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# Dermatoglyphic Variation in The Mali: A Small Tribe from Andhra Pradesh, India

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ABSTRACT Finger and plam print data on a total of 343 Malis from 10 villages of Visakhapatnam district, Andhra Pradesh are presented. Palmar quantitative characters exhibited inter-group difference between the two Mali sub-groups — the Bodo Mali and Sung Mali suggesting the operation of micro-evolutionary forces, especially keeping in view the small population size of the Bodo Mali. This corroborates the work of Malhotra et al. (1974, 1981) on the Nandiwalla.

## INTRODUCTION

Dermatoglyphic studies on small populations from south Indian state of Andhra Pradesh are few though good amount of such information is available for large and nomadic groups (Mukherjee, 1976; Malhotra, 1978; Singh and Bhasin, 1979; Narahari, 1982 among others). The present paper reports, for the first time, finger and palmar dermatoglyphics of an unique and small tribal population, *viz.*, the Mali from the coastal state of Andhra Pradesh.

The Mali, numbering 2,017 (ITDA Report), is an horticultural tribal population found in the border areas between the states of Andhra Pradesh and Orissa. Though it is a migrant population, the people are unable to recollect their place and period of migration. They speak Oriya with hilly accent. In physical features they are medium to tall in stature and have brown to dark tan coloured skin. They prefer and practice consanguineous marriages particularly between the cross cousins, *i.e.* with FSD and MBD, but discourage uncle-niece marriages. There are three endogamous sub-populations among the Malis — the Bodo Mali, the Munj Mali and the Sung Mali; their names referring to the existence of social hierarchy among them. These differ in their size and distribution, and the present study was confined to Bodo Mali and Sung Mali because of their availability in Andhra Pradesh.

## MATERIALS AND METHODS

Bilateral inked prints of finger balls and plams were collected and analysed after Cummins and Midlo (1961). The subjects included 94 Bodo Malis (69 males + 25 females) from 3 villages, *viz.*, Dodiput, Gattar Manda and Panasa; and 249 Sung Malis (122 males + 127 females) from 7 villages, *viz.*, Vanaba Singhi, Kummarput, Narsaput, Bondaput, Durgaguda, Petamaliput and Gudamaliput of Munchiguput Mandal, Visakhapatnam district, Andhra Pradesh (Fig. 1). Only unrelated subjects were considered.

## RESULTS AND DISCUSSION

Dermatoglyphic data were analysed for both qualtative and quantitative characters and results are presented in table 1. The inter-group variation between the two Mali sub-populations was assessed by means of chi-square and t-tests as shown in table 2.

### Finger Dermatoglyphics

#### *a) Finger Pattern Types*

The universal preponderance of whorls in Sung Mali and loops in Bodo Mali for both sex series, and an excess of arches in female Bodo Malis are the notable features. The


**Fig. 1. Map showing location of investigated areas in Andhra Pradesh**

bilateral significance was ascertained for female series in whom left hand exhibited greater variability in the occurrence of patterns over the right. Both the Mali sub-populations showed significant sex differences. The inter-groups variation was significant for male series compared.

### *b) Finger Pattern Intensity Index (FPII)*

This index showed higher mean values for the Sung Mali than the Bodo Mali that too in male series. This is in accord with the whorl frequencies of the respective Mali sub-groups. The sex difference was significant in both the sub-populations, whereas the inter-group variation was not evident.

### *c) Total and Absolute Finger Ridge Counts (TFRC and AFRC)*

The mean values were higher for Bodo Malis than the Sung Malis, although a reverse trend of whorl incidence was observed among them. This reflects that the size of the pattern was greater in the former sub-population whose size is small and invites attention from the point of drift. Again, males showed greater values over their counterparts. The sex differences was significant in both the sub-populations. The inter-group difference was, however, non-significant. According to Holt (1968) and Mukherjee (1967) sex-linked genes influence the size of the pattern in an individual as deciphered from ridge counts. Thus the sex differences observed for this character in the present study corrorborates earlier findings.

## Palmar Dermatoglyphics

### *a) Principal Main Line Formule (PMLF)*

7.5.5.– predominated among the Bodo Mali while among the Sung Mali it was 11.9.7.–. The next frequently occurring formula was 9.7.5.– in the former and 7.5.5.– in the latter sub-population. Thus, the two Mali sub-populations rendered greater variability for this character which was statistically significant. The bilaterality was significant for the Sung

