DERMATOGLYPHIC PATTERN AMONG SOUTH INDIAN WOMEN WITH HYPOTHYROIDISM IN RELATION TO POLYCYSTIC OVARIAN SYNDROME

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Abstract Introduction

Dermatoglyphics is the study of epidermal ridge patterns (fingerprints) on the skin of the fingers, palms, toes, and soles that commence during embryological development between the sixth and seventh week of intrauterine life, and are fully formed by the 21st week. It has been used widely in fields of anthropology, genetics, and medicine and as a valuable non-invasive diagnostic tool and early assessment of risk for certain medical conditions. The presentation of PCOS in women varies from simple acne to infertility and may even be associated with disorders like Diabetes mellitus, Hypothyroidism, Dyslipidemia. This shows that the individual's response to androgen varies i.e ethnic variation exists. They are at risk of developing Coronary artery disease, Metabolic syndrome, Type 2DM, Endometrial cancer.

Materials and Methods

A total of 300 subjects will be used for the study. Out of total number of 300 subjects, out of these 150 was normal subjects and 150 was hypothyroidism with PCOS. Female subjects of 20 to 40 years age group among south Indian population. Patients diagnosed hypothyroidism and PCOD attending the tertiary care center will be used for this study. The individuals not suffering from hypothyroidism and PCOD without any family history of hypothyroidism and PCOD will be taken as control group. Patients suffering from skin conditions which would affect the proper recording of the dermal ridges will be excluded from the study.

Results

In this study the mean age group of PCOS is 29.65 years and in control group 30.15 years. In Case Group (hypothyroidism with PCOS) mean of Right-hand Whorls patterns (2.27 with SD 1.55) was noticed and in controls was whorl patterns 2.40 with SD 1.51 was noticed. Mean Left-hand Whorls among Case was 2.20 with SD 1.56 and in control group Left-hand Whorls was 2.50 with SD 1.84. Mean Right-hand Arches among Case was 0.17 with SD 0.38 and in

control group Right-hand Arches was 0.60 with SD 0.70. Mean Left-hand Arches among Case was 0.20 with SD 0.55 and in control group Left-hand Arches was 0.50 with SD 0.85. Mean Right-hand Loops among Case was 2.57 with SD 1.48 and in control group Right-hand Loops was 2.10 with SD 1.52. Mean left-hand Loops among Case was 2.63 with SD 1.54 and in control group left-hand Loops was 2.10 with SD 1.37.

Conclusion:

Dermatoglyphics could be used as a cost effective tool for the preliminary prediction of certain medical conditions like hypothyroidism & PCOS. Early detection of the problem could eventually lead to formulate an efficient treatment plan. This would be of great help to come to some conclusion about the possibility of cause of infertility and failures of Hypothyroidism or repeated abortions. From the result of present study, it seems that now there is a time to think whether study should be made compulsory before proceeding for therapy in PCOD patients to avoid psychosocial and financial stress to the couples.

Keywords: Dermatoglyphic, Hypothyroidism, Polycystic Ovarian Syndrome

Introduction

Dermatoglyphics is the study of epidermal ridge patterns (fingerprints) on the skin of the fingers, palms, toes, and soles that commence during embryological development between the sixth and seventh week of intrauterine life, and are fully formed by the 21st week. [1] It has been used widely in fields of anthropology, genetics, and medicine and as a valuable non- invasive diagnostic tool and early assessment of risk for certain medical conditions. [2] The relationship between different dermatoglyphic traits and various medical diseases have been widely evaluated, and the main hypothesis for support of this association is "if growth of the limbs is disturbed in very early fetal life, changes in the epidermal ridge configurations are likely". [3] It should be added, however, that both environmental and genetic factors do influence the development of dermatoglyphics. [4]

In 1892, Sir Francis Galton 70, anthropologist and cousin of Charles Darwin, is considered to be the inventor of dermatoglyphics whereas Cummins is considered to be the father of dermatoglyphics. Sir Francis Galton was the first to introduce practical method of individual finger print identification. [5] He was the one responsible for basic nomenclature to introduce arch, loop and whorl patterns. He scientifically demonstrated permanence of finger prints and also the first to start twin research. Harris Hawthorne Wilder in 1897 was the first American to study dermatoglyphics named A, B, C, D, Triradii points. He was the first to invent main line index, studied thenar and hypothenar eminence, zone II, III and IV. In 1923, Kristine Bonnevie was the first person to start extensive genetic studies. [6]

