**ORIGINAL ARTICLE**
**Year** : 2012 | **Volume** : 26 | **Issue** : 1 | **Page** : 2-5

# A study of palmar dermatoglyphics of bronchial asthma patients and their first degree relatives in Kurnool district

K Sreenivasulu[1], P Anil Kumar[2], G Chinna Nagaraju[3], G Ravindranath[1], Manisha R Gaikwad[4]
[1] Department of Anatomy, Viswabharathi Medical College, Kurnool, Andhra Pradesh, India
[2] Department of Anatomy, Santhiram Medical College, Nandyal, Andhra Pradesh, India
[3] Department of Anatomy, Gujarat Adani Institute of Medical Sciences, Bhuj, Gujurat, India
[4] Department of Anatomy, All India Institute of Medical Sciences, Bhuvaneswar, India

Date of Web Publication 10-Dec-2012

Download Article (pdf) Email Article Print Article Read / Write a Comment Citation Manager

**Correspondence Address**:
K Sreenivasulu
H.No-87-1377-13, Sehadri Nagar, Near Nandyal check post, Kurnool-2, Andhra Pradesh
India
Login to access the email ID

**DOI**: 10.4103/0972-6691.104435

Get Permissions for commercial use

Abstract

The word dermatoglyphics denotes the epidermal ridge patterns of sole, palm, and fingertips. In early foetal life dermal ridge differentiation occurs. It is genetically determined, and is influenced by physical, topographical, and environmental forces. Probably, the blood supply and nerve supply also modulate the dermatoglyphic patterns. Recently the dermatoglyphic patterns have proved to be of diagnostic value in certain clinical disorders associated with chromosomal and developmental defects, like mongolism, mental retardation, turner syndrome, cardiovascular diseases, diabetes, and schizophrenia. In the present study dermatoglyphic prints were obtained from 50 patients of bronchial asthma and 50 relatives of these patients. We have observed a statistically significant difference in the number of whorls on thumbs and a-b ridge count in comparison between bronchial asthma cases and controls. These parameters are also valuable in predicting the disease in the first degree relatives of patients.

**Keywords:** A-b ridge count, bronchial asthma, number of whorls on thumbs, palmar dermatoglyphics

**How to cite this article:**
Sreenivasulu K, Kumar P A, Nagaraju G C, Ravindranath G, Gaikwad MR. A study of palmar dermatoglyphics of bronchial asthma patients and their first degree relatives in Kurnool district.

Indian J Allergy Asthma Immunol 2012;26:2-5

**How to cite this URL:**
Sreenivasulu K, Kumar P A, Nagaraju G C, Ravindranath G, Gaikwad MR. A study of palmar dermatoglyphics of bronchial asthma patients and their first degree relatives in Kurnool district. Indian J Allergy Asthma Immunol [serial online] 2012 [cited 2013 Oct 9];26:2-5. Available from: http://www.ijaai.in/text.asp?2012/26/1/2/104435

## Introduction

The word dermatoglyphics denotes the epidermal ridge patterns of sole, palm, and fingertips. It is a valuable method used in medico-legal, anthropological, and genetic studies. It can be used as a diagnostic tool for diagnosis of various diseases. In the year 1926, Harold Cummins introduced the word dermatoglyphics. However, the ridge pattern was first described by BIDLOW in 17 $^{th}$ century.

In early foetal life dermal ridge differentiation occurs. It is genetically determined, and is influenced by physical, topographical, and environmental forces. Probably, the blood supply and nerve supply also modulate the dermatoglyphic patterns. [1],[2]

Recently the dermatoglyphic patterns have proved to be of diagnostic value in certain clinical disorders associated with chromosomal and developmental defects, like mongolism, [3],[4] mental retardation, [5] Turner syndrome, [6] cardiovascular diseases, [7],[8],[9] diabetes, [10],[11] and schizophrenia. [12],[13]

The chronic bronchial asthma is an allergic disorder associated with bronchospasm. It is a proven fact that bronchial asthma is also influenced by genetic factors. Many members of the family can be affected by the disease. As the dermatoglyphic patterns are also genetically determined. These two may have a correlation which could be of help in predicting the occurrence of bronchial asthma among relatives of patients suffering from the same disease.

