



## Dermatoglyphics (finger prints) as predilection marker for impacted teeth: A randomized blind trial

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**Abstract:** Impacted teeth are teeth which remain embedded in the jaws past their normal eruption time or which have been blocked from their normal eruption path because of crowding of adjacent teeth or lack of enough jaw size to accommodate their eruption. Impacted teeth can cause a number of problems if left in place. Dermatoglyphics is the study of skin patterns and finger ridges that present on the fingers, toes and the soles. Fingerprint patterns of both hands were analyzed among ten patients with impacted teeth seen clinically and radiographically and equal number of healthy subjects. This study showed that tented arch pattern in index fingers of both the hands has been observed in impacted subjects thus serving as an indicator of genetic susceptibility in the incidence of dental impaction.

**Key words:** Dermatoglyphics; Impacted Teeth; Predilection; Marker

### Introduction

Scientific study of the skin ridge patterns on the fingers, toes, palms of hands and soles of feet is called dermatoglyphics. The types of fingerprint are unique based on the genetic characteristics of each individual. It reveals the congenital links between fingers and intrinsic qualities and talents. The ridges on the fingers are developed along with brain simultaneously from 10<sup>th</sup> week to 24<sup>th</sup> week of gestation period during fetus development and once formed remain permanent and never change throughout the life except in dimensions in proportion to the growth of an individual. There is a chance, environment, and heredity all play a role in the development of an individual's fingerprints.

The pattern of fingerprint is divided into three types namely arch, loop and whorl. The arch type is divided to two subgroups: simple and tented and the loop type is divided to two subgroups: radial and ulnar. The whorl type is divided into five subgroups as simple, central packed loop, twinned loop, lateral packed loop, and accidental. In general population, the line pattern consists of arch type, 4% loop type 55% and whorl type 41% respectively. There are many diseases that are known to be caused by abnormality of genes. Whenever there is any abnormality in the genetic makeup of parents, it is inherited to the children and is reflected in dermatoglyphic pattern (Walker J.F.A. 1964). As a diagnostic aid dermatoglyphics is now well established in number of diseases which have strong hereditary basis and is employed as a method for screening for abnormal

anomalies (Commins and Midlo, 1961). The use of these patterns as potential diagnostic tool in various pathologies of oral cavity and prove to be a significantly useful tool for preliminary investigations in those conditions with a suspected genetic base (Madhura *et al.*, 2015).

Impacted teeth are those which fail to erupt in dental arch within expected time or classically defined as teeth retained in the jaw beyond their normal date of eruption, surrounded by their coronary bag and without communication with the oral cavity (Favre, 2003). Dental impaction confronts the practitioner with a serious challenge. Treatment for dental impaction is a complex procedure on account of the wide range of cases encountered and the difficulty involved in making a precise and, most importantly, an early diagnosis and adequate treatment plan.

In this connection the present study was designed to make observation of the usefulness of dermatoglyphic pattern in serving as predictor for impacted teeth in population and to analyze finger print patterns in people with impacted teeth and compare them with people without impacted teeth. This in turn will help dermatoglyphics and its important role in the diagnosis as predilection marker for impacted teeth in prioritize treatment in patients with such patterns and rationalize decision making in relation to better treatment options.

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## Materials and Methods

A randomized, blind trial conducted at Dental College, Itaura, Azamgarh, Uttar Pradesh, India. on ten patients with impacted teeth seen clinically and radiographically (screening of patients with OrthoPantomogram (OPG)) in age group of 19 to 40 years assessed, dermatoglyphic patterns in comparison with 10 healthy volunteers. The fingerprints of both the hands were obtained from 10 patients with impacted teeth as group one and 10 healthy subjects as control, group two. The materials used for taking fingerprints were Ink, glossy drawing paper, cotton, digital finger print scanner, OPG radiograph, mouth mirror and probe. The data were statistically analyzed by chi square test.

