

## Finger and Palmar Dermatoglyphic Study Among the Bondos of Orissa

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**ABSTRACT** Finger and Palm print data on 150 Bondos from 10 villages of Malkangiri district of Orissa are presented. Finger rather than palmar data revealed greater variation than too for qualitative characters. In laterality and sex dimorphism, the Bondo corroborates with some neighbouring Andhra tribal groups – the Khond, the Bagatha, the Konda Dora and the Mali.

### INTRODUCTION

Dermatoglyphic characters, despite polygenic, are putatively non-adaptive and exhibit a wide range of variation in different ethnic groups. The present paper reports, for the first time, finger and palmar dermatoglyphics of a unique tribe of Orissa viz., the Bondo. The Bondo is a scheduled tribe of Orissa. The size of the population is 8,503 scattered over 130 sq. kms of high land on the right bank of Matchkand. The history, origin and migration of the tribe is in vogue. The people are distinct by their attire and ornaments. They wear skirt on lower part and upper part of the body is covered by a number of bead chains. Their women are used to shave their head due to curse of a goddess, while men have their hairstyle. Their physique reveal lean body mass with brown to dark skin color and low wavy hair. They have their own dialect with Oriya accent but no script exists. The Bondo is an endogamous tribe with exogamous clans that regulate marriage alliances. Men practice agriculture besides hunting while women indulge in fishing and gathering that reflect the topography of their habit.

### MATERIALS AND METHODS

Bilateral inked prints of finger balls and palms were collected and analysed after Cummins and Midlo (1961) and Holt (1968). The data included 150 unrelated individuals (60M + 90F) belonging to the Bondo from 10 villages of Koraput Block in Malkangiri district of Orissa. The villages are: Dantipada, Bardapada, Kirasaniguda, Gokkhu-pada, Salipada, Bandipada, Bavindipada,

Mudilipada, Padaiguda and Andrahal.  $\chi^2$  and t-tests were computed to know the significance of bilaterality and sex dimorphism.

### RESULTS AND DISCUSSION

Finger and palmar print data were analysed for both qualitative and quantitative characters. The results are shown in tables 1 and 2.

#### 1. Finger Dermatoglyphics

**a. Qualitative Characters:** In pattern types, the Bondos are characterized to show a preponderance of loops followed by whorls and arches. Their males possess an excess of whorls (48.16%) while the females display a high frequency of loops (48.66%) and arches (7%). Thus a difference of 4% in whorls, less than 1% in loops and 3.5% in arches is evident between the male and female series. The incidence of composite and tented arches do not contribute much for the sex variation among the Bondos (Table 1). In laterality, the right hand shows greater variation than the left hand but only males depict significant bilaterality. The sex dimorphism, an established phenomenon for pattern types (Mukherjee, 1967), is also recorded in the present population. A similar observation was made on the Bagatha (Heena and Narahari, 1990), Konda Dora (Narahari et al., 1989), Mali (Narahari et al., 1995) and Khonds (Narahari et al., 2005).

The pattern symmetry show much difference (12%) in whorls than loops (9%) and arches (2%) between the male and female series. However, the sex difference is statistically non-significant at total symmetry level. In monomorphic hands,

right hand in females and left hand in males show high frequency that too for whorls and loops, respectively.

**b. Quantitative Characters:** The finger pattern intensity index (FPII) show higher mean value for the males ( $14.73 \pm 0.29$ ) than females ( $13.59 \pm 0.28$ ), thereby signify the sex dimorphism. The value of Dankmeijer's index in females is almost double to that noted in males. In contrast, the Furuhashi's Index shows a greater value in males than females. Thus, the amount of variation in individual pattern frequencies influence the variation in quantitative characters (Table 1).

## 2. Palmar Dermatoglyphics

**a. Qualitative Characters:** The modal types

(Table 2) in Principal Mainline Formulae (PMLF) among the Bondos reveal the trend 11.9.7. – > 9.7.5. – > 7.5.5. – in both male and female series. Of these, 4% variation is observed for 11.9.7. – and 9.7.5. – from males to female Bondos. But the sex dimorphism is statistically non-significant. Right hand shows greater variation than the left and yield significant bilaterality. The Bondos having a high frequency of the modal type 11.9.7 come closer to the Bagatha, Koya Dora, Valmiki and Khond tribal groups of Andhra Pradesh. The total symmetrical occurrence of PMLF is higher in females (31.11%) than males (25%) wherein the modal type 11.9.7 contributes a major share. The sex dimorphism for symmetry is non-significant.

The terminations of Polymorphic C-line display most frequently by 'Ulnar' followed by