Therefore, the present work was undertaken so as to study two things:

1. If a specific pattern is seen in asthma patient which may be of diagnostic value.
2. Whether this specific pattern is also observed in the first degree relatives of the patients and if so, whether it will be of help in predicting bronchial asthma in their future life.

## Materials and Methods

The present study was carried out in the Department of Anatomy, Santhiram Medical College and Hospital, Nandyal. Dermatoglyphic prints were obtained from 50 patients of bronchial asthma and 50 relatives of these patients. Fifty healthy individuals, not suffering from bronchial asthma with negative family history were selected as control group. All the patients were having long standing bronchial asthma with seasonal variation.

Three study groups were designated as follows:

Group - A: Cases of chronic bronchial asthma

Group - B: First degree relatives of the patients

Group - C: Controls

Male and female were not considered separately for analysis. For taking the dermatoglyphic prints of the patients, a pro forma was prepared.

1. The black ink pad was used for taking the prints.
2. The prints taken were from both hands, the right and left, on a plain white glossy drawing paper.
3. At first the palmar aspect of the wrist was rested firmly on the paper.
4. Slowly the palm was placed on the paper with fingers abducted to their maximum extent.
5. Each finger tip was rolled from side to side.
6. Finally pressure was applied on dorsum of the hand to obtain triradius patterns on the palm.

The prints were studied with the help of a hand lens.

## Observations and Results

The dermatoglyphic prints were recorded, tabulated, and analyzed by statistical tests [Figure 1]a-d, [Table 1] and [Table 2].

Figure 1a: (Case)-Palmar Dermatoglyphics of mine showing all 10 whorls in finger tips, a-b ridge count-37, atd° 42
Figure 1b: (1st degree relative)-Palmar dermatoglyphics of my daughter showing all 8 whorls and 2 ulnar loops in finger tips, a-b ridge count-40, atd° 42
Figure 1c: (Control)-Palmar dermatoglyphics of control showing all 5 whorls, 3 ulnar loops, and 2 radial loops in finger tips, a-b ridge count-28, atd° 38
Figure 1d: Palmar Dermatoglyphics of mine showing a-b ridge count with magnifying lens

**Click here to view**

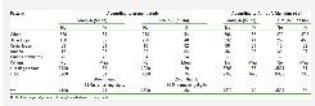

Table 1: Comparison of finger print pattern in total cases and controls[14]

**Click here to view**

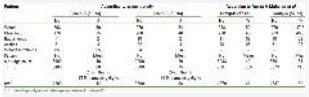

Table 2: Comparison of finger print pattern in total first degree relatives of patients and controls[14]

**Click here to view**

We have observed number of whorls in all digits, percentage of whorls on thumb, a-b ridge count, Total fingers ridge count and atd angle were more in patients and first degree relatives when compared to controls whereas a-b ridge count. Total fingers ridge count and atd angle were more in

first degree relatives of patients.

## Discussion

Various diagnostic criteria are available for labeling bronchial asthma, such as medical history, family history, physical examination, and laboratory studies like skiagrams, spirometry, and allergy tests. Apart from advances in medical diagnostic procedures, the diagnosis of bronchial asthma is difficult, as patients with asthma are heterogeneous and they present a wide spectrum of signs and symptoms which vary in severity, from patient to patient and from season to season.

So to help the diagnosis of bronchial asthma, the dermatoglyphics can play an important role, although it has its own limitations. As bronchial asthma and dermatoglyphic patterns of the individual, both are genetically determined, the patterns may aid the diagnosis of asthma in patients and their relatives.

The dermatoglyphics were known since ancient times as personal identification marks and were used for identifying criminals [1] and also used them as a diagnostic aid in medical diseases. Since then it, has become a valuable tool in medico-legal, anthropological, and genetic studies.

The dermatoglyphic study is advantageous because of its easy accessibility, non-invasive nature, less expansiveness, and applicability to all ages. Though the advantages are many, the limitations of this technique should not be overlooked. Dermatoglyphic characteristics of a given disease may also be found in a perfectly normal individual because of a great variability of pattern in normal population.

### Whorls

The whorls observed in group-A were (64%) [Table 1] and [Table 2], in group-B (59%) and in group-C (54%). After applying statistical test the difference of the prevalence of whorls on the fingertips was not found significant.

