



Research Article

HAND IS THE ORGAN OF ALL ORGANS: DERMATOGLYPHICS AND ITS RELATION TO DENTAL CARIES IN CHILDREN WITH MENTAL RETARDATION

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ABSTRACT

Introduction: Every person has certain features that make them radically distinct from others. One such feature are finger prints. They remain the same throughout life and are uninfluenced by injuries, diseases, or environmental changes. A possible true genetic predisposition towards dental caries and dermatoglyphics has piqued interest in the minds of dental investigators for decades as skin, and tooth enamel are derivatives of embryonic ectoderm.

Methodology: The study was conducted among 200 children aged 9-15 years in Bagalkot, Karnataka, India. Dental caries was recorded by using DMFT index and the finger prints of both the hands were recorded using the stamp pad method.

Results: Prevalence of dental caries was higher among children with whorl patterns in the normal children and loop pattern in the mentally retarded children.

Conclusion: Dermatoglyphics can prove to be an extremely useful, non-invasive and cost-effective tool for preliminary investigations into conditions with a suspected genetic base.

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INTRODUCTION

Dermatoglyphics is the scientific study of epidermal ridges and their configuration on palmar & plantar region. Cummins and Midlo in 1926 coined the word dermatoglyphics.¹ Dermatoglyphics is a branch of science, which deals with the study of ridge patterns on fingertips, palms, soles and toes.² The dermal ridges are differentiated in their definitive forms during 3rd and 4th month of fetal life and completed by 7th month. Once fully formed, except for change in size, they never change pattern either in the remaining intrauterine life or after birth.³ Dermatoglyphics is a sensitive indicator of intrauterine anomalies both dental as well systemic.⁴

Mental retardation is the arrested or incomplete development of mind. It is a condition of sub average intellectual function combined with deficits in adaptive behavior. The etiological factors contributing to human developmental problems may be prenatal, perinatal and postnatal. Along with environmental, physiological, sociocultural, genetic risk factors.⁵

Dental caries is a chronic, complex, multifactorial disease for which a number of causative agents like host and environmental factors have been proposed. There are numerous host factors for dental caries that are genetically determined.⁶

The pattern of dental caries has been found to be similar in members of the same family over several generations and hence, inheritance of this susceptibility is suspected. The dermatoglyphic patterns can be used as an oral health marker, which can determine the genetic predisposition of children to dental caries.⁷

By the seventh week of intrauterine life, the primary palate and lip develops in human embryo⁶. Since it has been noted that the epithelium of finger buds, as well as, the enamel (most susceptible dental tissue to caries) have an ectodermal origin, and both develop at the same time of intrauterine life.⁸ This implies that genetic message present in the genetic makeup of a person, normal or abnormal, is transmitted during this period and is also reflected by Dermatoglyphics.⁹ As dermatoglyphic patterns stay constant during life so it may sometimes play a significant role in the diagnosis of dental diseases like caries. Therefore, taking into consideration the genetic predisposition of Dermatoglyphics, Mental Retardation and Dental Caries. The present study was undertaken to evaluate the dermatoglyphic peculiarities and note any specific variations or diagnostic features of mental retardation and dental caries as compared to normal children.

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Recording the DMFT index



Recording the finger and palmer prints



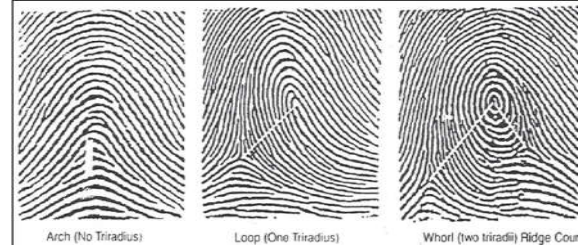
Records of the finger and palmer prints

Evaluation of patterns: Dermatoglyphic patterns of all the digits and palm were recorded using Cummins and Midlo method.² The dermatoglyphic patterns were thus recorded and the following parameters were studied.

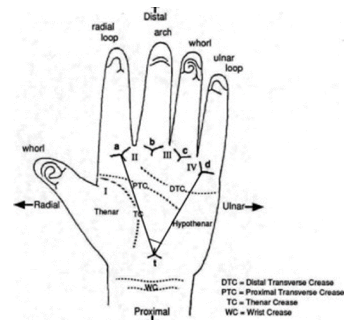
1. Qualitative analysis of fingerprints - Whorls, Loops and Arches.
2. Quantitative analysis of fingerprints - TFRC (Total Finger ridge Count), - AFRC (Absolute Finger Ridge Count).
3. Palmar patterns

4. Axial Triradii
5. "atd" angle
6. Sydney Line & Simian Line.

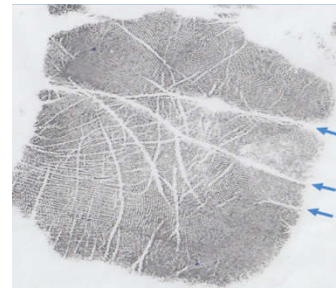
The data was recorded and analyzed statistically using Mann Whitney U test to compare the dermatoglyphic pattern changes and dental caries rate between control group and mental retardation group.



