

DERMATOGLYPHIC ANALYSIS OF PALMAR ANGLE AMONG VARYING GENDER IN SOUTH INDIAN POPULATION

Iankathir Sridharan^{1*}, K. R. Srinivasan²

1. Professor, Department of Anatomy, Aarupadai Veedu Medical College and Hospital (Puducherry), Vinayaka Missions Research Foundations, Deemed to be University.
2. Professor Emeritus, Department of Anatomy, Aarupadai Veedu Medical College and Hospital (Puducherry), Vinayaka Missions Research Foundations, Deemed to be University.

Corresponding author:

Dr. Iankathir Sridharan^{1*}

Email: anat9799@gmail.com

ABSTRACT

BACKGROUND: Dermatoglyphic pattern, epidermal ridges, triradii develops between 4th & 11th week of intrauterine life persists all through the life. Estimation of palmar angle bilaterally among varying gender may provide details for forensic experts, researchers to correlate with existing diseases in the community serving as a screening tool.

AIM: To analyze the dermatoglyphic pattern quantitatively using palmar angles among varying gender bilaterally in South Indian population and identify its significance.

MATERIALS AND METHODS: The present study was undertaken with an aim to analyze the dermatoglyphic features in both the gender. The study consists of 200 participants consisting of 105 males and 95 females. Dermatoglyphic prints were taken by “Ink Method” described by Cummins and Midlo and further subjected to statistical analysis to find the varying angles.

RESULTS: There was a significance value noted with left ATD ($P < 0.001$) when compared to right. There was no significant value bilaterally found with varying gender with respect to the remaining palmar angles.

CONCLUSION: From the present study, it appears that there exists variations in the palmar angle with varying side, which can be used as a screening tool for determining quantitatively, correlating with various congenital diseases due its genetic influence.

KEYWORDS: Palmar angle, ATD, DAT, TDA.

Introduction:

Dermatoglyphics – Scientific study of epidermal ridges over the palm and foot, which was actually coined by Harold Cummins^(1, 2). During the intrauterine phase from 4th to 11th week the ridges over the palm and foot develops^(3, 8) and remains unaltered all through the life unless interrupted by any trauma of any cause. This epidermal ridges makes up the fingerprints⁽⁹⁾ over the extremities serves for identity, particularly pertained to palms. Fingerprints remains unique for each individual and being used as identification of evidence. Researchers have been behind this fingerprints, correlating it with various disease and its varying patterns with respect to gender since many years due to its genetic background. Studies have been made to identify the varying fingerprint patterns over the palm, focusing mainly over the prints found with the pulps of each finger. At times for forensic purpose, human genetics and physical anthropology studies needs further details of the palm, where angles formed by the triradii also plays an important role in identification is often neglected. Hence the present study aimed at determining the details of various angles formed between the triradii of the palm among varying gender in south Indian population.

Materials and Methods:

The study was carried out in Department of Anatomy, Aarupadai Veedu Medical College, Puducherry under VMRF, Salem. 200 subjects participated in the study consisting of 105 males and 95 females. Institutional Research committee and Ethical committee clearance have been obtained. The purpose of the study were briefly explained to the participants and informed consent form have been obtained from them before the start of the study. The following procedures were followed for obtaining the palmar prints.

- Participants were informed to wash their hands thoroughly using soaps for removal of dust particles.
- Stamp pad ink (duplicating ink) was painted over the palm using cotton balls and checked for complete coverage of all the areas of the palm from pulp of the finger until the flexor crease near the wrist as suggested by Cummins and Midlo⁽²⁾.
- White A4 chart have been used for recording the prints
- Print was taken with the wrist (palmar aspect) being pressed firmly over the A4 chart, slowly declining the palm followed by the digits over the sheet.
- Gentle pressure was applied for uniform distribution of prints.
- Pulp of the fingers were rolled form radial aspect to ulnar aspects for obtaining the complete prints separately.

