that most frequent fingerprint pattern as Ulnar loop in the total population as well as in the sex wise distribution [8].These findings are in agreement with the present study. Arabind basu observed high frequency of loops, moderate whorls and low arches [9]. Our study reveals same findings.

Ridge counts in Male and Female: The Mean ridge count in Male was 12.4 and in Female were 12 in the present study. As Ulnar loop was predominant fingerprint pattern both in Male and Female ridge count calculated from it was highest and least ridge count was from Radial loop. Reddy reported the Mean ridge count for Males

as 13.41 and that of Female as 12.04 [10]. In comparison with this study our findings differ for Males but almost same for Females. Plato et al found the Mean ridge count in Male is more than Female [11]. In the present study also Mean ridge count being more in Males than in Females.

Dr.sudesh Gungadin showed that a mean ridge count of 13 ridges is more likely to be Males and 14 ridges is likely to be Females [12]. Vinod C.Nayak reported that significant gender differences occur in the finger ridge count of 12 ridges more likely to be of Males and more than 13 ridges is more likely to be of Female origin in Chinese subjects. In Malaysian Male 11 ridges or less and in Female more than 13 ridges is observed [13]. Jantz RL studied sex and race differences in finger ridge count. He noticed in the Parsis of Indian Males showed significant higher average correlations than Females [14].

Conclusion

The discovery of uniqueness of fingerprints caused an immediate decline in the prevalent use of anthropometric methods of identification and led to the adoption of fingerprints as a more efficient method of identification [15]. The predominant fingerprint pattern was Ulnar loop in both Male and Female. Mean ridge count in Male is 12.4 and in Female are 12. The ridge count in Male is slightly more than in Female. Newer methods are in use now a day for fingerprint identification, hence a great help in knowing the identity of a person.

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