ORIGINAL ARTICLE

Palmar Dermatoglyphic: A forecast of hereditary diseases by the cumulative and comparative data in eastern Uttar Pradesh.

Ankit Srivastava[1], Anand Bihari[2], Manisha Upadhyay[3], Abdul Ghaffar[4], Padmawati Gautam[5],

[1]Lecturer, Department of Anatomy, Government Medical College and Super facility hospital, Chakrapanpur, Azamgarh, [2]Lecturer, Department of Community Medicine, Government Medical College and Super facility hospital, Chakrapanpur, Azamgarh, [3]Associate Professor Department of Anatomy, Government Medical College and Super facility hospital, Chakrapanpur, Azamgarh, [4]Tutor, Department of Anatomy, Government Medical College and Super facility hospital, Chakrapanpur, Azamgarh, [5]Assistant Professor, Department of Obs & Gynae.,Government Medical College and Super facility hospital, Chakrapanpur, Azamgarh

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Corresponding Author

Corresponding Author: Dr Anand Bihari, Lecturer, Department of Community Medicine, Government Medical College and Superfacility hospital, Chakrapanpur, Azamgarh, Uttar Pradesh - 276128
E Mail ID: anandbhu05@gmail.com

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Abstract

Background: The study of ridges in the form of different designs as Loops, Whorls and Arches, various triangle, ridge counts as Total finger ridge count (TFRC) and Absolute finger ridge count (AFRC) etc. is called as Dermatoglyphics. **Aims & objectives:** This study is mainly focused on checking the validity and reliability of Dermatoglyphics for the prediction of various diseases which are mostly inherited like Bronchial Asthma, Essential Hypertension and Diabetes Mellitus. In this study the finger tip pattern like Loops, Whorls and Arches with Finger ridge count (FRC), TFRC and AFRC is included. **Material & Method:** The Study has been planned in Govt. Medical College, Azamgarh on 190 healthy individual, out of those 140 were male and 50 were female. The finger tip pattern of both hands was collected in the form of Loops, Whorls and Arches with FRC, TFRC and AFRC. The created data was compared with previous case-control study. **Results:** It is been observed that there is no solid proof of Dermatoglyphic reliability because of unavailability of standard parameters (quality & quantity) of finger tip pattern, wide range of counts of patterns and Matching of present study results with both case and control of previous studies. Some studies was found important in which the count grading (from higher to lower) was changed from most normal results as Loops-Whorls-Arches to significant results as Whorls-Loops-Arches. The variability of results can also put a question on the inheritance of these diseases as it could be environment induced. **Conclusion:** Our study conclude that Dermatoglyphics should not be used as a tool for prediction of disease because of high variability in results until the cytogenetic study of these inherited diseases doesn't show any specific parameter range of finger tip patterns in both aspects quality and quantity

Keywords

Dermatoglyphics; Bronchial Asthma; Essential Hypertension; Diabetes Mellitus;Fingertip pattern.

Introduction

With the advancement of science, it's been proved that human's traits, health & wealth are stored in palms as different type of palm ridge pattern as loops, whorls, arches and ridge count as Finger ridge count, Total finger ridge count and Absolute finger ridge count. The study of these patterns on palm and sole is called as Dermatoglyphics. As these frames are made in intrauterine life only around 3rd and 4th month so once it gets formed, cannot be changed. (1) Because of its fixed nature it is used to predispose the different type of diseases at genic level; Essential Hypertension, Bronchial asthma, Diabetes mellitus etc. The study is planned on these diseases only because it accounts for bulk proportion of unhealthy population in India and at global basis. Hypertension estimated about 40 % of adult aged >25 year whereas Bronchial asthma affecting 300 million people globally and according to European Diabetes Care Predicators (EURO DIAB) diabetes will be on top of the mortality and morbidity causes. (2,3,4). The general healthy population has been included for sample collection. The different type of whorl, loops, and arches with its counts was analyzed & compared with previous studies of Essential hypertension, Bronchial asthma and diabetes patients and the control group which will give a forecast and prediction of hereditary diseases in eastern Uttar Pradesh. The novelty of this study is not taking the already known patient which was suppose to be an initiative to achieve or to develop Dermatoglyphics as a tool for pre-identification of sickness and to assess the probable burden in eastern Uttar Pradesh by comparing the data to already available patient data.

