Research Article

Dermatoglyphic analysis of fingertip and palmer print patterns of obese children

Nikha Bhardwaj[1], Pankaj Bhardwaj[2], Vineeta Tewari[1], Mohammed Shakeel Siddiqui[1]

[1]Department of Anatomy, Era's Lucknow Medical College and Hospital, Lucknow, Uttar Pradesh, India.
[2]Department of Community and Family Medicine, All India Institute of Medical Sciences (AIIMS), Jodhpur, Rajasthan, India.
Correspondence to: Pankaj Bhardwaj, E-mail: pankajbhardwajdr@gmail.com

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Abstract

Background: *Dermatoglyphics* is the scientific term used for study of epidermal ridges and their configuration on the palmer region of hand and planter region of foot and toes. Obesity is a multifactorial condition (polygenic and environmental). Factors determining obesity in utero may influence dermatoglyphic patterns.

Objectives: To identify dermatoglyphic patterns in obese individuals and to find out the association between the dermatoglyphic patterns and obesity.

Material and Methods: Three government and three private schools were selected by simple random sampling, with a sample size of 370. A predesigned and pretested questionnaire was used to interview the study participants to elicit the information. Body weight and height was measured and body mass index was calculated.

Results: In 42% obese individuals, there was an increase in the number of arches in thumb, mainly right thumb. Out all obese, 29% showed increase in the ATD angle value. There was presence of additional triradii in 17% of obese individuals. Among all obese individuals, 21% had abnormal endings of the main palm lines whereas 11% had reduced C line.

Conclusion: Dermatoglyphic patterns can be used as a marker to detect the obesity. An increased number of arches in thumb may be considered in identifying individuals at high risk for obesity. So, necessary preventive and promotive health measures can be adopted in such identified high-risk individuals.

KEY WORDS: Dermatoglyphics, obese, children

Introduction

Dermatoglyphics is the scientific term used for study of epidermal ridges and their configuration on the palmer region of hand and planter region of foot and toes. Many articles have been published in medical journals around the world, and dermatoglyphics has been used in such diverse field as pediatric medicine, genetic research, criminology, psychiatry, and anthropology. Different diseases have different finger prints associated with them. It is clear now that in near future, owing the recent advancement in the field of dermatoglyphics, it is possible to predict that an individual is having or will have that disease.

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Obesity is a multifactorial condition (polygenic and environmental). Factors determining obesity in utero may influence dermatoglyphic patterns. Dermatoglyphic patterns can be used as a marker to detect obesity. Hence, this study was undertaken to detect the any possible relationship between the dermatoglyphic pattern and obesity.

Dermatoglyphics is one of the new and advancing branches of medical science, which studies cornified layer of epidermis and dermal papillae. It is situated and used in the prediction of genetic disorders.[1]

Patterns of epidermal ridges have a role in diagnosing and delineating certain syndromes of congenital malformation[2]

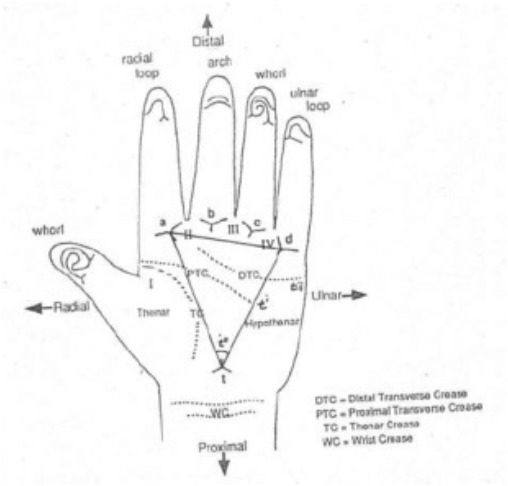

Figure 1: Lines and angles of the palm.

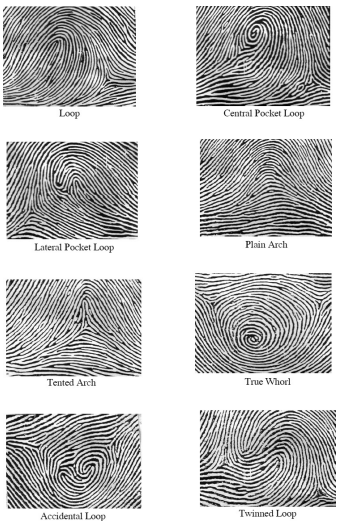

Figure 2: Pattern of dermatoglyphics of the fingertip**.**

as well as in establishing twin zygosity[3] in anthropologic surveys[4] and in population genetics.[5]

Each individual's genetic background remains an important determinant of susceptibility to obesity. Discovery of genes involved in development of common forms of obesity, thereby identifying pathways that are casual in patients, will guide clinicians and scientists in designing more effective therapies and in identifying high-risk individuals for early interventions.[6,7]

Objectives

The aims of this study were to identify dermatoglyphic patterns in obese individuals and to find out the possible relationship between the dermatoglyphic patterns and obesity.

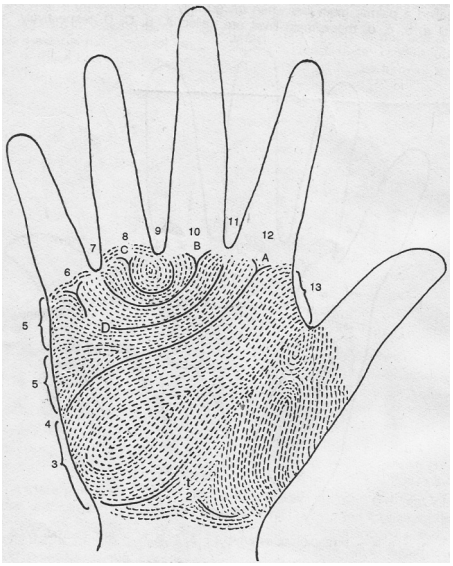

Figure 3: Dermatoglyphic pattern of the palm.