### Inclusion Criterion

Ten patients with impacted teeth seen clinically and radiographically (screening of patients with OPG without print out) in age group of 19 to 40 years. Patients without any impaction seen clinically and radiographically were chosen as healthy subjects.

### Exclusion criteria

Exclusion criteria included any of the following: Patient suffering from diabetes, cardiovascular disease, oral cancer, OSMF, leukoplakia, aphthous ulcer, periodontitis, asthma, cleft palate, burns and development defects.

### Ethical issues

Written approval to perform the trial was obtained from the Hospital and Informed consent was obtained from all study participants for taking the finger prints.

### Method of collection of data

Considering the ethical issue and confidentiality of fingerprints of patients, the procedure was explained in detail to the participants and permission was obtained through written consent forms before recording the fingerprints. Brief case history with clinical examination was also recorded. Subject's hand were cleaned and dried before imprinting. The finger prints of the subjects were taken using a stamp pad. An imprint of five fingertips was recorded on an A4 size bond sheet. The same procedure was repeated in relation to the other hand. Prints were dried and studied using a magnifying lens to identify the finger patterns. After taking the imprints of all fingers ink was removed by using oil, soap and water. The fingertip patterns were analyzed according to the classical method and configurational types were classified according to the topological method.

### Evaluation of patterns

The various patterns of fingerprints were analyzed according to the standard guidelines for

classification of patterns. The data recorded was entered in Microsoft Excel sheet and applied for statistical analysis. Statistical analysis was performed using nonparametric tests and t-test to compare the dermatoglyphic pattern changes between the study group and the control group and was applied for each variable, to compare the proportions and p-value.

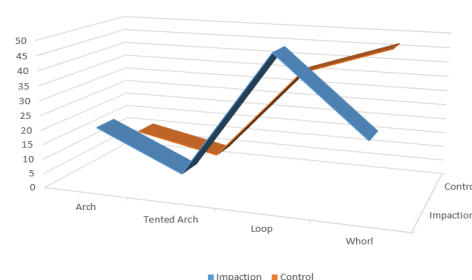
### Limitations

The use of stamp pad ink in dermatoglyphic study has got certain disadvantages. The imprint is affected by the amount of pressure exerted while the palm is recorded. Hence care has been taken while recording the prints to apply the stamp ink material in adequate amounts. A thin or thick application results in light or dark improper prints.

## Results

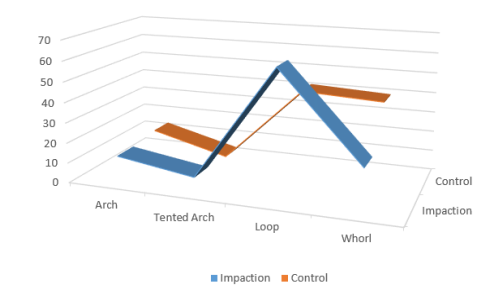
The data obtained by analyzing the fingerprints of study group and control group were entered in a primary data sheet. In order to describe the characteristics, we have recorded the observations appropriately and systematically organize the results. So tabulation, frequency distribution and percentage of individual dermatoglyphic patterns were performed. Frequencies, percentage, valid percentage and cumulative percentage of impacted teeth were also done. Impacted Teeth and whorl pattern, are represented by a point on a graph. This graph is called 3-D Line diagram (Graph 1 and 2). The configuration of the points on the graph indicates the nature of relationship. Since these points lie clustered, it suggests a correlation or relationship between variables (dental caries and whorl pattern).

Dermatoglyphic ridge patterns have been widely studied in major malformation syndromes. In the present study, the main patterns studied were loop, whorl, arch and tented arch and their incidence and predominance of the pattern were observed in both the groups respectively (Table 1 and 2). The statistically significant observations were obtained on the left index and left middle finger only in both the groups.