When the whorls were observed only on thumbs, they were found to be 76% in group-A, 65% in group-B, and 54% in group-C. This higher incidence of the whorls on the thumbs of group-A was highly significant by the statistical test.

### Ulnar loops

The present study shows 32% of ulnar loops in group-A, 35% in group-B, and 40% in group-C. This slight rise in the occurrence of ulnar loops in group-C than the other group is statistically insignificant [Table 1] and [Table 2].

### Radial loops

The frequency of radial loops is 1% in group-A, 2% in group-B, and 2% in group-C [Table 1] and [Table 2]. This shows that the frequency is almost similar in all groups.

### Arches

The arches were 3% in group-A, 4% in group-B, and 4% in group-C [Table 1] and [Table 2]. This

slight variation is insignificant.

The percentage of whorls is more in all groups of my study when compared to the study done by Amrut A Mahajan et al, whereas the percentage of arches are less and the remaining values are similar. [14]

**Quantitative analysis**

1. a-b ridge count: The a-b ridge count in group-A was found with the mean value of 37. In group-B the value was 40, whereas the group-C has a mean of 29. The statistical test applied between group-A and group-C showed significant difference (alpha <5%) [Table 1] and [Table 2].
2. T.F.R.C: The total finger ridge count in group-A was 64, while in group-B it was 68, whereas on group-C it was found to be 75. Thus, rise in ridge count on finger tips was insignificant as alpha >5% [Table 1] and [Table 2].
3. atd°: The atd angle was measured in the three study groups. Group-A showed 41°, group-B showed 42° and group-C showed 38°. It is seen that group-B has a slightly wider angle, but it is insignificant as alpha >5% [Table 1] and [Table 2].

The values of a-b ridge count, T.F.R.C. and atd° are coinciding with the study done by Amrut A Mahajan *et al.*[14]

## Summary and Conclusions

1. Preponderance of whorls pattern in most digits in group-A and group-B [Figure 1]a, [Figure 1]b.
2. The presence of whorls on both the thumbs was a constant feature in all persons of group-A. This feature is statistically significant and can be used as one of the diagnostic criterion for bronchial asthma [Figure 1]a, [Figure 1]b and [Table 1].
3. In contrast, in first degree relative (group-B) these values were closer to the control (group-C), so it was of no value in prediction of the disease [Table 2].
4. The higher a-b ridge count in group-A as compared to group-C was statistically significant (RD >2, alpha <5%). This may be taken as an additional diagnostic criterion [Figure 1]a and [Figure 1]c, [Table 1].
5. a-b ridge count in group-B as compared to group-C is statistically significant, so it may be of use in predicting the disease in the relatives (RD >2 and alpha <5% [Figure 1]a and [Figure 1]b, [Table 2].
6. Following criteria were found to be statistically insignificant:
    - Ulnar loops
    - Radial loops
    - Arches
    - Total finger ridge count (T.F.R.C)
    - atd angle

So these are not forming a part of any specific dermatoglyphic pattern for bronchial asthma patients.

## References

1. Cummins H. Epidermal ridge configuration in developmental defects in past reference to ontogenetic factors which condition the ridge direction. Am J Anatomy 1926;38:89.

2. Mardia KV, Li Q, Hansworth JT. On the Penrose hypothesis on fingerprint patterns. IMA J Math Appl Med Biol 1969;9:289-94.

3. Rajangam S, Janakiram S, Thomas IM. Dermatoglyphics in Down's syndrome. J Indian Med Assoc 1995;93:10-3.
[PUBMED]

4. Otto PA, Filho JV. Comparative analysis of dermatoglyphic indices used for diagnosis of Down's syndrome. Rev Brasil Genet 1989;12:145-9.

5. Singh S. Dermatoglyphics of schizophrenics, patients with Down's syndrome and mentally retarded males as compared with Australian Europeans using multivariate statistics. Am J Phys Anthropol 1975;42:237-40.
[PUBMED]

6. Holt SB, Lindsten J. Dermatoglyphic Anomalies in Turner's syndrome. Ann Hum Genet 1964;28:87-100.
[PUBMED]

7. Swartz MH, Herman MV. Dermatoglyphic patterns in patients with mitral valve prolapse: A clue to pathogenesis. Am J Cardiol 1976;38:588-93.

