

A STUDY OF DERMATOGLYPHICS OF DEAF-MUTES

By



Sabah Mohammed Mohammed El-Nagar

Demonstrator, University College for Women,
Ain Shams University

**Thesis for the Degree of Master of Science
Presented to the Department of Zoology**

615.5



University College for Women

Ain Shams University

Cairo

1977



ACKNOWLEDGEMENT .

The author wishes to express her deep feeling of gratitude and appreciation to Professor Zakia M. Riad, Head of the Zoology Department, University College for Women, Ain Shams University. Many thanks to her supervision, valuable advice, encouragement, directing criticism and unfailing help throughout the course of this work. She gave me so much of her precious time for the revision of all the details and discussion of results which have made this work possible.

The author also wishes to express her thanks to the authorities in the Ministry of Education for offering the facilities during collection of the normal and abnormal samples from school students in Cairo and Saebeen El-Kome city. Thanks are especially presented to all the staff members of these schools for their interest and aid in supplying the sample for the present study.



CONTENTS

	Page
ACKNOWLEDGEMENT.	-
INTRODUCTION.....	1
MATERIAL AND METHODS.....	5
OBSERVATIONS.....	10
1 - THE PATTERN DISTRIBUTION ON FINGER TIPS	10
i - Arches	15
ii - Loops	19
iii - Patterns with Two triradii	21
iv - Patterns with Three Triradii	26
2 - THE TOTAL RIDGE COUNT.....	30
i - Pattern Size	33
ii - Pattern Size on Different Digits	36
3 - THE PATTERN INTENSITY ON FINGERS	46
4 - DERMAL RIDGE INTERRUPTIONS.....	52
5 - THE PATTERN DISTRIBUTION ON PALMS....	57
6 - THE PALMAR TRIRADII	64
i - Triradius a.	66
ii - Triradius b.	68
iii - Triradius c.	69
iv - Triradius d.	70
v - Triradius t.	71

7 -	ORIENTATION OF THE PALMAR MAIN LINES	74
8 -	THE a - b RIDGE COUNT	82
9 -	THE α ANGLE	85
10-	BARR BODIES	89
11-	SOME SELECTED CASES OF SPECIAL INTEREST	92
i	- Case 1	92
ii	- Case 2	94
iii	- Case 3	95
iv	- Case 4	95
v	- Case 5	96
vii	- Case 6	96
vii	- Case 7	97
viii-	Case 8	99
ix	- Case 9	100
	DISCUSSION	101
	SUMMARY	120
	REFERENCES	124
	ARABIC SUMMARY	

INTRODUCTION.

Deaf-mutism has attracted the attention of many authors. The direct cause for its development is still a subject of debate. According to some views, it is regarded as a perceptive trait that results secondary to some uncommon conditions that prevail in the intra uterine life. These conditions ultimately lead to the development of congenital deaf-mutism.

Brentano, (1948) studied the different mechanical and pathological causes that may lead to loss of hearing.

Scott-Brown, (1952) suggested that deaf-mutism could be classified into congenital and acquired according to diseases or hereditary factors that cause it.

Hallenger, et al, (1954) could sort out deaf-mutes into several groups according to the various causes that include extraneous factors, diseased mothers, and congenital malformations.

In 1956, Lederer and Hallenger, discussed the possible causes of congenital deafness in relation to the intra and extra uterine life.

Jackson, et al, (1958) reported that the incidence of congenital deafness following maternal rubella in the first sixteen weeks

of pregnancy is 30% .

In the same year, Newby tried to sort out deaf-mutes into those having congenital or acquired cases, and those in whom the sense of hearing is somewhat functional.

Jackson and Jackson, (1959) discussed the etologic factors known in deafness. He could sort it out into prenatal "biologic or pathologic" and post natal causes.

De Weese and Saunders, (1960) reported the different factors that lead to damage of the oocles and result in congenital deafness.

In the same year Mohr and Agency suggested an explanation for reported deaf-mutes in a number of cases affected individuals in the same generation.

Brain, (1961), reported that deafness is more frequent among twins than families in a population of 1.

In the same year, Stewart gave a discussion on familial deafness in relation to clinical cases. He related deaf-mutes to congenital anomalies or maldevelopmental conditions.

In 1962, Rosenbaum studied the relationship between otosclerosis and congenital deafness.

Alter and Schulenberg, (1965), studied the dermatoglyphics of rubella damaged children in comparison to a control group.

Farid and Girgis, (1966), studied the causes of deafness in Egyptian children at school age.

In the same year, Aohs et al, studied dermatoglyphic abnormalities among children with prenatal rubella syndrome in comparison to normal children whose mothers were exposed to rubella during pregnancy.

Gibbs, (1967) mentioned that rubella is associated with certain dermatoglyphic traits which are present in increased frequencies.

In the same year, Rosner, et al, confirmed in his report the influence of rubella in altering dermatoglyphics.