Aims & Objectives

1. To analyze various finger tip pattern in general population in terms of its quality and quantity.
2. To compare present data with previous (diseased) population data for probable outcome.
3. To develop Dermatoglyphics as a tool for pre-identification of inherited disease and storage of data for future reference.

Material & Methods

Study type: Cross-Sectional study
Study population and Area: The study was planned in Govt. Medical College, Azamgarh and individuals were taken from institution staff & students who were belonging to eastern Uttar Pradesh.

Study duration and Sample size: This study is completed in Six months from March to August 2019 and carried out on 190 healthy persons who were not diagnosed with Hypertension, Bronchial asthma and diabetes.

Ethical approval and consent: Prior to start the study, the ethical clearance was approved by Institutional ethics Committee & the data has been collected after explaining about study and obtained written consent.

Inclusion criteria: Individuals who have not diagnosed with above diseases and never produce signs and symptoms.

Exclusion Criteria: Those who were diagnosed with any of three diseases.

Data Analysis: Basic landmarks on fingertip patterns (5)

Triradius: It's formed by confluence of three ridge system on finger tip.

Core: approximate centre of finger tip pattern.

Dermatoglyphic pattern: Different types of finger tip pattern found in this study is given below.(Figure 1)

Whorl: These are the circles on finger tip which are three type symmetrical, spiral and double loop.

Loops: loops are single sided half circle. These are of two types Ulnar and Radial.

Arches: Simple horizontal lines called as simple arch and the tented horizontal line are called tented arch.

TFRC: it's a ridge count across a line drawn from core point to triradius point. In whorl larger line would be taken as it has two triradius. TFRC includes sum of ridge count of all 10 fingers.

FRC: The count of FRC is same as counting of TFRC but on single finger tip.

AFRC: shows sum of ridge count of all 10 fingers and includes both the ridge count of whorl pattern.

Procedure: The materials were used are a strip of paper, cello tape, led pencil, dark sketched led pencil paper. The individuals were asked to wash their hands with hand-wash and wiped off. The preparation was done by sticking the cello tape on table. The people were asked to roll their fingertip on led pencil sketched paper and then prints were taken on stacked cello tape on table. After taking all 10 fingers the cello tape was covered with strip paper and finally taken out from table. After removal of the cello tape from the table it was properly labeled with ID, Age, sex, side (right or left) and in each side the ulnar or radial direction was also mentioned. The

collected data was of two types Qualitative (whorl, arch, loop and its different types) and Quantitative (FRC, TFRC and AFRC). The duration of study was around six month.(Figure 2)

Data thus generated was analysed with the help of appropriate test using Microsoft Excel 2007 and SPSS version 16th software.

Research Question:

- The collected data was analyzed and compared with previous case-control study to know, was there any correlation exist between our population and any diseased exploring study?

- The study was planned to know the dermatoglyphic pattern in general population in terms of similarities and dissimilarities so that it can be explored that is there any basic and fixed standard pattern in terms of quality or quantity of loops, whorls and arches exist in population if they are devoid of any hereditary disease?

- The cumulative data has been compared with previous case control study to out break the connection between our general population and diseased population and if the connection found so the precaution and preventive policies should administered. If there is no connection so there are three possibilities:
  - The population is diseased free,
  - These diseases are environment influenced and
  - The most important that there is no specific dermatoglyphic pattern to predict or to diagnose the futuristic health issues.