- Palm was gently raised from the sheet and the prints were confirmed for completeness, if any lacunae found, the entire procedure was repeated in a new sheet.
- Prints were obtained bilaterally and hand lens were used for quantitative parameters.

Triradii:

A point formed by confluence of ridges arising from 3 different directions, predominantly found over the palm particularly proximal to flexor crease of metacarpo phalangeal joint and distal to flexor crease near the wrist. The former have been named as “a”, “b”, “c”, “d” from radial to ulnar aspect and the later as “t”. The triradius “a” “d”, “t” were interconnected and the angles between them were measured using Protractor. The data observed were tabulated and analyzed.

Result:

The following were the results obtained from analysis of the observations made.

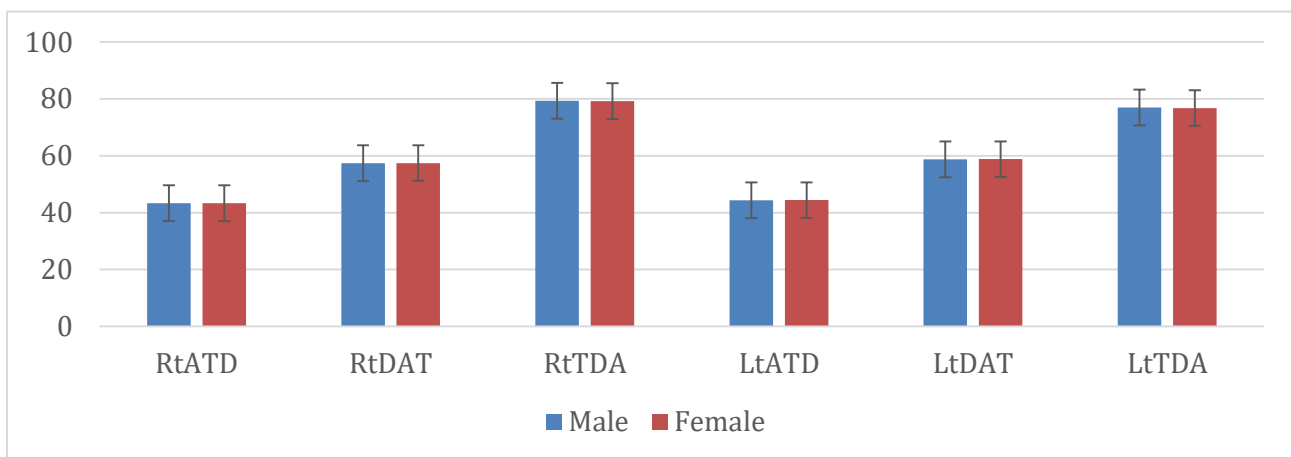
- The mean angle irrespective of gender remains close to the same.
- There is a slight increase in ATD & DAT with left side with respect to right side.
- There is a slight decrease in TDA with left side with respect to right side.
- LtATD is statistically significant.

Table 1: Distribution of palmar angle among varying Gender (n=200)

| Palmar Angles | Gender | N | Mean | SD | p-value |
|---------------|--------|-----|-------|-------|-------------|
| RtATD | Male | 105 | 43.29 | 2.612 | 0.917 |
| | Female | 95 | 43.31 | 2.698 | |
| RtDAT | Male | 105 | 57.36 | 2.539 | 0.317 |
| | Female | 95 | 57.44 | 2.747 | |
| RtTDA | Male | 105 | 79.35 | 2.675 | 0.084 |
| | Female | 95 | 79.25 | 2.953 | |
| LtATD | Male | 105 | 44.29 | 2.507 | 0.05 |
| | Female | 95 | 44.40 | 2.882 | |
| LtDAT | Male | 105 | 58.78 | 2.357 | 0.501 |

| | | | | | |
|-------|--------|-----|-------|-------|-------|
| | Female | 95 | 58.80 | 2.499 | |
| LtTDA | Male | 105 | 76.93 | 2.736 | 0.391 |
| | Female | 95 | 76.80 | 2.720 | |