Purvis-Smith, et al, (1968) studied the dermatoglyphics of adults with congenital rubella and compared the with normal controls.

Dai, et al, (1970), made a comparative study of the dermatoglyphics and palmar creases of families including patients with deafness to unaffected parents.

Gazi, (1970), examined a deaf child who had many congenital abnormalities.

Gumpel, et al, (1971), could detect rubella antibody in (61%) of children aged from 6-7 years with congenital perceptive deafness.

Fraser and Freus (1972) questioned the recorded dermatoglyphic abnormalities in cases of rubella.

In 1973, Farvis Smith, et al, made a dermaloglyphic follow up of patients with congenital rubella. The study included the patients as well as their normal parents. They compared their dermatoglyphics with those of normals of either sexes.

In the same year, Roberts, explained the genetic background of deaf-mutism.

In the present work, a detailed study of some biological parameters of deaf-mutes, was carried out. The obtained results were compared with those for apparently normal individuals of the same population.

expressions were previously described by many authors.

Several methods for obtaining dental ridge

and mandibles.

diseases such as bleeding cough, typhoid, tonsillitis, patients showed this feature secondary to one or another

history of any special feature. The remaining 225

evaluation. A few of them were reported not to have a

rubella, mumps, or bleeding due to unsuccessful

medical authorities included the patients infection with

and declared by the presumed causes, as declared by the

these 300 patients exhibited this trait as a congenital

patients of either sex suffering from deaf-mutism. Of

physically fit. Small prints were collected from 525

All of them were reported by the medical authorities to be

Others. These subjects had an age between 8 and 15 years.

girls and a variety of primary and secondary syphilis in

They were randomly selected and small boys and small

obtained. They showed a few cases of either sex.

and girls, and it was apparently not included as was

as the old type of male and sex. A collection of finger

this study covered the dermatoglyphic features as well

MARTIN AND MARTIN

Generally speaking these methods can be classified into simple ink methods and others that depend on inkless procedures (Cummins, et al, (1961), Rife (1968), and Singh, (1970), used printing ink. Alter (1967) recommended the use of stamp pads to obtain such prints.

Other methods depending on other chemical preparations were also described. Walker, (1957) obtained dermal impressions on sensitized paper on which palms soaked with a chemical solution were pressed. Tips, et al (1964) suggested another inkless method for uncooperative subjects. He applied molds over the palmar surface to obtain detailed dermatoglyphic impressions. Lyons, (1971) recorded dermatoglyphic prints by the use of a transparent vinyl-based adhesive tape to the skin which was blackened by graphite or carbon paper.

In the present work, the dermal ridge impressions were obtained by the use of ordinary printing ink.

A concentration of 30% gave satisfactory impressions on glazed paper. These impressions show the necessary details. For the finger-tips, a complete roll print was obtained. Care was taken to obtain an impression of the whole of the ridged palmar surface as well as its extensions on the sides of the palms. This method proved to be satisfactory for the purpose of the present study. It is more economic and gives a detailed picture of the dermal ridge patterns.

The dermatoglyphic study included the following parameters:

1. The identification of the patterns as well as their distribution on the individual digits.
2. A determination of the total ridge count.
3. The pattern-digit relationship received several treatments including the average count per digit, the average count per pattern, and the count per pattern per particular digit.
4. The determination of the pattern intensity.
5. A search for signs of improper dermal ridge development.

On the palms, the following features were taken into consideration:

1. The pattern distribution on the different topographic areas.
2. The palmar triradii with special reference to their relative positions as well as the probability for their duplication or their disappearance.
3. The general orientation of the dermal ridges as shown by the palmar main line terminations.
4. The palmar dimensions expressed in terms of the Δ angle and the a-b ridge count.

A proper magnification could be attained through the use of a stereo microscope with x 10 objective lenses.

An attempt was made to search for a possible relation between dermatoglyphics and nuclear sexing. An estimation of Barr bodies in buccal smear cells was carried out. Samples from the oral mucosa were instantly fixed in Papanicolaou fixative. Then they were stained with

Feulgen nuclear stain and counterstained with 0.5% fast green.

Microscopic study was carried out by a binocular microscope using x10 eye piece and x 100 oil immersion objective lenses. Determination of the percentage of Barr bodies was calculated through an examination of 300 cells.

OBSERVATIONS.

1. THE PATTERN DISTRIBUTION ON FINGER TIPS.

Literature Review.

Several studies covering this subject were carried out on samples of normals as well as congenitally deaf individuals.

Plain arches could be spotted on the finger-tips of both sexes in a variety of populations. Certain facts could be extracted from these studies. Arches present rare patterns; they are more frequent on finger-tips of females than males; and more in left than right hand digits (Auer, 1950; Jenkins, et al., 1951; Bonné, et al., 1971; and Grace, et al., 1972). Moreover, they were reported to be crowded on the index (Sunderland, et al., 1968 and Shepherd, 1970).

A radial loop also presents an uncommon pattern. Females of certain populations show more of this