

2. Dermatoglyphics of the Deoris of Assam

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Abstract

Assam is a state in India where different tribes can be divided into plain and hill tribes. The Deori or Deuri group is a tribal group mainly settled in Assam. Deoris inhabit the areas of Lakhimpur, Sibsagar, Jorhat, Sonitpur, Dibrugarh and Tinsukia of Assam. Deoris were regarded as priests or worshippers of God and Goddess. The Deori community depend on agriculture for their livelihood and paddy is their main staple crop. The Deori community has its own culture and tradition. Agriculture is the main source of livelihood, and paddy is the main crop.

Key Words - Tribes, Deori, Ethnic, Demography, Assam

Introduction

Northeast India is a land where different tribal communities are live in both hills and plains. According to the 2001 census, there are 176 Scheduled tribes in Northeast India. Particularly in Assam, the different ethnic groups inhabiting in this area have their own unique culture, language, religious beliefs, etc. Assam's tribes can be divided into two groups based on their habitation, plain tribes and hill tribes. There are fourteen numbers of hill tribes that live in the hill district of Assam. The rest of the nine scheduled tribes are live in the plain district of Assam. According to the 2001 census, it is reported that in Assam, there are 23 scheduled tribes. Assam's total tribal population is 3308,540 out of 26,655,528, constituting 12.4 per cent of its total population. The Deori or Deuri group, who are mainly live in the upper Assam and the Indian constitution, has regarded as a scheduled tribe of Assam. The present inhabitation of the Deoris is spread in North Lakhimpur, Sibsagar, Jorhat, Sonitpur, Dibrugarh and Tinsukia District of Assam. The Deoris are believed to be Priests or worshippers of God & Goddess W. B. Brown succinctly refers that the Deories are a small and scheduled tribe of Upper Assam and the name implies. They represent the priestly or Levite class

among the Chutia, one of the most numerous upper Assam casts. It is known from history to have been the ruling race in upper Assam before the Ahom invasion in the fifteenth century. It has been stated in the available documents that the Deoris are ethnically affiliated to great Tibeto-Burman tribes of North-East India. The Deori community has its own culture and tradition Agriculture is the primary sources for their livelihood and paddy is the main crop.

Dermatoglyphic Traits

Finger and palm prints of 228 individuals (120 males and 108 females) belonging to the Deori population were collected. However, a few palm prints had not been included in the analysis as these were indistinct the age of the subject varied between 14 and 50 years. The prints were obtained by using printer's black ink. The ridge counts were scored from the prints and pattern types were classified by the standard method as designed by Cummins and Midle (1961). Statistical significance of the differences between samples in the present study was calculated concerning traits considered here by the chi-square test and by the test for quantitative variables.

Finger

The finger patterns are classified according to Galton's threefold classification i.e. where loop and arch. In the present study, the lateral pocket loops, twin loops and central pocket loops and accidentals are recorded as whorls, and plain and tented arches are also recorded as the arch.

The rules formulated by Cummins and Middle (43) and followed here for ridge counting are as follows-

The number of ridges that cross a straight line connecting the triradius to the core of a pattern is termed the pattern's ridge-count. Arches do not have any ridge count; loops have one and whorls and composites have two. If a pattern has two ridge counts, the larger at the two is used the point of the triradius and the core is not counted in determining the ridge count. All ridges crossed by an imaginary line joining the tri-radius and the core are counted.

The values of pattern type have been found out by Furuhatas index Dankuneijer's index and pattern intensity index.

There are-

1. Furuhatas index = (whorls : loops) x 100
2. Dankuneijers index = (Archs – whorls) x 100
3. Pattern intensity index - $\{(whorls \times 2)\} \div loops \div n$

Palm

The palm is studied to find out the followings :

1. Termination of mainline
2. Position of the proximal medial tri-radius
3. Configuration of hypothenan and thenar area
4. Configuration of thenar interdigital area
5. A+d angle.

Another tri-radius is usually found at the base of the palm, which is known as axial tri-radius. To determine the position of axial tri-radius, a line is drawn from the proximal radiant of the mainline C towards the proximal and then it is further extended up to the bracelet crease. It may have three positions the distal-most part is t, the proximal is t and the intermediate is t.

The mainline index for each palm is the sum of the values of mainline A & D's ending.

The angle 'atd' has been extensively used by penrose (1954) in his study of the correlation of the incidence of an axial tri-radius which occurs near the center of the palm and Mongolism Roughly in 'art' angle of over 50° is of equivalent quality in scoring the tri-radius at t'' while an angle less than 45° is equivalent to t and an intermediate angle is ranked as t.

Results

The present study has attempted to deal with recorded finger and palm prints of 228 numbers of individuals with 120 males and 108 females.