Figure 1: Gender differences in palmar angles (n=200)



Discussion:

In the present study, the mean value of Rt.ATD in males was 43.29 and for female 43.31 and Lt.ATD in male was 44.29 and in females was 44.40, which was comparatively less in right (42.48) and more for left (45.94) as reported by Vaishali S et al ⁽⁴⁾., and for males comparatively less bilaterally Right (41.2) and Left (40.3), for female Right (40.2), left (40.4) as reported by Deepa G et al ⁽⁵⁾., but comparatively less (male – 55.30 & female – 50.50) than that of reported by Deepa Ut et al⁽⁶⁾., but comparatively less (right – 48.19 & left – 47.49) as reported by Anjali Wanjari, N et al ⁽⁷⁾.,

The mean value for Rt.DAT in male was found to be 57.36 and for female 57.44 whereas Lt.DAT in male was found to be 58.78 and in female 58.80, which was comparatively for males less in right (58.5) and found to be near equal for left (58.7) and for female right (58.9) and left (59.4) as reported by Deepa G et al ⁽⁵⁾.,

The mean value for Rt.TDA in male was found to be 79.35 and in female 79.25 whereas for Lt.TDA in male was found to be 76.93 and in female 76.80, which was comparatively for males more for right (81.6) and less for left (78.7) and for female right (80.1) and females (80.5) reported by Deepa G et al ⁽⁵⁾.,

Conclusion:

From the present study, dermatoglyphic pattern varies with right and left palm of varying gender. Comparison of varying angles formed by the triradii with varying gender shall facilitate further research into existing disease which has got genetic influence by correlating them. This method adopted shall be a noninvasive screening tool for determining various congenital diseases in the community and shall be a greater support in the field of forensic medicine too.

Acknowledgments:

Authors would like to thank the other faculties of the Department of Anatomy, Aarupadai Veedu Medical College and Hospital, Puducherry, Vinayaka Missions Research Foundations, Deemed to be University, Salem, Tamilnadu, for their humble support to complete the research work.

Conflict of Interest:

None declared

Reference:

1. Cummins H and Midlo. Palmar and plantar epidermal configurations (dermatoglyphics) in European Americans. *Am.J. Phys Anthropol*, 1926; 9:471-502
2. Cummins H. and Midlow C. Fingerprints Palms and Soles, an introduction to Dermatoglyphics. 1961, Newyork, Dover Publication
3. Moore, K. L., & Dalley A. F. (2006). Upper Limb. *Clinically Oriented Anatomy* (5 ed., 674-675). Philadelphia: Lippincott Williams and Wilkins.
4. Vaishali S, Nandanvankar D, Bhusari P, Anturlikar. Prashant Bhusari .A Quantitative Study of Palmar Dermatoglyphics in Congenital Heart Diseases. *Indian J Anat*. 2018; 7(4):424–9.
5. Deepa G. & Shrikrishna B.H. / Study of Gender Differences in Palmar Dermatoglyphics among Healthy Adults. *Indian Journal of Anatomy*.2016; 5(1). **DOI:** <http://dx.doi.org/10.21088/ija.2320.0022.5116.14>
6. Deepa UT, Arasan DG. Dermatoglyphics pattern in children with congenital malformations. *Int J Contemp Pediatr* 2018; 5:749-53.

7. Anjali Wanjari, N. D. Pise. "Study of Palmar Dermatoglyphics in Congenital Heart Disease". Journal of Evidence Based Medicine and Healthcare; Volume 1, Issue 8, October 15, 2014; Page: 978-986.
8. Saddler, T. W. (1990). Langman's Medical Embryology (6th ed., p. 400). Baltimore: Williams and Wilkins.
9. Herschel, W. J. (1880). On the Skin Furrows of the Hand. Scientific Journal "Nature", 23, 79.
<https://doi.org/10.1038/023076b0>