



DETERMINATION OF AGE, SEX AND STATURE FROM DERMATOGLYPHICS STUDY

Dr. Rajesh Dehankar^{*1}, Dr. Ujjwala Bhakare² and V. M. Paikrao³

¹Associate Professor, Dept. of Anatomy, NKP Salve Institute of Medical Sciences & Research Centre, Digdoh Hills, Nagpur.

²Lecturer, Dept. of Microbiology, NKP Salve Institute of Medical Sciences & Research Centre, Digdoh Hills, Nagpur

³Genticist, NKP Salve Institute of Medical Sciences & Research Centre, Digdoh Hills, Nagpur.

Corresponding Author: Dr. Rajesh Dehankar

Associate Professor, Dept. of Anatomy, NKP Salve Institute of Medical Sciences & Research Centre, Digdoh Hills, Nagpur.

Article Received on 29/05/2020

Article Revised on 19/06/2020

Article Accepted on 09/07/2020

ABSTRACT

Dermatoglyphics is the scientific study of epidermal ridges on palms and soles. It is one of the recent and advancing of medical science. If there is any abnormality in the genetic make-up of parents it is inherited to the children and is reflected in dermatoglyphic pattern. This study is undertaken to find out correlation between dermatoglyphics and age, sex and stature. Identification of ages, sex and stature plays a vital role in forensic and medicolegal investigations. Various dermatoglyphic palmar patterns of various males and females of different age and stature are studied. The present study is carried with an aim to study the dermatoglyphic trait in males and females of different age and stature. The sexual and digital differences in dermatoglyphic patterns of individuals are also seen. The present study is carried out in the department of anatomy, NKP SIMS, Nagpur. It consists of 200 subjects (100 males and 100 females) whose palmar prints are collected from department of skin and venereal diseases. Prints are taken on maplitho paper by using printing ink and studied with magnifying lens. Various parameters of dermatoglyphics like finger tip patterns, total and absolute finger ridge count, a-b ridge, atd angle and simian crease count are analyzed by using Statistical calculations. After complete analysis it is concluded from the study that there is definitely a statistically significant difference in the dermatoglyphic patterns of individuals of different sex, age and stature. There is no regional difference but differences are found in the male and female subjects.

KEYWORDS: Dermatoglyphics, Age, Sex, Stature, Palmar prints, Analysis.

INTRODUCTION

Dermatoglyphics is the scientific study of epidermal ridges and their configurations on the palmar region of hand and fingers and plantar region of foot and toes. Dermatoglyphics is one of the recent and advancing of medical science which depends upon the cornified layer of epidermis and dermal papillae. It is studied and used in the predictions of genetic disorders.^[1] The epidermal ridges are differentiated in their definitive forms during third and fourth month of foetal life, hence they are the significant indicators of conditions existing several months prior to the birth of individual.^[2] Similarities of dermal patterns are seen among relatives especially usually between monozygotic twins,^[3] but still there are distinct variations between unrelated individuals as well as members of different age, stature and between different sexes.^[4,5,6]

Identification of sex plays a vital role in forensic and medico-legal investigations. Identification means determination of the individuality of a person. It may be

complete (absolute) or incomplete (partial). Complete identification means the absolute fixation of the identity of a person. Partial identification implies ascertainment of only some facts about the identity like sex, age and stature, while others still remain unknown. The most successful approach for individualization utilizes a combination of more than one method.^[7] Amongst the number of parameters available for establishing the identity of individual. Fingerprints are considered to be the most precise and reliable indicators of personal and gender identification.^[8] No two fingers are found to have identical prints, and it is an overwhelming mathematical probability that no two will ever be found to match. It has been estimated that chances of two persons having identical finger impressions are about one in sixty four thousand million of the world population. Identical twins originating from one fertilized egg are arguably the most alike of any beings on earth. They share the same DNA profile because they began their existence as one entity, yet their fingerprints are as distinctive as any unrelated persons.^[9]

AIM

Aim of this study is to determine the age, sex and stature from dermatoglyphics study.

MATERIAL AND METHODS

The present study is carried out in the Department of Anatomy, NKP Salve Institute of Medical Sciences and Research Centre, Digdoh Hills, Nagpur. Dermatoglyphic patterns of 200 subjects (100 Males + 100 Females) were studied on both the sides.