The presentation of PCOS in women varies from simple acne to infertility and may even be associated with disorders like Diabetes mellitus, Hypothyroidism, Dyslipidemia. This shows that the individual's response to androgen varies i.e ethnic variation exists. [7] They are at risk of developing Coronary artery disease, Metabolic syndrome, Type 2DM, Endometrial cancer. More than 50% of the PCOS women are obese but can also present as lean individuals. Obese

PCOS women have higher risk of developing Insulin resistance & Infertility than lean PCOS women. [8]

However lean PCOS women have their mean hormones (Androgens, Testosterone, Estradiol) levels higher than their age matched controls. This multi-endocrine disorder is more commonly found among teen aged girls to early thirties i.e in the early phase of reproductive age of women. [9] Even though Hyper Insulinemia, elevated LH/FSH ratios are not included in criteria for diagnosing PCOS, many women with this syndrome

were found to have associated elevation of fasting Insulin, raised LH/FSH ratio. Co-existence of Hypothyroidism in PCOS is found in many young girls with menstrual irregularities and infertile women. Thyroid hormone sensitivity by ovaries could be explained by the presence of thyroid receptors in human oocytes.
[10]

Materials and Methods

Tools: Glass plate, round bottle, magnifying hand lens, ink roller, printers ink.

Method: Cummins and Midlo technique was used.

Procedure: After the written consent of the study subject, the palm and finger prints will be taken as follows. Patient will be asked to wash hands thoroughly with soap and water. Finger print pattern of subjects will be obtained by using ink smeared glass plate following Cummins and Midlo technique as detailed below. Glass plate will be smeared with a thin layer of printers' ink with the help of roller. The hand of the subject will be placed on the ink smeared glass plate with a little pressure. The ink smeared hand will be placed on a sheet of bond paper kept on the round bottle. The hand will be rolled backwards from the root of the hands to tips of fingers, with minimum pressure applied on the dorsum of the hand by the researcher. The prints of each finger tips / inter digital areas / palms will be taken on the same paper for the second time for the safety measure.

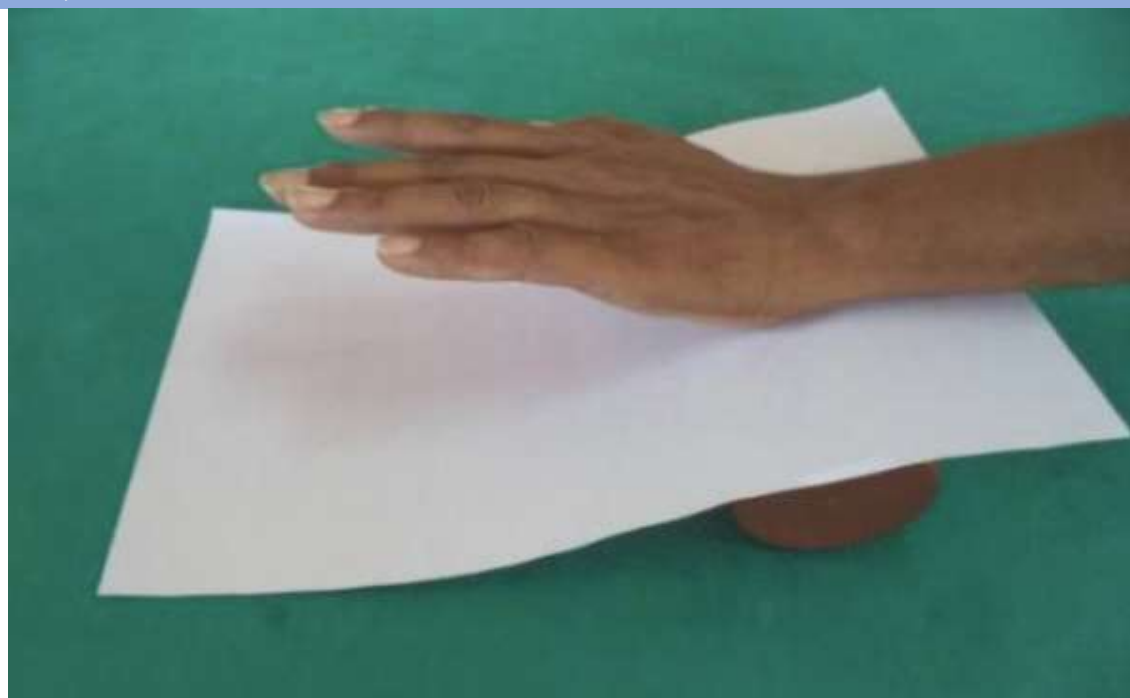Figure1. Glass plate smeared with ink with the help of roller.