**Table 1: Dermatoglyphic variation in two Mali sub-populations**

| *Character* | *Bodo Mali* | | *Sungh Mali* | |
|---|---|---|---|---|
| | *Males (69)* | *Females (25)* | *Males (122)* | *Females (127)* |
| **Finger Dermatoglyphics** | | | | |
| *Finger pattern types (in per cent)* | | | | |
| Whorls | 41.90 | 33.60 | 47.13 | 38.50 |
| Loops | 55.80 | 60.40 | 56.00 | 56.77 |
| Arches | 2.34 | 6.00 | 2.87 | 4.72 |
| *FPII* ($\bar{X} \pm$ S.E.) | 14.01±0.27 | 13.00±1.83 | 14.42±0.20 | 13.31±0.22 |
| *Ridge-counts* | | | | |
| TFRC ($\bar{X} \pm$ S.E.) | 107.81±3.84 | 82.64±6.83 | 105.91±2.46 | 92.63±2.94 |
| AFRC ($\bar{X} \pm$ S.E.) | 143.78±6.94 | 105.40±10.31 | 143.58±4.89 | 120.02±4.99 |
| **Palmar Dermatoglyphics** | | | | |
| *Palmar main line formulae (in per cent)* | | | | |
| 11.9.7.–. | 18.12 | 6.00 | 28.69 | 26.77 |
| 9.7.5.–. | 21.74 | 34.00 | 19.26 | 22.84 |
| 7.5.5.–. | 29.71 | 42.00 | 21.72 | 24.02 |
| Rest | 30.44 | 18.00 | 30.33 | 26.38 |
| *Polymorphic C-line (in per cent)* | | | | |
| Radial | 36.23 | 12.00 | 39.75 | 39.37 |
| Ulnar | 55.07 | 82.00 | 45.90 | 50.39 |
| Proximal | 5.89 | 2.00 | 6.97 | 5.51 |
| Absent | 2.90 | 4.00 | 7.38 | 4.72 |
| *Hypothenar triradii (in per cent)* | | | | |
| $H^{p}$ | 17.39 | 16.00 | 16.39 | 19.29 |
| $H^{ext}$ | 10.87 | 18.00 | 8.61 | 5.91 |
| $H^{p+ext}$ | 0.73 | 0.00 | 0.41 | 0.00 |
| *MLI* ($\bar{X}$±S.E.) | 15.20±0.42 | 14.40±0.73 | 16.64±0.32 | 16.69±0.31 |
| *PPII* ($\bar{X}$±S.E.) | 11.65±0.20 | 11.40±0.28 | 12.01±0.14 | 11.70±0.13 |
| *Ridge counts* | | | | |
| a-b ($\bar{X}$±S.E.) | 61.89±1.44 | 56.72±2.38 | 55.26±0.88 | 54.88±0.92 |
| b-c ($\bar{X}$±S.E.) | 41.10±1.29 | 38.92±2.15 | 32.04±0.98 | 34.36±1.16 |
| c-d ($\bar{X}$±S.E.) | 48.86±1.54 | 40.52±2.58 | 40.54±1.33 | 45.49±1.32 |

Mali while the males alone in Bodo Mali showed it. Yet, both sub-populations reveal significant sexual dimorphism.

### *b) Polymorphic C-Line*

'Ulnar' type of terminations occurred most frequently followed by 'Radial' type in Bodo Mali while the situation was exactly reverse in Sung Mali. The incidence of 'Abortive' and 'Absent' types in the Sung Mali was twice that observed in the Bodo Mali. The bilaterality in the Sung Mali and sex difference in the Bodo Mali for C-line termination were statistically significant. However, both the groups failed to show significant inter-group variation.

### *c) Hypothenar Teriradii*

The Bodo Mali showed 5% greater value than the Sung Mali in the incidence of hypothenar triradii. In the former sub-population, females showed greater variability. The bimanual and sex differences were non-significant as was the inter-group difference.

### *d) Main Line Index (MLI)*

The mean values of this character were observed slightly higher for males in both the Mali groups, yet only the Bodo Malis revealed bilaterality for males and sex difference in female series as significant. The inter-group variability was evident only for female series.

**Table 2: Inter-group dermatoglyphic variation among the Malis**

| *Character* | *Males* | *Females* |
|---|---|---|
| *Qualitative (chi-square values)* | | |
| Finger pattern types | 6.02 | 2.51 |
| Palmar main line formula | 6.52 | 25.4[2] |
| Polymorphic C-line | 2.49 | 0.05 |
| Hypothenar triradii | 0.42 | 0.17 |
| *Quantitative (t-values)* | | |
| FPII | -1.22 | -0.17 |
| TFRC | 0.57 | -1.34 |
| AFRC | 0.23 | -1.28 |
| MLI | -0.14 | -2.89[2] |
| PPII | -1.47 | -0.97 |
| *Palmar ridge counts* | | |
| a-b | 3.93[2] | 0.72 |
| b-c | 5.59[2] | 1.87 |
| c-d | 4.09[2] | -1.71 |

1. Significant at 10% probability level
2. Significant at 5% probability level

### *e) Palmar Pattern Intensity Index (PPII)*

The total number of triradii on the plamar per individual in either Mali group failed to show any notable trend which corroborated most of the earlier works.

### *f) Palmar Ridge Counts*

The palmar ridge counts in general exhibited greater mean values for the Bodo Mali rather than the Sung Mali. The sex-wise analysis showed higher values for males over their female counterparts in the Bodo Mali, while almost similar values were observed in both sexes of Sung Mali. For a-b ridge count there was significant bilaterality in Sung Mali and the two Mali sub-groups showed significant sex difference. The b-c ridge count did not reveal any significant trend either for bilateraility or for sex variation. On the other hand, the c-d ridge count was found to be significant between the male and female series of both the groups. However, the Bodo Mali alone showed bimanual difference. The inter-group variation was statistically significant for male series only.

Thus, the dermatoglyphic variation of the two Mali sub-groups tend to show significant differences for the palmar rather than finger characters. Earlier studies by Narahari (1982) on the four Yerukula sub-groups of Andhra Pradesh and by Malhotra et al. (1974, 1981) on three nomadic Mendelian isolates of the Nandiwalla of Maharashtra clearly showed the association between population size and nature of variation for certain dermatoglyphic, particularly the palmar characters, and observation also made in the present study.

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