The palmar prints of psoriatic patients were collected from the Department of Skin and Venereal Disease, NKP Salve Institute of Medical Sciences and Research Centre, Digdoh Hills, Nagpur. The palmar prints of 200 normal healthy individuals were collected for the study. The present study was approved by the institutional ethical committee and after that the work was started. The dermatoglyphic prints were taken by the "INK METHOD" described by Cummins and Midlo (1961).^[10]

The prints of both the hands were taken on Map Litho paper and then they are subjected for detailed dermatoglyphic analysis with the help of magnifying hand lens and ridge counting was done with the help of sharp needle.

5 Parameters were applied for the study.

- i) Finger Tip Patterns.
- ii) Total finger ridge count.
- iii) Absolute finger ridge count
- iv) 'a – b' ridge count.
- v) Simian crease

Parameters were analyzed to find out mean, SD, Coefficient of variation, & SE. Parameters were confirmed by applying test of significance like 't' test or 'x²' test. Statistical calculations were done by using the formulae like mean, standard deviation etc. Sex differentiation was also done by using various parameters.

OBSERVATIONS

Table 1: Percentage wise digital distribution of fingertip patterns among males and females.

Digits	FTP	MALE		FEMALE	
		Mean	%	Mean	%
I	L	62	62 %	74	74 %
	W	28	28 %	20	20 %
	A	10	10 %	06	06 %
II	L	64	64 %	72	72 %
	W	29	29 %	23	23 %
	A	07	07 %	05	05 %
III	L	73	73 %	69	69 %
	W	19	19 %	27	27 %
	A	08	08 %	04	04 %
IV	L	59	59 %	68	68 %
	W	31	31 %	26	26 %
	A	10	10 %	06	06 %
V	L	61	61 %	71	71 %
	W	33	33 %	22	22 %
	A	06	06 %	07	07 %

Table 2: Frequency distribution of dermatoglyphic patterns among males and females.

Sex	TFRC (Mean value)	AFRC (Mean value)	'a-b' ridge count (Mean value)	'atd' angle (Mean value)	Simian crease
Male	136.46	161.27	41.80	45.60	143
Female	120.22	129.33	36.73	40.69	127

Table 3: Frequency distribution of dermatoglyphic patterns among individuals of different age groups.

Age (years)	TFRC (Mean value)	AFRC (Mean value)	'a-b' ridge count	'atd' angle (Mean value)	Simian crease
15 – 18	136.46	117.89	34.25	39.11	129
19 – 22	120.22	129.63	36.49	40.65	132
23 – 26	152.78	163.58	42.79	45.15	141
27 – 30	131.23	139.72	38.12	41.61	152

Table 4: Frequency distribution of dermatoglyphic patterns among individuals of different height.

Height (cms)	TFRC (Mean value)	AFRC (Mean value)	'a-b' ridge count	'atd' angle (Mean value)	Simian crease
151 – 155	110.54	121.40	33.15	34.26	128
156 – 160	126.87	132.53	37.89	39.17	135
161 – 165	134.21	147.54	40.14	43.48	147
166 – 170	142.14	153.06	43.54	49.85	154
171 – 175	148.58	156.20	44.90	46.79	152
176 – 180	153.17	161.23	45.57	45.21	149
> 180	153.79	162.27	46.27	40.26	144

Table 5: Frequency distribution of dermatoglyphic patterns among individuals of different weight.

Weight (Kgs)	TFRC (Mean value)	AFRC (Mean value)	'a-b' ridge count	'atd' angle (Mean value)	Simian crease
46 – 50	111.11	119.29	34.89	31.34	131
51 – 55	124.47	127.90	39.54	36.56	137
56 – 60	133.58	129.02	41.02	47.71	144
61 – 65	145.25	141.76	42.65	45.64	155
66 – 70	149.54	144.64	44.21	44.98	151
71 – 75	152.09	158.24	45.32	48.13	147

DISCUSSION

In this study various dermatoglyphic parameters were studied in 100 males and 100 females and compared with different authors.

Finger Tip Patterns

Arch Pattern^[11]

In this study 8.2% of arches are found in males and 5.6 % in females. This means percentage of arch pattern is more in males than females.

Loop Pattern^[11]

In males the loop pattern is 73.0 % on the third digit, while in females it is 74.0 % on the first digit, 72.0 % on second digit, 68.0 % on fourth and 71.0 % on fifth digit which shows significant difference.