Fingerprint patterns



"atd" angle



Simian crease and Sydney line



Total finger ridge count

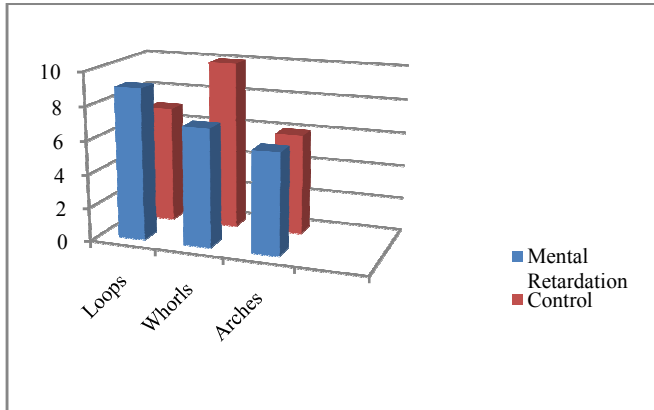
RESULTS

	Group	N	Mean (SD)	Range	Median (Q1-Q3)	Mann Whitney U test	
						U Statistic	p-value
Loops	Control	100	2.63 (1.69)	0 - 7	2.5(1- 4)	1571.50	<0.001*
	MR	100	5.02 (1.56)	1 - 9	5(4- 6)		
Whorls	Control	100	2.07 (1.94)	0-10	2(1- 2)	3761.00	.002
	MR	100	2.73 (1.75)	0 - 7	2(1- 4)		
Arches	Control	100	1.69 (1.22)	0 - 5	2(1- 2.75)	3628.00	0.001*
	MR	100	2.26 (1.18)	0 - 6	2(2- 3)		
A-B ridge count	Control	100	52.43 (5.29)	42- 65	54(48- 56)	13.00	<0.001*
	MR	100	74.42 (7.24)	60- 101	73(70- 76)		
ATD angle	Control	100	44.01 (2.33)	36- 49	45 (43- 45)	3280.00	<0.001*
	MR	100	42.02 (4.03)	34- 52	42(39- 45)		

*p<0.05 statistically significant,

p>0.05 Non Significant, NS

	Group	N	Mean (SD)	Range	Mann Whitney U test	
					U Statistic	p-value
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	MR	100	5.02 (1.56)	1 - 9		
Whorls	Control	100	2.07 (1.94)	0 - 10	3761.00	.002
	MR	100	2.73 (1.75)	0 - 7		
Arches	Control	100	1.69 (1.22)	0 - 5	3628.00	0.001*
	MR	100	2.26 (1.18)	0 - 6		



DISCUSSION

The study of various dermatoglyphic features and its composite evaluation has been of value in diagnosing variety of disorders which could be either gross chromosomal or localized genetic. Majority of these disorders have mental retardation as a common and striking feature.

Dental caries is a chronic, complex, multifactorial disease and numerous host factors for dental caries that are genetically determined.⁶The pattern of dental caries has been found to be similar in members of the same family over several generations and hence, inheritance of this susceptibility is suspected. The dermatoglyphic patterns can be used as an oral health marker, which can determine the genetic predisposition of children to dental caries.²These dermal patterns once formed remain constant throughout life and also are considered to be unique for a person.¹⁰

In the present study,

1. Loop patterns were found to be significantly greater in the mentally retarded children as compared to normal children followed by the arch pattern.
1. The a-b ridge count was found to be significantly greater in mentally retarded children as compared to normal children
2. The Atd line angle was found to be significantly greater in mentally retarded children as compared to normal children.
3. The Simian crease and Sydney line were found to be the peculiar feature of mentally retarded children.

This relative frequency of ulnar loops in mentally retarded children was also noted by Kher *et al*¹¹; Purandare Hema¹²; Niikawa N. *et al*¹³; Harold Chen¹⁴. Studies carried out by Alter & Bruhel¹⁵, Gupta *et al*¹⁶ and showed that there was no significant difference in frequency pattern.

In a study conducted by Metin Atasu, Caries-active group showed increased frequency of whorls as compared to frequency of whorls present in Caries-free group.⁷

With respect to caries experience in the present study,

1. The DMFT score was found to be significantly greater in mentally retarded children with loop patterns.
2. The DMFT score was found to be significantly greater in normal children with whorl patterns. This finding was in accordance to a study conducted by C. Anitha *et al* wherein whorl patterns were seen in children with ECC.¹⁷Whereas the arches were found to be equal in both the groups.

CONCLUSION

Hence, specific fingerprint patterns may be used as a potential non-invasive anatomical tool which could be used for screening for dental caries and for guiding future research. Dermatoglyphics can prove to be an extremely useful, non-invasive and cost-effective tool for preliminary investigations into conditions with a suspected genetic base. Early detection can aid the clinician to anticipate oral health problems in the susceptible children and initiate preventive oral health measures at a very young age. However, further studies are required to find a significant link between dermatoglyphics and dental caries.

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