8. Rashad MN, Mi MP. Dermatoglyphic traits in patients with cardiovascular disorders. Am J Phys Anthropol 1975;42:281-3.
[PUBMED]

9. Alter M, Schulenberg R. Dermatoglyphics in Congenital Heart Disease. Circulation 1970;41:49-54.
[PUBMED]

10. Eswaraiah G, Bali RS. Palmar flexion creases and dermatoglyphics among diabetic patients. Am J Phys Anthropol 1977;47:11-3.
[PUBMED]

11. Ziegler AG, Mathies R. Dermatoglyphics in type 1 diabetes mellitus. Diabet Med 1993;10:720-4.

12. Mellor CS. Dermatoglyphic evidence of fluctuating asymmetry in Schizophrenia. Br J Psychiatry 1992;160:467-72.
[PUBMED]

13. Murthy RS, Wig NN. Dermatoglyphic in schizophrenia: The relevance of family history. Br J Psychiatry 1977;130:56-8.
[PUBMED]

14. Mahajan AA, Gour KK. Dermatoglyphic patterns in patients of Chronic Bronchial Asthma - A Quantitative study. Int J Biol Med Res 2011;2:895-6.

M
W
a
b
c
d
e


M
W
UL
a
b
c
e


UL
M
W
RL
a
b
c
d
e


M
W
a
b
c
d
e

| Pattern | According to present study | | | | According to Amrut A Mahajan *et al.* | | | |
|---|---|---|---|---|---|---|---|---|
| | Group-A (50 no) | | Group-C (50 no) | | Group-A (57 no) | | Group-C (57 no) | |
| | No | % | No | % | No | % | No | % |
| Whorl | 320 | 64 | 270 | 54 | 296 | 52 | 270 | 47.5 |
| Ulnar loops | 160 | 32 | 200 | 40 | 232 | 41 | 259 | 45.5 |
| Radial loops | 06 | 01 | 10 | 02 | 06 | 01 | 10 | 02 |
| Arches | 16 | 03 | 22 | 04 | 36 | 06 | 31 | 05 |
| Whorls in thumbs | 76 | 76 | 54 | 54 | -- | -- | -- | -- |
| Pattern | No | Mean | No | Mean | No | Mean | No | Mean |
| a–b ridge count | 3700 | 37 | 2900 | 29 | 3705 | 37 | 3591 | 34 |
| TFRC | 3200 | 64<br>20-on thumb<br>12-0n remaining digits | 3800 | 75<br>24-on thumb<br>14-0n remaining digits | 7353 | 64.5 | 8379 | 73.5 |
| atd° | 4100 | 41 | 3800 | 38 | 4572 | 40 | 4537 | 39 |

TFRC - Total finger ridge count, atd - anglution between tri radius a,d&t

| Pattern | According to present study | | | | According to Amrut A Mahajan *et al.* | | | |
|---|---|---|---|---|---|---|---|---|
| | Group-B (50 no) | | Group-C (50 no) | | Group-B (57 no) | | Group-C (57 no) | |
| | No | % | No | % | No | % | No | % |
| Whorl | 293 | 59 | 270 | 54 | 283 | 50 | 270 | 47.5 |
| Ulnar loops | 176 | 35 | 200 | 40 | 230 | 40 | 259 | 45.5 |
| Radial loops | 11 | 2 | 10 | 2 | 11 | 02 | 10 | 02 |
| Arches | 21 | 4 | 22 | 4 | 46 | 08 | 31 | 05 |
| Whorls in thumbs | 65 | 65 | 54 | 54 | -- | -- | -- | -- |
| Pattern | No | Mean | No | Mean | No | Mean | No | Mean |
| a-b ridge count | 3900 | 40 | 2900 | 29 | 3933 | 40 | 3591 | 34 |
| T.F.R.C | 3400 | 68<br>21-on thumb<br>13-0n remaining digits | 3800 | 75<br>24-on thumb<br>14-0n remaining digits | 7581 | 66.5 | 8379 | 73.5 |
| atd° | 4200 | 42 | 3800 | 38 | 4679 | 41 | 4537 | 39 |

TFRC - Total finger ridge count, atd - anglution between tri radius a,d&t