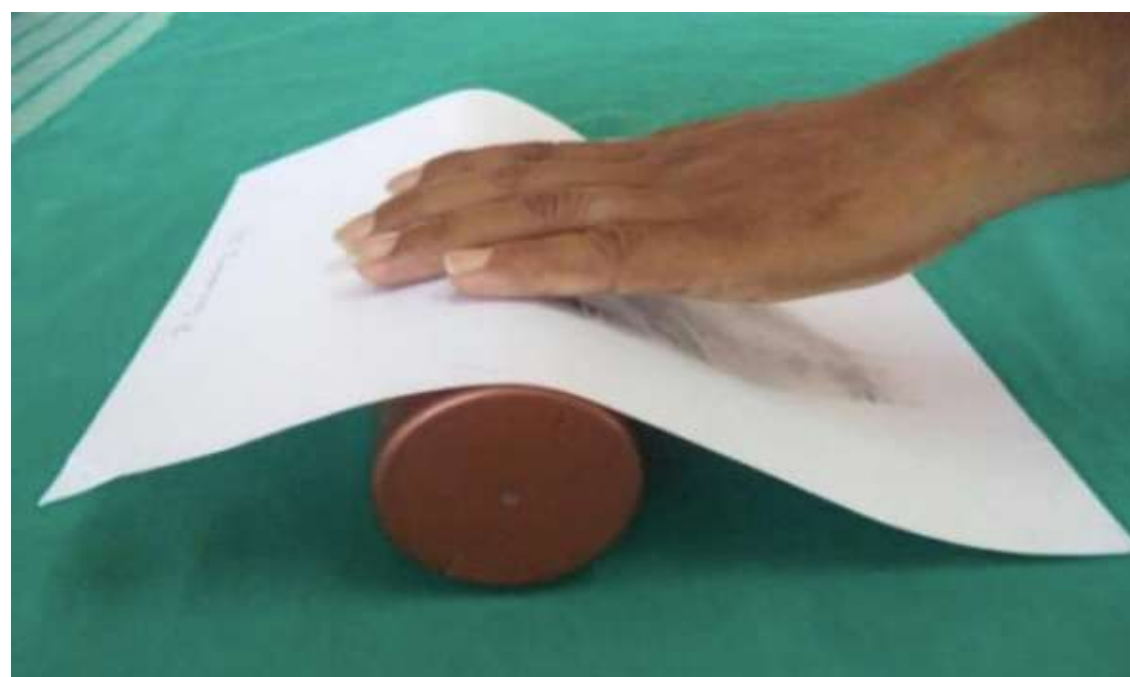Figure 2. Method of smearing ink to the palm of subject from Glass plate.

Figure 3. Method of rolling ink smeared hand over the paper

Study Design: A total of 300 subjects will be used for the study. Out of total number of 300 subjects, out of these 150 was normal subjects and 150 was hypothyroidism with PCOS.

Inclusion criteria:

- Female subjects of 20 to 40 years age group among south Indian population.

- Patients diagnosed hypothyroidism and PCOD attending the tertiary care center will be used for this study.
- The individuals not suffering from hypothyroidism and PCOD without any family history of hypothyroidism and PCOD will be taken as control group.

