Dermatoglyphic Pattern Study

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ABSTRACT

Objectives: This dermatoglyphic study was focused on to evaluate bilateral dermatoglyphic dimorphism, gender dermatoglyphics dimorphism, pattern occurrence and difference from mean pattern occurrence. **Study Design & Method**: It was conducted at PMC Faisalabad, 152 students of 2nd year MBBS (session2009-2010) took part as subjects. Data was obtained with use of ink pad. Patterns were recorded, classified, statistically analyzed and discussed. **Results & Conclusion:** Arithmetic mean, percentage and mode of data were calculated. Analysis showed that loop pattern has the highest frequency (51.1%) followed by whorl pattern (36.8%). Arch pattern is the rarest pattern (7.8%). There is more predominance of arch and loop pattern than average values in this study. **Key Words:** Dermatoglyphics, arch, ulnar loop, radial loop, whorl

INTRODUCTION

Dermatoglyphics is a term coined by Cummins and Mildo (1943). It is the study of ridged skin found on the finger pad, palms and soles[1] It includes anthropologic, genetic and Egypt logic study of finger prints. Finger prints are dermal ridge configurations having grooves in between them.[2] They develop at 13th week of prenatal life and remain unchanged throughout the remaining life, thus providing mark of individuality.[3] Finger print is a multifactor trait. Large number of genes play their role along with environmental influence.[4] Monozygotic twins have close resemblance in dermatoglyphic pattern showing common genetic factors and least differences showing influences of other factors.[5] Actually there is large number of genes determining the ridge pattern. Chromosomal aberrations affect these genes and produce variations in dermatoglyphic pattern in various chromosomal syndromes.[6] There are three basic dermatoglyphic patterns; whorl, loop and arch.[1] Whorl pattern has two deltas, Loop has one delta and Arch has one central or no delta at all. Loop pattern is further classified into Radial and Ulnar loop depending on the side to which loop opens. Average frequency of Whorl, Ulnar loop, Radial loop and Arch in whole world population is 25%, 70%, <1% and 5 % respectively.[1, 2] In recent years interest increased among the clinicians in medical application of Dermatoglyphics.[6] It has been proved valuable marker trade. Its diagnostic value is well documented e.g. in Downs's syndrome; there is absence of simian crease.[7] In hypospadia, ulnar loop and whorl pattern occurs more and less than normal respectively[8]. High proportion of arches is associated with mental abnormalities.[9] Apart from it, its importance in investigation and forensic is well known.[10] It is just said, as eye is key hole to brain, the skin is an insight into the body.

MATERIAL AND METHODS

The study Data forms were prepared for taking finger prints. Classical ink-pad and paper method was used for its simplicity and convenience. Each digital pad of both hands was pressed against inked cotton pad. Then it was rolled in specific box on data form. By this method, sharp and clear fingerprint were obtained. A total of 250 students were taken as subjects. But the finger prints of only 152 students were accepted. Remaining finger prints were discarded for being incomprehensible. These 152 include 68 male students and 84 female students. The fingerprints were studied with the help of

magnifying glass. Following symbols allotted to denote the study.

A = Arch   **M = Mode**
U= Ulnar loop   **W = Whorl**
% =Percentage
X = Arithmetic mean AM)   **R= Radial loop**

Figure-1
Different types of Loops
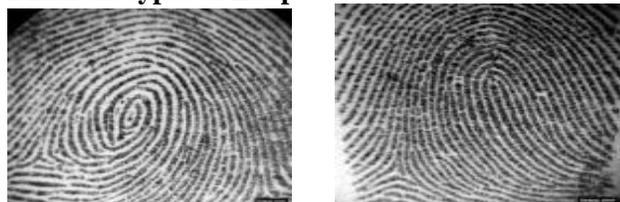
Whorl   Ulnar loop

Radial loop   Arch

RESULTS
Subsequent three aspects have been studied using mathematical formulas.