Whorl Pattern^[11]

The whorl pattern shows significant increase in males mainly on the first digit (28.0 %), second digit (29.0 %), fourth digit (31.0 %) and fifth digit (33.0 %) than females where it is increased only on third digit (27.0 %).

Total finger ridge count and Absolute finger ridge count^[12]

TFRC and AFRC are significantly increased in males as compared to females which is similar to the findings shown by Cummins. TFRC (152.78) and AFRC (163.58) are significantly increased in the age group of 23 – 26 years.

Significant increase is found in TFRC (153.79) and AFRC (162.27) of the individuals having height of >180 cms.

TFRC (152.09) and AFRC (158.24) are significantly increased in males and females having weight between 71 – 75 Kg's.

'a-b' ridge count^[13]

There is significant increase in the mean values of 'a-b' ridge count in males (41.80) than that of females (36.73). Similarly mean values of 'a-b' ridge count are significantly increased in the age group of 23 – 26 years (42.79). 'a-b' ridge count is also significantly increased in the individual having height of >180 cms (46.27) and weight between 71 – 75 kgs (45.32).

'atd' angle^[13]

The mean values for 'atd' angle are significantly increased in males (45.60) than females (40.69). Similarly mean values are increased in age group of 23 – 26 years (45.15). Mean values of 'atd' angle are also increased in individuals having height of 166 – 170 cms (49.85) and weight between 71 – 75 Kgs (48.13).

Simian crease^[13]

Mean values of simian crease are increased in males (143) than females (127). It is also increased in age group of 27 – 30 years (152). Significant increase is found in individuals having height between 166 – 170 cms (154) and weight between 61 – 65 Kgs (154).

CONCLUSION

The present study concludes that

1. There is definitely a statistically significant difference in the dermatoglyphic patterns of males and females which is helpful for identification of sex.
2. Statistically significant difference is found in dermatoglyphic patterns of individual in different age groups.

3. There is statistically significant variation in dermatoglyphic patterns of individuals having variable height and weight.

So present study conclude that statistically significant variations are found in dermatoglyphic patterns of individuals of different sex, age and stature.

REFERENCES

1. Cummins H. and Midlo Palmar and Plantar epidermal ridge configuration (Dermatoglyphics) in European Americans, *Am. J. Phy. Anthropol*, 1926; 9: 471 – 505.
2. Cummins and Midlo Finger prints of palms and soles. An introduction to dermatoglyphics. Dover. Pub INC NEWYORK, 1943.
3. Mollar E. Die Deweistraft der annlichtar in vatersch fidnach weis therotica che Ge selischaft in wein, 1937; 67: 9 – 53.
4. Banerjee D. K. Finger dermatoglyphics of some Bengali Castes. *Man in India*, 1970; 50: 161 – 196.
5. Ashizawa K. The distribution of palmar Dermatoglyphics in the world. *Anthropologic (Paris)*, 1972; 62(1-2): 97 – 134.
6. Thowa A. Dermatoglyphics and the origin of races, *Journal of Human Evaluation*, 1974; 3(3): 241 – 245.
7. K. Vijtextbook of forensic medicine, principles and practice (1st ed.), Churchill Livingstone Pvt, New Delhi, 2001; 62-2.
8. E. Gutierrez-Redomero, C. Alonso, E. Romero, V. Galera: Variability of fingerprint ridge density in a sample of Spanish Caucasians and its application to sex determination. *Forensic Sci Int*, 2008; 180: 17 – 22.
9. J. martin, D. Portabales: Quantitative finger dermatoglyphics in a Spanish population (Tierra de Campos) *Anthropol Anz*, 1986; 44: 227 – 238.
10. Cummins and Midlo Finger prints of palms and soles. An introduction to dermatoglyphics. Dover. Pub INC NEWYORK, 1961.
11. M.I. Arrieta, B. Martinez, A. Simon, L. Salazar, B. Criado, C.M. Lostao: Quantitative and qualitative finger dermatoglyphics in the Basque Valley of Urola, Spain *Anthropol. Anz*, 1990; 48: 68 – 84.
12. M.I. Arrieta, L. Salazar, C. M. Lostao: Finger ridge count in Basque populations: univariate and multivariate comparison with other Spanish populations. *Ann Hum Biol*, 1987; 14: 507 – 516.
13. G. Floris : Sex and side differences and correlations between quantitative palmar characteristics in a sample Sardinian population. *Am J Phys Anthropol*, 1975; 42: 277 – 280.