Exclusion criteria:

- Patients suffering from skin conditions which would affect the proper recording of the dermal ridges will be excluded from the study.
- Patients suffering from pregnancy induced hypothyroidism and PCOD will be excluded.
- Patients suffering from

 a) Anomalous development of the epidermis and its derivatives,

 b) Excessive pigmentation of epidermis (Melanism),

 c) Excessive production of cornified layer (Ichthyosis),

 d) Naevus or mole (Benign proliferation of melanocytes),

 e) Ectodermal dysplasia will be also excluded from this study.

Fingertip ridge count

1. Finger ridge count of each of the ten fingers was done by line drawn from triadial point of core.
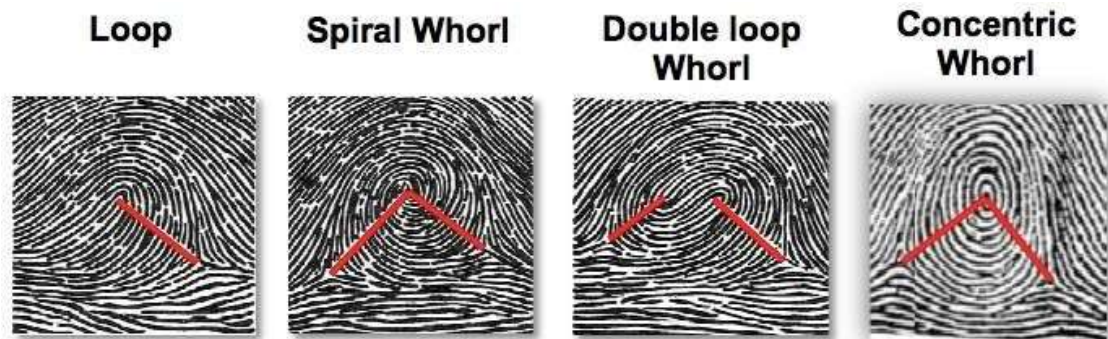2. Total number of ridges were counted.

Figure: Method of fingertip ridge count.

Statistical Analysis:

The values obtained by finger and palm print analysis were statistically analysed statically analysed with SPSS software version 25th

 1. Mean, standard deviation of all descriptive data will be obtained.

 2.   Paired t test will be used to compare the mean d ridge counts, atd, dat and tda angles and total finger ridge counts of both right and left hands.

Results

Table 1: Distribution of Age Group among Case and Control Group

	Mean	SD	p-value	Inference
Case	29.65	4.55	0.93	NS
Control	30.15	4.51		

In this study the mean age group of PCOS is 29.65 years and in control group 30.15 years in Table 1.

Table 2: Distribution of Right-hand Whorls among Case and Control Group

	Mean	Median	SD	p-value	Inference
Case	2.27	2.00	1.55	0.89	NS
Control	2.40	2.00	1.51		

In Case Group (hypothyroidism with PCOS) mean of Right-hand Whorls patterns (2.27 with SD 1.55) was noticed and in controls was whorl patterns 2.40 with SD 1.51 was noticed in Table 2.

Table 3: Distribution of Left-hand Whorls among Case and Control Group

	Mean	Median	SD	p-value	Inference
Case	2.20	3.00	1.56	0.59	NS
Control	2.50	2.00	1.84		

In table 3, Mean Left-hand Whorls among Case was 2.20 with SD 1.56 and in control group Left-hand Whorls was 2.50 with SD 1.84.

Table 4: Distribution of Right-hand Arches among Case and Control Group

	Mean	Median	SD	p-value	Inference
Case	0.17	0.00	0.38	0.10	NS
Control	0.60	0.50	0.70		

In table 4, Mean Right-hand Arches among Case was 0.17 with SD 0.38 and in control group Right-hand Arches was 0.60 with SD 0.70.

Table 5: Distribution of Left-hand Arches among Case and Control Group

	Mean	Median	SD	p-value	Inference
Case	0.20	0.00	0.55	0.43	NS
Control	0.50	0.00	0.85		

In table 5, Mean Left-hand Arches among Case was 0.20 with SD 0.55 and in control group Left-hand Arches was 0.50 with SD 0.85.