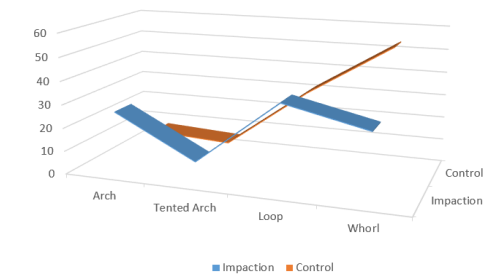


**Graph 1:** Finger print patterns in comparison with Impaction and Normal group

In the present study loop pattern was observed slightly lower in control group than that of Impacted Teeth group. Loop Pattern was about 49% in Impacted Teeth group and 37% in control group. Whorl pattern was significantly higher about 47% in comparison with Impacted Teeth group about 24%. In the observation, Arch was found that 20% of the Impacted Teeth subjects have arch pattern in thumb, index, middle and ring fingers. In contrast only 11% of the control groups have this arch pattern. Interestingly this pattern was observed little in both the groups where as in the tented arch fingerprint is significantly increased in patients with Impacted Teeth in contrast to control groups (7% versus 5%).























Graph 2: Finger print patterns seen on the right hand



Graph 2: Finger print patterns seen on the left hand

Table 1: Finger Print of impacted teeth (Impaction)

Patient	Hand	Thumb	Index	Middle	Ring	Little			
Patient 1	Left Hand								
	L	W						A	TA
	1	4							
	Right Hand								
L	W	A	TA						
2	3								
Patient 2	Left Hand								
	L	W						A	TA
	2	3							
	Right Hand								
L	W	A	TA						
2	3								
Patient 3	Left Hand								
	L	W						A	TA
	2	1						1	1
	Right Hand								
L	W	A	TA						
5									
Patient 4	Left Hand								
	L	W						A	TA
	3							1	1
	Right Hand								
L	W	A	TA						
3									