Material and Methods

A list of government and private school was procured from Office of Basic Shiksha Adhikari. Three government and three private schools were selected by simple random sampling method. As no such study was carried out previously, so assuming probability of such correlation to be 50%, at 5% error, a sample of 370 was calculated.

A predesigned and pretested questionnaire was used to interview the study participants to elicit the information. Information on individual characteristics such as age, sex, eating habits, and time spent on television viewing and outdoor games was also collected. Body weight was measured (to the nearest 0.5 kg) with the subject standing motionless on a weighing scale with feet 15 cm apart and weight equally distributed on each leg. Height was measured (to the nearest 0.5 cm) with the subject standing in an erect position against a vertical scale and with the head positioned so that the top of the external auditory meatus is in level with the inferior margin of the bony orbit.

Body mass index (BMI) was calculated as weight in kilograms/(height in meter).[2] Obesity was assessed by BMI for age. The following reference criteria for Asian population were used to calculate BMI:

Criteria	BMI
Normal	18.5–22.99
Overweight	23.0–24.99
Obesity	≥25

Dermatoglyphic print was taken by Ink method.

Table 1: Dermatoglyphic patterns of fingers of obese and normal individuals

Finger	Thumb		Index		Middle		Ring		Little	
	Obese	Normal	Obese	Normal	Obese	Normal	Obese	Normal	Obese	Normal
Arch	48	18	23	11	37	21	19	20	15	26
Radial loop	3	4	8	4	5	10	11	8	3	11
Ulnar loop	26	39	24	43	56	34	44	38	58	40
Whorl	36	34	58	37	15	30	39	29	37	18
Total	113	95	113	95	113	95	113	95	113	95

Table 2: Lines and angles of palm of obese and normal individuals

Parameters	Male		Female	
	Obese (mean ± SD)	Normal (mean ± SD)	Obese (mean ± SD)	Normal (mean ± SD)
Left hand ATD angle	43.49 ± 1.22	38.21 ± 1.23	44.39 ± 1.20	42.21 ± 1.11
Right hand ATD angle	45.29 ± 1.23	39.99 ± 1.24	44.29 ± 1.20	40.99 ± 1.21
Left hand distance a–d (mm)	59.88 ± 1.66	48.11 ± 1.33	59.77 ± 1.22	47.11 ± 1.26
Right hand distance a–d (mm)	59.99 ± 1.71	49.11 ± 1.61	58.45 ± 1.44	48.11 ± 1.55

- Subjects were asked to clean their hand with soap and water.
- They were also asked to do dry their hands but to leave some moisture.
- Then one hand of the subject was placed on inkpad of some areas are not uniformly inked, such as hollow of palm; then, some ink with cotton puff was applied.
- Hand of the subject then placed on a sheet of paper from proximal to distal end. The palm was gently pressed between intermetacarpal groove at the root of fingers, and on the dorsal side corresponding to thenar and hypothenar regions.
- The palm was then lifted from the paper in the reverse order from distal to the proximal end. The fingers were also printed below the palmar point by using the finger print method. The fingers rolled from radial to ulnar side to include all the patterns.
- The procedure was repeated with other hand on a separate paper.
- The prints were then subjected to a detailed dermatoglyphic analysis with the help of a magnifying hand-lens and ridge counting was performed with the help of a sharp needle. The details were noted on the same paper with help of a pencil.

Statistical Analysis

After the completion of data entry, statistical analysis was carried out by using Epi Info, version 6.04, software (Centers for Disease Control and Prevention, Atlanta, GA).

Results

Analysis of Dermatoglyphic Patterns in Obese Subjects

In 42% obese individuals, there was an increase in the number of arches in thumb, mainly right thumb. Of all obese individuals, 29% showed increase in the ATD angle value. Additional triradii was present in 17% of the obese individuals. Among all obese individuals, 21% had abnormal endings of the main palm lines whereas 11% had reduced C line.

Discussion

To the best of our knowledge, very few studies have been conducted to assess dermatoglyphic patterns and their possible relationship with obesity in children. Nevertheless, there are several studies available that show the association of dermatoglyphic patterns and prevalence of diabetes and hypertension, which are again the associated comorbid conditions with obesity.

A study was conducted by Gilligan et al.[8] to search for the major gene effects on palmer pattern ridge count to identify the dermatoglyphic traits in India. Similar results were shown by a study conducted by Kaladze et al.[9] in which dermatoglyphics were analyzed in 544 children with constitutional exogenous adiposity. The results showed dermatoglyphic changes that included papillary patterns intensified at the expense of loops and twists. Other notable findings of the study include an increase in the ATD angle value, a–b count in boys, presence of additional triradii, abnormal endings of the main palm lines

along with a reduced C line, and absence of C triradius in patients with constitutional exogenous adiposity. Similar findings were observed in the relatives of the first-degree of kinship.[9]

Conclusion

Obesity is considered an epidemic of modern time. The most important factor with which a very effective impact in its control can be seen is to identify persons at risk and more so ever during their childhood. As obesity is multifactorial disease, one such risk factor identification can be through studying dermatoglyphic patterns. This study showed an increased number of arches in thumb, along with presence of additional triradii, reduced C line with increase in the ATD angle value, and abnormal endings of the main palm lines. Children with these patterns may be considered at high risk for obesity. So, necessary preventive and promotive health measures should be adopted.

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