Table- I
Finger Pattern of Deori males and females: all fingers combined
(N-120 male, 108 female)

Sex	Total No of subject	Total No of whorl	P.C (%)	Total No. of Loop		Total Loop	P.C (%)	Total Arch	P.C (%)	Total	P.C (%)
				Ulnar Loop	Radial Loop						
Male	120	397	33.08	695	34	729	60.75	74	6.16	1200	100%
Female	108	368	34.07	655	28	683	63.24	29	2.68	1080	100%
Total	228	765	33.55	1350	62	1412	61.92	1.3	4.51	2280	100%

Table I shows the finger Pattern (all finger combined) of males and females. The finger pattern loop occurs more highest than the whorls and arches in both male and female. The predominance of ulner loop significantly plays a vital role in the whole finger pattern among them. The whorl finger pattern is found 33.08% in males and 34.07% in females slightly higher than the male. In the case of a loop, female also shows a higher percentage than the male. It is found 60.75% in males and 63.24% in females. On the other hand, among the male finger pattern arches shows a higher percentage than the female, which is 6.16% in males and only 2.68% in females.

Table – IIa

Percentile frequency of fingerprint pattern of the male
(N=120)

Finger Pattern	Right Hand						Left Hand						Total R+L Total
	I	II	III	IV	V	Total	I	II	III	IV	V	Total	
Whorl %	56 25.33	41 18.55	26 11.76	72 32.57	26 11.76	221 36.83	34 19.31	41 23.29	23 13.06	55 31.25	23 13.06	176 29.33	397 33.08
Ulnar Loop %	59 17.77	60 18.07	79 23.79	46 13.85	88 26.50	332 55.33	76 20.13	57 15.70	94 25.89	49 13.49	87 23.96	363 60.5	695 57.91
Radial Loop %	2 11.76	12 70.58	3 17.64	0 0	0 0	17 2.83	3 17.64	6 35.29	0 0	5 29.41	3 17.64	17 2.83	34 2.83
Total Loop %	61 17.47	72 20.63	82 23.49	46 13.18	88 25.21	349 58.16	79 20.78	63 16.57	94 24.73	54 14.21	90 23.68	380 63.33	729 6075
Arch %	3 10.00	7 23.33	12 40.00	2 6.66	6 20.00	30 5.00	7 15.90	16 36.36	3 6.81	11 25.00	7 15.90	44 7.33	74 6.16

Table IIa shows the percentile frequency of the Deori male's fingerprint pattern on the basic pattern types defined by Galton (1982). The digit I of right-hand shows more numbers of whorls 25.33% than the digit I 19.13% of left hand. On the other hand the same digit of right-hand ulner loop exhibits lower 17.77% than that of the left-hand ulner loop 20.13%. There are 11.76% of radial loop are found

in the right hand and 17.64% in left hand. The digit I of left hand shows more number arches than the digit I of right hand. The percentage of arches is 15.90% in left hand and 10% being in the right hand.

The digit II of left hand, whorls shows higher percentage than that of the digit II of right hand which is 23.29% and 18.55% respectively. On the other hand the finger having ulner loop is higher in right hand 18.07% than the same digit of left hand which shows 15.70%. In digit II, radial loop exhibits 70.58% in right hand and 35.29% of radial loop shows in left hand. The left hand shows more arches 36.36% in the digit II and the right hand shows 23.33% respectively.

The finger pattern whorls occur higher in left hand in the digit III than the right hand. The percentage of whorl is 11.76% in the right hand and 13.06% in the left hand. The same digit of right-hand ulner loop also seems lower than the left hand ulner loop. The right-hand shows 23/79% and left-hand shows 25.89% respectively. The radial loop exhibits 17.64% in the digit III of the right hand and it is absent in the digit III of the left. The finger pattern arches is found 40% in the digit III of right hand and only 6.81% is found in left hand.

The whorls finger pattern shows in digit IV of right hand slightly higher than the left hand. The percentage of whorls is 32.57% and 31.25% are found in left hand. In the same digit, most of the similarities are seen in case of ulner loop in both the right and left and which is 13.85% and 13.49% respectively. The radial loop is absent in right hand in digit IV and 29.41% is found in left hand. On the other hand the arches are present 6.66% in right hand and 25% is seen in left hand.

In the digit V, the pattern of whorls is seems to be higher in left hand which is 13.06% and the right hand shows 11.76% respectively. In right hand ulner loop are found 26.50% in the digit V and it is comparatively very low than the left hand which seems 60.5%. The radial loop is absent in digit V of right hand and 17.64% is found in left hand. The arches are found 20% in digit V of right hand and 15.90% is seen in left hand respectively.