Table 6: Distribution of Right-hand Loops among Case and Control Group

	Mean	Median	SD	p-value	Inference
Case	2.57	2.00	1.48	0.47	NS
Control	2.10	2.50	1.52		

In Table 6, Mean Right-hand Loops among Case was 2.57 with SD 1.48 and in control group Right-hand Loops was 2.10 with SD 1.52.

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Table 7: Distribution of Left-hand Loops among Case and Control Group

	Mean	Median	SD	p-value	Inference
Case	2.63	2.00	1.54	0.40	NS
Control	2.10	2.00	1.37		

In Table 6, Mean left-hand Loops among Case was 2.63 with SD 1.54 and in control group left-hand Loops was 2.10 with SD 1.37.

Discussion

In our study, in Case Group (hypothyroidism with PCOS) mean of Right-hand Whorls patterns (2.27 with SD 1.55) was noticed and in controls was whorl patterns 2.40 with SD 1.51 was noticed. Recently, Valkenburg observed that the Right-hand Whorls in PCOS was 2.31. [11] On the other hand, we observed that the fingertip dermatoglyphic pattern of PCOS is significantly different from case and control group in terms of reduction in whorl pattern.

In this study, mean Left-hand Whorls among Case was 2.20 with SD 1.56 and in control group Left-hand Whorls was 2.50 with SD 1.84. This is also indicated by which showed that the pattern of the mean Left-hand Whorls has a high value. [12] A low value compared with the control sample was also found due to the low rate of Whorls in patients with the syndrome, as the density index is the average number of delta in the total sample. [13] Table shows the recorded and expected frequencies of phenotypic patterns of finger. The presence of this relationship between the phenotype of the Dermatoglyphics of the fingers and the incidence of PCOS may explain that factors affecting the female reproductive system in its early embryonic life may affect the development of Dermatoglyphics patterns. [14]

In this study, Mean Left-hand Arches among Case was 0.20 with SD 0.55 and in control group Left-hand Arches was 0.50 with SD 0.85. The frequency of the Mean Left-hand Arches was greater than expected compared to the control group, as opposed to the projected frequency of the cycle, which was lower than expected compared to the control group. Whereas, while the arches were zero for the middle of the right hand and index finger in the left hand compared to the control group, which was repeated at 2 and 10, respectively. [15]

In this study, mean left-hand Loops among Case was 2.63 with SD 1.54 and in control group left-hand Loops was 2.10 with SD 1.37. As for the pattern of Radial Loop, there was an increase

in frequencies in all fingers for patients with the syndrome compared to the control group except the index finger, where the frequency was low compared to the control group.

In present study 81.25% of infertile females having PCOS are showing chromosomal aberrations either structural or numerical. Few of those infertile females with PCOS which showed chromosomal abnormality, suffered from repeated failures of ARTs. May be this is the time to think whether the chromosomal abnormalities in these patients is the cause of failures of ARTs in spite of best of the treatment. If it is so it might give a guideline to the treating doctors to decide about the line of treatment and might also help the patients to avoid financial and psychosocial stress of failure in treatment.

Dermatoglyphic and chromosomal findings have definite co- relation because dermatoglyphic patterns are under genetic influence. Modern cytogenetic method allows precise identification of chromosomes and thus helps in studying the co-relation between individual chromosomal aberrations and dermatoglyphic features. Due to this, diagnostic role of dermatoglyphic patterns is bright especially in chromosomal abnormalities. Above dermatoglyphic findings might help to get a guideline to know whether female patients with primary infertility have PCOS.

Conclusion:

Dermatoglyphics could be used as a cost effective tool for the preliminary prediction of certain medical conditions like hypothyroidism & PCOS. Early detection of the problem could eventually lead to formulate an efficient treatment plan.

This would be of great help to come to some conclusion about the possibility of cause of infertility and failures of Hypothyroidism or repeated abortions. From the result of present study, it seems that now there is a time to think whether study should be made compulsory before proceeding for therapy in PCOD patients to avoid psychosocial and financial stress to the couples.

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