X = Arithmetic mean (A.M) Arch
To know relative occurrence of each pattern thus providing the basis for comparison both in between patterns and sexes AM is used. Following formula was used to calculate AM.

$$X = \frac{x1+x2+x3+.....+xn}{N} = \frac{\sum xn}{N}$$

N = total No of individuals having specific pattern. n1, n2, n3 ….= No of pattern in individual 1, 2, 3 and so on respectively. The study illustrates four types of X (A.M) showing prevalence of each pattern.
Following table No. 1 summarize them and depicts the values taken from the analysis of collected data.

PERCENTAGE
Being more general than arithmetic mean, it gives an instant idea of comparison. Following table shows % of each pattern in males, females and the combined percentage of each pattern

Table 1:
Arithmetic mean of each pattern

X	Males	Females	Combined
XW	1.676	1.976	1.842
XU	2.764	2.428	2.578
XR	0.220	0.155	0.184
XA	0.338	0.440	0.395

Table 2:
Percentage of each pattern

%	Male	Female	Combined
%W	33.529	39.524	36.842
%U	55.294	48.578	51.175
%R	4.412	3.095	3.684
%A	6.165	8.810	7.895

MODE
It shows prevalence of specific pattern at specific finger and vice versa. So, in accordance, there are two Modes. **Mf;** shows predominance of certain pattern at specific finger. **Mp** shows predominance of specific pattern at certain finger. Following table 3 and 4 shows their comprehensive values taken from this study.

Table 3:
Mf & Mp in male students

	I	II	III	IV	V	Mp
W	38	24	14	27	11	I
U	27	23	48	37	53	V
R	1	6	3	3	2	II
A	2	15	1	3	2	II
Mf	W	W	U	U	U	

Table 4:
Mf & Mp in female students

	I	II	III	IV	V	Mp
W	46	37	20	44	19	I
U	32	23	51	37	61	V
R	1	10	1	0	1	II
A	5	14	12	3	3	II
Mf	W	W	U	W	U	

DISCUSSION AND ANALYSIS

Table 1 shows that;

- **U** pattern is the most predominant pattern both in males and females. **U** pattern is comparatively more prevalent in males than in females.
- **W** pattern is second most prevalent pattern. In this case it is comparatively more prevalent in females than males.
- **A** pattern is third one in predominance having more comparative prevalence in females than in males.
- **R** is most rare pattern. In female it is comparatively rarer.

Figure-1
Summary of All the Results

Graph no.1
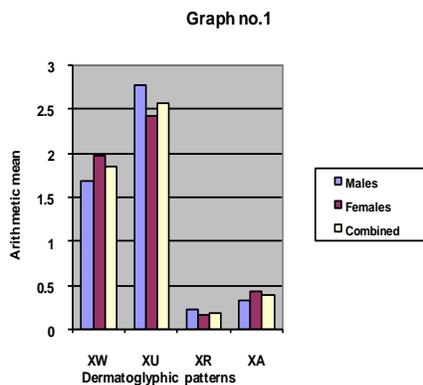
Table 2 shows relative abundance of pattern. It can be compared with average values of the whole world population. Following deviations are well apparent

- **U** pattern is less prevalent as compared with other world population studies, 52% vs.70%. [1, 2]

- **W, A** and **R,** all other three patterns are more prevalent as compared with other world population studies. (**W** 37% vs. 25%), (**A** 7.8% vs. 5%), (**R** 3.6% vs. <1%). [1, 2]

Sexual dermatoglyphic dimorphism is not significant statistically when compared with other studies (p>0.5). [1, 2]

Table 3 and 4 tells which specific pattern occurs more frequently or less frequently at which specific finger and vice versa. Tables show that;

- Finger specific predominance in both male and female is same except in the case of 4th finger. In male **U** and in female **W** pattern predominates.
- The most predominant pattern at finger 1 and 2 is **W** while at finger 3 and 5 is **U.**
- There is not sexual dimorphism in the case of pattern specific distribution.

W and **U** pattern predominates at finger 1 and 5 respectively.

- Both **R** and **A** predominates at finger 2.

CONCLUSION

Analysis showed significant and non significant deviation from average values. It is to be noted that both A and R pattern are more predominant in our people than average values.

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