**Table 1: Finger dermatoglyphic characters among the Bondos**

| Character                                            | Male (60) |                  | Female (90) |                  |
|------------------------------------------------------|-----------|------------------|-------------|------------------|
|                                                      | No.       | %                | No.         | %                |
| <b>I. Qualitative</b>                                |           |                  |             |                  |
| <b>a) Finger Pattern Types</b>                       |           |                  |             |                  |
| Plain Arch                                           | 15        | 2.5              | 59          | 6.56             |
| Tented Arch                                          | 6         | 1                | 4           | 0.44             |
| Radial Loop                                          | 16        | 2.67             | 11          | 1.22             |
| Ulnar Loop                                           | 274       | 45.67            | 427         | 47.44            |
| True Whorl                                           | 263       | 43.83            | 368         | 40.89            |
| Composites                                           | 26        | 4.33             | 31          | 3.44             |
| (for sex diff. 14.58*)                               |           |                  |             |                  |
| <b>b) Pattern Symmetry</b>                           |           |                  |             |                  |
| Whorl                                                | 103       | 34.33            | 101         | 22.44            |
| Loop                                                 | 101       | 33.67            | 191         | 42.44            |
| Arch                                                 | 3         | 1                | 12          | 2.67             |
| Total                                                | 207       | 69               | 304         | 67.55            |
| (for sex diff. 0.17)                                 |           |                  |             |                  |
| <b>c) Monomorphic Hands</b>                          |           |                  |             |                  |
| Right : Whorl                                        | 5         | 8.33             | 10          | 11.11            |
| Loop                                                 | 5         | 8.33             | 9           | 10               |
| Arch                                                 | 0         | 0                | 0           | 0                |
| Left : Whorl                                         | 4         | 6.67             | 6           | 6.67             |
| Loop                                                 | 9         | 15.1             | 4           | 4.44             |
| Arch                                                 | 0         | 0                | 0           | 0                |
| Both (Right+Left together)                           |           |                  |             |                  |
| Whorl                                                | 10        | 16.67            | 16          | 17.78            |
| Loop                                                 | 9         | 15               | 13          | 14.44            |
| Arch                                                 | 0         | 0                | 0           | 0                |
| <b>II Quantitative</b>                               |           |                  |             |                  |
| <b>a) Pattern Indices</b>                            |           |                  |             |                  |
| Finger Pattern Intensity Index (FPII)                |           | $14.73 \pm 0.29$ |             | $13.59 \pm 0.28$ |
| ( $\bar{X} \pm S.E$ ) (t value for sex diff = 2.81*) |           |                  |             |                  |
| Dankmeijer's Index                                   |           | 7.27             |             | 15.79            |
| Furuhashi's Index                                    |           | 99.66            |             | 91.08            |

\* Statistically significant at 5% Probability Level.

**Table 2: Palmar dermatoglyphic characters among the Bondos**

| Character                                  | Male (60) |                  | Female (90) |                  |
|--------------------------------------------|-----------|------------------|-------------|------------------|
|                                            | No.       | %                | No.         | %                |
| <b>I. Qualitative</b>                      |           |                  |             |                  |
| <b>a) Palmar Mainline Formula</b>          |           |                  |             |                  |
| 11.9.7. -                                  | 43        | 35.83            | 58          | 32.22            |
| 9.7.5. -                                   | 22        | 18.33            | 41          | 22.78            |
| 7.5.5. -                                   | 15        | 12.5             | 24          | 13.33            |
| "Rest"                                     | 40        | 33.33            | 57          | 31.67            |
| ( $\chi^2$ for sex diff. 1.06)             |           |                  |             |                  |
| <b>b) Mainline Symmetry</b>                |           |                  |             |                  |
| 11.9.7. -                                  | 7         | 11.67            | 12          | 13.33            |
| 9.7.5. -                                   | 3         | 5                | 8           | 8.9              |
| 7.5.5. -                                   | 3         | 5                | 4           | 4.44             |
| "Rest"                                     | 2         | 3.33             | 4           | 4.44             |
| Total                                      | 15        | 25               | 28          | 31.11            |
| ( $\chi^2$ for sex diff. 0.66)             |           |                  |             |                  |
| <b>c) C-line variation</b>                 |           |                  |             |                  |
| Radial                                     | 39        | 32.5             | 70          | 38.89            |
| Ulnar                                      | 54        | 45               | 87          | 48.33            |
| Proximal                                   | 19        | 15.83            | 12          | 6.67             |
| Absent                                     | 8         | 6.67             | 11          | 6.11             |
| ( $\chi^2$ for sex diff. 3.86)             |           |                  |             |                  |
| <b>d) C-line Symmetry</b>                  |           |                  |             |                  |
| Radial                                     | 12        | 20               | 20          | 22.22            |
| Ulnar                                      | 8         | 13.33            | 20          | 22.22            |
| Proximal                                   | 5         | 8.33             | 3           | 3.34             |
| Absent                                     | 1         | 1.67             | 2           | 2.22             |
| Total                                      | 26        | 43.33            | 45          | 50               |
| ( $\chi^2$ for sex diff. 0.64)             |           |                  |             |                  |
| <b>II Quantitative</b>                     |           |                  |             |                  |
| Palmar Pattern Intensity Index PPII        |           | 10.28 $\pm$ 0.91 |             | 10.47 $\pm$ 0.70 |
| (t <sub>a</sub> value for sex diff = 0.17) |           |                  |             |                  |

'Radial', 'Proximal' and 'Absent' types. Right hand shows greater variability than the left hand. Yet the bilaterality is statistically significant in females and M + F combinal series. No significant sex dimorphism is evident for this character. However, the Bondos are characterised to show a greater frequency of 'Abortive' (Proximal + Absent) model type, a deviation observed for many tribal groups of Andhra Pradesh (Narahari et al., 2004). The symmetrical occurrence of C-line types almost reveal the same trend observed earlier for individual termination frequencies.

**b. Quantitative Characters:** The Palmar Pattern Intensity Index (PPII) fails to show any difference in its mean values either at laterality or sex dimorphism level. Consequently, both bilaterality and sex dimorphism are statistically non-significant.

Thus the dermatoglyphic variation of the Bondo is significant for the finger rather than palmar that too qualitative dermatoglyphic characters. They tend to be closer to some Andhra tribes like the Khond, the Bagatha, the Konda Dora and the Mali.

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