Results

In both hands the dominant finger tip pattern was loops & least are arches. All the three pattern loops, whorls and arches are more in left hand. In both the hands, the Ulnar loops, spiral whorl and tented arches are predominant among all pattern. In left hand the loops (ulnar loops) are highest followed by whorls and then arches. Ulnar loops are more in little finger and ring finger has highest spiral whorl. Tented arches are highest in index. In right hand, the Grading is as in left hand like maximum loops then whorl and least arches. Middle finger shows maximum no. of ulnar loop and maximum spiral whorl found in thumb and tented arches are more in index finger. There are some finger prints could not be included in the study because of sample errors in pattern (Table 1)

Out of all three Patterns the loops are 54.68 % and whorls are 38.53 % and least is arches. There was some pattern which was not identifiable which accounts 2.05 %. (Table 2)

In both hands, the FRC was higher in thumb & left thumb shows more FRC in comparison with right hand. Index and little finger shows lesser FRC. The mean difference in right and left are considered to be not statistically significant. (Table 3)

TFRC and AFRC are not higher and the difference between these two had matched with other from our finding with other study. (Table 4)

Discussion

The present data has been compared with previous case-control studies and try to interpret our findings with case and control both groups so we can conclude that what is the status of our population.

Comparison with Bronchial Asthma studies

According to Sahana et al. Arches were lower, more ulnar loops & higher TFRC with insignificant AFRC in compare to control group.(1) When it was compared with present study, the proportion of loops and whorls was matching with control group. The proportion of arches was towards patient. TFRC matched with control and AFRC was insignificant. Pakhale's study reveals that arches were much lower with higher ulnar loops, TFRC was normal with high AFRC in patients. (5) Our study also enlightens the same and the difference between TFRC and AFRC was same as control. Cummin's study also shows the same values. (6) Sanjay Sahai et al, Sreenivasulu et al & Ozkargoz et al were given a different grading that was more whorls followed by loops and then arches which was completely different from our study and even among all the studies it was very significant because of gross change in the counts of Loops, Whorls and Arches. (3,7,8)

Comparison with Essential Hypertension Studies

According to K. Sumangala Devi et al FRC was higher in Digit 1 and digit 5 and in our study digit 1 shows same and digit 5 was variable. (9) Rudragouda S Balagouda said more number of arches and radial loop was in patient and higher ulnar loop and whorl in control group so the present study matches with control. (10) Rakesh Garlapati has given same results in patients as our findings. (2) Ahmad revealed decreased loops and increased arches in patients comparatively. (11) Rudy Jose Nodari Junior has said that finger 5 of right hand has high FRC and Ulnar loop is higher in 5th finger of left hand and 4th and 5th

finger of right hand which matches with this study. (12)

Comparison with Type II Diabetes Mellitus Studies: According to Rakate NS the patients showed maximum whorls followed by loops and arches and Ulnar loops were highest in control. This study again shows significance as the grading is changed from whorl-loop-arches. (13) Vijay Nayak et al suggested that there was no difference present between patient and control. (4)

Conclusion

At the end, the compare of our data with previous studies reveals the status of eastern Uttar Pradesh population on the basis of research question. The present data is matched with both like cases and controls at gross level as decreasing order of pattern from loops, whorls and arches so the question is rose that what is the standard counts on which the predictor could predict the disease and even the higher or lesser number of patterns is variable with sample size. Even the range of difference between TFRC and AFRC was also matching with cases and control both. The significance of the present study is enlighten by some study in which the descending grade count from loops-whorls and arches was changed as whorl-loops and arches.(7,8,13) So until the grading of Loops-whorl and Arches does not change, it is quite difficult to predict the disease because of non-availability of standard counts of finger tip pattern. More studies are required at large sample of patients to ensure the grading first and then try to finalize the range of finger tip pattern counts then only dermatoglyphics could be helpful. The fluctuating data also give signs that most of the disease can be environmental influenced until cytogenetics doesn't match with some of restricted parameters of Dermatoglyphics. So finally this article couldn't answer the title in view of prediction of hereditary diseases by Dermatoglyphic values. The study has given multi exploratory areas as different variables associated with Dematoglyphics but not rely only on the same. The purpose of writing this article was to sensitize the future and novel research in the area of Dermatoglyphics.

Recommendation

- Dermatoglyphics can be used at primary level for every patient who visits OPD, just to have alarming idea about health.
- Early counseling about lifestyle on the basis of results of palm ridge.