Patient 5

Right Hand

L	W	A	TA
4		1	

Left Hand

L	W	A	TA
3	2		

Patient 6

Right Hand

L	W	A	TA
4	1		

Left Hand

L	W	A	TA
2	2	1	

Patient 7

Right Hand

L	W	A	TA
3	1	1	

Left Hand

L	W	A	TA
		4	1

Patient 8

Right Hand

L	W	A	TA
1		1	3

Left Hand

L	W	A	TA
2		3	

Patient 9

Right Hand

L	W	A	TA
3		2	

Left Hand

L	W	A	TA
1		3	1

Patient 10

Right Hand

L	W	A	TA
3	1	1	

Left Hand
























































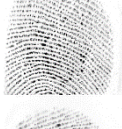









L	W	A	TA
3	2		

Right Hand

L	W	A	TA
4	1		



**Table 2: Finger Print of Control Group (No- Impaction)**

Patient	Hand	Thumb	Index	Middle	Ring	Little		
Patient 1	Left Hand							
	<table><tr><td>L</td><td>W</td><td>A</td><td>TA</td></tr><tr><td></td><td>5</td><td></td><td></td></tr></table>						L	W
L	W	A	TA					
	5							
	Right Hand							
	<table><tr><td>L</td><td>W</td><td>A</td><td>TA</td></tr><tr><td></td><td>5</td><td></td><td></td></tr></table>						L	W
L	W	A	TA					
	5							
Patient 2	Left Hand							
	<table><tr><td>L</td><td>W</td><td>A</td><td>TA</td></tr><tr><td>2</td><td>1</td><td>1</td><td>1</td></tr></table>						L	W
L	W	A	TA					
2	1	1	1					
	Right Hand							
	<table><tr><td>L</td><td>W</td><td>A</td><td>TA</td></tr><tr><td>3</td><td>1</td><td>1</td><td></td></tr></table>						L	W
L	W	A	TA					
3	1	1						
Patient 3	Left Hand							
	<table><tr><td>L</td><td>W</td><td>A</td><td>TA</td></tr><tr><td></td><td>4</td><td>1</td><td></td></tr></table>						L	W
L	W	A	TA					
	4	1						
	Right Hand							
	<table><tr><td>L</td><td>W</td><td>A</td><td>TA</td></tr><tr><td></td><td>5</td><td></td><td></td></tr></table>						L	W
L	W	A	TA					
	5							
Patient 4	Left Hand							
	<table><tr><td>L</td><td>W</td><td>A</td><td>TA</td></tr><tr><td>3</td><td>2</td><td></td><td></td></tr></table>						L	W
L	W	A	TA					
3	2							
	Right Hand							
	<table><tr><td>L</td><td>W</td><td>A</td><td>TA</td></tr><tr><td>3</td><td></td><td>2</td><td></td></tr></table>						L	W
L	W	A	TA					
3		2						
Patient 5	Left Hand							
	<table><tr><td>L</td><td>W</td><td>A</td><td>TA</td></tr><tr><td>3</td><td>1</td><td>1</td><td></td></tr></table>						L	W
L	W	A	TA					
3	1	1						
	Right Hand							
	<table><tr><td>L</td><td>W</td><td>A</td><td>TA</td></tr><tr><td>3</td><td>1</td><td></td><td>1</td></tr></table>						L	W
L	W	A	TA					
3	1		1					
Patient 6	Left Hand							
	<table><tr><td>L</td><td>W</td><td>A</td><td>TA</td></tr><tr><td>3</td><td>1</td><td></td><td>1</td></tr></table>						L	W
L	W	A	TA					
3	1		1					
	Right Hand							
	<table><tr><td>L</td><td>W</td><td>A</td><td>TA</td></tr><tr><td>3</td><td></td><td>1</td><td>1</td></tr></table>						L	W
L	W	A	TA					
3		1	1					
Patient 7	Left Hand							
	<table><tr><td>L</td><td>W</td><td>A</td><td>TA</td></tr><tr><td></td><td>5</td><td></td><td></td></tr></table>						L	W
L	W	A	TA					
	5							





## Discussion

Dermatoglyphics is an interesting field by giving the importance in both medical and dental fields. The main advantage of the knowledge of dermatoglyphics is they remain unchanged throughout individual's life span and the convenience and inexpensive methodology of recording (Gh. Mohd. Bhat, *et al.*, 2014). Dermatoglyphic ridge patterns have been widely studied in major malformation syndromes. In the present study the dermatoglyphic findings of these Impacted Teeth group was found to be lower than the normal study population in the whorl, arch regions where as found higher in loop region. Our findings indicated that there is a significant relation between the tented whorl and arch types of fingerprint and the risk of Impacted Teeth. This hints that the formation of ridges as a marker were influenced by genetic differences. It also indicates some genetic association between dental impaction and fingerprint patterns.

In early stages of foetal development the dermal ridges start differentiating. These ridges were always genetically determined and were also changed depending on the environmental factors. (Cummins, Midlo. 1929). During 10 week of gestation was the time when the fetal pads start the

development process and continues until the end of 24<sup>th</sup> week of inutero development. From 11-14<sup>th</sup> week the development is unaffected by any environmental factors and thus highlights on the importance of studying the ridges in its unique way. This shows as a marker for each one's identification as well as to know the developmental anomalies or the defects inutero during early stages of pregnancy itself. Therefore, both genetic and environment are to be considered as an important fact in this aspect. Now a days dermatoglyphics has evolved for the research field to help and detect the medical problems such as congenital anomaly and helps us to detect the inutero dental anomalies (Atasu M. 1998). The main use of dermatoglyphics in medical and dental fraternity is the most upcoming for detection of potential cases such as oral clefts, dental impaction and caries for early detection and prevention.

## Conclusion

From our study it appears that there is a significant correlation between dermatoglyphic patterns and Impacted Teeth and it is observed that there is an important antenatal factors that contribute the etiology of dental impaction in humans thereby serving as a screening and early detection tool for the prevention of disease.

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