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Review Article

DERMATOGLYPHICS IN PRIMARY AMENORRHEA – A ROBUST REVIEW

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ABSTRACT
Dermatoglyphics deals with scientific study of the patterns of skin ridges present on the fingers, toes, palm of the hands and soles of feet. Genetic disorders like; Turner's syndrome, Gonadal dysgenesis etc, present with primary amenorrhoea and tend to produce characteristic dermatoglyphic abnormalities. Due to their multifactorial etiology, extensive studies have been undertaken to ascertain the relationship between the two i.e. amenorrhoea and Dermatoglyphics. We present a comprehensive account of the research conducted so far in this regard with a desire as well as concern for further exploration of this technique into the newly discovered genetic disorders.

Keywords: Primary Amenorrhea, Dermatoglyphics, Ridges, Atd Angle

INTRODUCTION
The term Dermatoglyphics has its origin from Greek words, derma means skin and glyphic means carvings (Gibbs, 1967) Since many genes take part in the formation of characters, it is possible that genes which predispose to familial disease may also influence the ridge patterns so that particular constellations of dermatoglyphic features may be characteristic of a particular disease (Fuller, 1973). In genetics it is used as a supportive investigation (Gangane, 2008)

***Embryological basis in dermatoglyphics*:**
The epidermal ridges are formed in the third month of intrauterine life. The ridges are made up of the pores of the sweat glands, present on the palms, palmar surface of the fingers, on the soles and the plantar surface of the toes. Dermal ridge differentiation takes place early in fetal development. Structural changes or a change in the arrangement of the ridges does not occur thereafter. Even after birth, no developmental changes occur in the ridges.

The resulting ridge configurations are genetically determined and influenced or modified by environmental factors (Sadler, 2010). They are stable throughout life, unique to the individual and significant as a means of identification. The details of small area are never repeated either in same individual or in a different individual; such is the variability of these ridge patterns. Thus palm prints today are extensively used for the identification of the persons (Mutalik et al., 1968).

Researches in the past
In the past, characteristic dermatoglyphic abnormalities were reported in genetic disorders like Down's syndrome, Cat cry syndrome, Klinefelter's syndrome etc (Schaumann and Alter, 1976). Other genetic disorders like; Turner's syndrome, Gonadal dysgenesis etc, manifest with primary amenorrhoea. Amenorrhoea may be primary or secondary. Primary amenorrhoea is when menstruation fails to commence up till the age of 16 years despite development of secondary sexual characters (Padubidri and Daftary, 2011). There is multifactorial i.e. genetic as well as environmental etiology associated with both amenorrhoea and Dermatoglyphics. (Meenakshi et al., 2006) so efforts have been taken to ascertain the relationship between the two.

Lindsten *et al.* (1963) analysed dermatoglyphics in five subjects of Turner's syndrome and compared with control Swedish females. They found following features them:

1) High degree of pattern intensity on the fingers as measured by high total ridge count.

2) Number of ridges between the triradii 'a' and 'b' on the palms were increased.
3) Distally placed 't' triradius.
4) Increased mean 'atd' angle.

Forbes (1964) studied digito-palmar dermatoglyphics in twenty-nine subjects with classic Gonadal dysgenesis and short stature, in twenty-five of whom ideograms showed deletion or modification of an X chromosome in some of all of their cells. He found that there was-

- Increased incidence of ulnar loops on the first digit of both hands.
- No true whorl on the thumb of any patient.
- Increased frequency of patterns in the hypothenar areas.
- Decreased frequency of thenar patterns.
- The high incidence of distally placed axial triradii.
- The 'atd' angle averaged 59^{o}.

Holt and Lindsten (1964) described palm and finger prints of 49 Swedish cases of Turner's syndrome. They were analyzed for the symptoms of ovarian dysgenesis. They observed the following features:

1. Palmar dermatoglyphics
- Increased frequency of hypothenar pattern in turners as compared to controls.
- Frequency of thenar pattern was decreased in turners as compared to controls.
2. Finger tip patterns
- Higher frequency of ulnar loops in turners as compared to control group.
- The frequency of radial loops in turners was decreased than in controls.
- There was a decreased frequency of arches in turners as compared to control group.
- Increased frequency of whorls in turners as compared to controls.
- Highest frequency of whorls on the digits II and IV in turners as well as controls.
3. Dermatoglyphic measurements
- a-b ridge count was significantly higher in turners than controls.
- Mean total finger ridge count was significantly higher in turners than in control females. But the difference in mean total finger ridge count between turners and control males was not significant.
- Mean atd angle was significantly increased in Turner's syndrome than controls.

Mutalik *et al.* (1968) studied dermatoglyphic patterns in ten female subjects of primary amenorrhoea. Their digito-palmar and plantar dermatoglyphic patterns were studied and classified as follows:

1. Patients of Turner's syndrome showed excess of whorls on fingers, increased 'atd' angle, increased ridge count and ulnar deviations of 'b' triradius.
2. Isochromosome patient showed increase in ulnar loops and horizontal loop on right sole.
3. Dermatoglyphic findings in a case of Testicular feminization syndrome were horizontal loops on both soles, in hallucal areas.
4. Five cases of Developmental anomalies of genital tract showed increased ulnar loops. In addition, one case had a horizontal loop on left sole and one case had arch fibular on right hallucal area.

Mann *et al.* (1983) studied dermatoglyphic patterns in the four girls with XY Gonadal dysgenesis and three female carriers revealed high a-b palmar ridge counts and a tendency for the 'A' mainline to terminate in thenar area.

Ferreira *et al.*(1985) determined A'-d ridge count in a sample of 108 patients affected by the Ullrich Turner syndrome (UTS), 28 women with primary amenorrhoea, 111 normal women and 50 normal men. The A'-d ridge count had a significantly higher value in UTS patients.

Kalpana and Satyanarayana (1999) performed digito-palmar dermatoglyphic studies involving 70 primary amenorrhoea cases and 30 controls. They observed less mean values of finger ridge counts and Interdigital ridge counts, marked difference regarding an accessory axial triradius and highly elevated axial triradius, different `t` values of Interdigital ridge counts, lower Dankmeijer`s index in the study group as compared to controls.

Meenakshi *et al*. (2006) performed a study on one hundred amenorrheic patients whose age ranged from 16 to 30 years. According to them the feature which could be applied as marker for amenorrhoea were the presence of arch pattern in the 2nd left finger, loop pattern on the 5th right finger, hypothenar pattern in the left palm and Sydney line in the 1st interdigital area of the left palm.

CONCLUSION

Although numerous dermatoglyphic studies have been reported from time to time with reference to various clinical and non-clinical conditions, but there is dearth of information related to study of dermatoglyphic patterns with reference to primary amenorrhea. So it warrants further extensive study to deduce correlations between the two in the Indian sub continent as well as globally.

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