- The above statements will become more important when the grading of Loops, whorls and arches get changed.

Limitation of the study

Other parameters of Dermatoglyhics are not included. Other Variables like Food habit, living place, stress level and physical activity could have noted.

Relevance of the study

The novelty of this study is archived by comparison of present data with previous article and showed that when whorls become more, there is a chance of something which is not good.

Authors Contribution

AS: Concept design and interpretation of data; AB: Analysis, interpretation of data and final approval of the version to be published; MU: Important intellectual content analysis; AG: Contribution of review of literature and interpretation of data; PG: Contributions to conception and design, acquisition of data.

Acknowledgement

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Tables

TABLE 1 COMPARATIVE TABLE OF FINGER TIP PATTERN BETWEEN RIGHT AND LEFT HAND

Pattern	Left					Total		Right					Total	
	Thumb	Index	Middle	Ring	Little			Thumb	Index	Middle	Ring	Little		
Radial Loop	4	17	3	2	4	30	537	2	18	1	2	4	27	502
Ulnar Loop	85	74	121	83	144	507		69	76	133	70	127	475	
Symmetrical Whorl	11	20	6	24	8	69		20	16	9	41	14	100	
Spiral Whorl	68	53	38	75	28	362	447	76	59	31	70	39	275	385
Double loop Whorl	10	2	2	0	2	16		6	1	2	1	0	10	
Tented Arch	3	18	16	4	1	42	52	3	13	10	2	0	28	38
Simple Arch	5	2	2	0	1	10		5	3	1	0	1	10	
Missing	4	4	2	2	2	14	14	9	4	3	4	5	25	25

TABLE 2 ANALYSIS OF LOOPS, WHORLS AND ARCHES IN BOTH HANDS

Patterns	N	%	Proportion SD
Loops	1039	54.68	0.547+0.027
Whorls	732	38.53	0.385+0.037
Arches	90	4.74	0.057+0.078
Missing	39	2.05	0.021+0.053
Total	1900	100.0	

TABLE 3 COMPARATIVE ANALYSIS OF FINGER RIDGE COUNT (FRC) OF INDIVIDUAL DIGITS BETWEEN RIGHT AND LEFT HAND

	FRC				t-test	p-Value
	Right		Left			
Digits	Mean	SD	Mean	SD		
Thumb	14.67	6.27	15.01	5.20	0.575	0.565
Index	10.29	5.35	10.13	5.24	0.295	0.768
Middle	10.49	5.72	11.12	5.03	1.140	0.255
Ring	13.31	4.23	12.90	3.80	0.986	0.325
Little	12.26	4.03	11.71	3.29	1.457	0.146

TABLE 4 TOTAL FINGER RIDGE COUNT (TFRC) & ABSOLUTE FINGER RIDGE COUNT (AFRC)

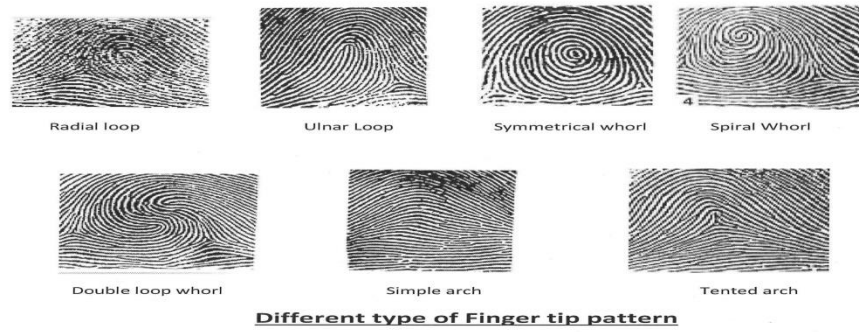|	TFRC Total	AFRC Total
Mean	121.88	147.16
Std. Deviation	32.57	56.45
Minimum Score	37	37
Maximum Score	196	283

Figures

FIGURE 1 TYPE OF FIGURE TIP PATTERN

Different type of Finger tip pattern

FIGURE 2 MATERIAL USED IN STUDY