Table III
Percentile frequency of finger print pattern of the female
(N=108)

Finger Pattern	Right Hand						Left Hand						Total R+L Total
	I	II	III	IV	V	Total	I	II	III	IV	V	Total	
Whorl %	46 25.13	39 21.31	14 7.65	71 38.79	13 7.10	183 33.88	48 25.94	43 23.24	13 7.02	55 29.72	26 14.05	185 34.25	368 34.07
Ulnar Loop %	58 17.68	51 15.54	92 28.04	36 10.97	91 27.74	328 60.74	59 18.04	48 14.67	92 28.13	49 14.98	79 24.15	327 60.55	655 60.64
Radial Loop %	2 12.5	11 68.75	0 0	1 6.25	2 12.5	16 2.96	0 0	12 42.85	0 0	0 0	0 0	12 2.22	28 2.59
Total Loop %	60 17.54	62 18.12	92 26.90	37 10.81	93 27.19	344 63.70	59 17.40	60 17.69	92 27.13	49 14.45	79 23.30	339 62.77	683 63.24
Arch %	2 15.38	7 53.84	2 15.38	0 0	2 15.38	13 2.40	1 6.25	5 31.25	3 18.75	4 25	3 18.75	16 2.96	29 2.68

Table III shows the percentile frequency of finger print pattern of the Deori female. The digit I of left hand shows slightly higher numbers of whorls than the left hand. The percentages are 25.94% and 25.13% respectively. In the same digit of right hand under loop is also exhibits lower 17.68% than that of the left hand ulner loop 18.04%. There are 12.5% of radial loop are found in the right hand and it is absent in left hand. On the other hand the digit of right hand shows more number arches of than the digit I of left hand. The right hand percentage is found 15.38% and 6.25% found in the left hand.

The digit II of left hand, whorls shows higher percentage than that of the digit II of right hand which is 23.24% and 21.31% respectively. The finger having ulner loop is slightly higher in right hand 15.54% than the same digit of left hand which shows 14.67%. Radial loop exhibits 68.75% in right hand and 42.85% of radial loop shows in left hand. The right hand shows more arches 33.84% in the digit II and the left hand shows 31.25% respectively.

The finger pattern whorls occur slightly higher in right hand in the digit III than the left hand. The percentage of whorl is 7.65% in the right hand and 7.02% in the left hand. The same digit of right hand ulner loop seems to be also higher than the left hand ulner loop. The right hand shows 28.04%

and left hand shows 28.13% respectively. The radial loop is absent in the digit III of both right and left hand. The finger pattern arches is found 15.38% in the digit III of right hand and 18.15% is found in left hand.

The whorls finger pattern shows in digit IV of right hand shows higher than the left hand. The percentage of whorls is found 38.79% and 29.72% are found in left hand. In the same digit in case of ulner loop the right shows 10.97% and left hand shows 14.98% respectively. The radial loop is found 6.25% in right hand in digit IV and it is totally absent in left hand. On the other hand the arches are absent in right hand and 25% is seen in left hand.

The digit V, the pattern of whorls is seems to be higher in left hand which is 14.05% and the right hand shows 7.10% respectively. In right hand ulner loop appear 27.74% in the digit V and it is found 24.15% in left hand. The radial loop is exhibits 12.5% in right land where it is totally absent in digit V of left hand. The finger pattern arches are found higher in left than the right hand in digit V. The right hand shows the percentage 15.38% and 18.75% is seen in left hand respectively.

Table IV

Comparative occurrence of Whorls & Loops in different digit of male and female

Digit	Male (N=120)			Female (N=108)		
	Right	Left	Combined	Right	Left	Combined
I	L>W	L>W	L>W	L>W	L>W	L>W
II	L>W	L>W	L>W	L>W	L>W	L>W
III	L>W	L>W	L>W	L>W	L>W	L>W
IV	W>L	W>L	W>L	W>L	W>L	W>L
V	L>W	L>W	L>W	L>W	L>W	L>W

Table IV shows the comparative occurrences of whorls and loops. After compression the two hand of both male and female and it is seen that only the digit IVV whorls exhibits greater than the loops among the other digits I, II, III and V.

Table V

Indices of pattern type of fingers (N=Male-120, Female-1108)

Hand	Male			Female		
	Furuhatas Index	Dankmeijer's Index	Pattern Intensity Index	Furuhatas Index	Dankmeijer's Index	Pattern Intensity Index
Right	63.32	13.57	6.59	53.19	7.10	6.57
Left	46.31	25	6.1	54.57	8.64	6.56
Combined	54.45	18.63	12.69	53.87	7.88	13.13

Table V represents the data indices of both male and female. The distribution of pattern types has been calculated on the basis of three indices namely- Furuhatas's Index, Dankmeijer Index and Pattern Intensity Index.

Furuhata's Index is occurred more in right hand 63.32 than the left hand 46.31 in males but in case of female it seems to be higher in left hand 54.57 than the right hand 53.19 in females. The Dankmeijer's Index in left hand of both male and female shows higher percentage than the right hand.

It is found 25 in the left hand and 13.57 in the right hand among the males and 8.64 in the left and 7.10 in right hand.

The pattern of Intensity Index in right hand shows 6.59 and 6.1 in left hand in males where the female shows 6.57 in right hand and 6.56 in left hand respectively.

Ridge Count:

The distribution of ridge counts between right and left hands are shown in the table VI. Among the male digit- I exhibit higher ridge count in the right hand than all the digits II, III, IV and V. The digits I and II of left hand show the same frequency while the digits III, IV and V shows almost same.

The differences are occurs higher in right hand than left hand in the digits I, III and IV. On the other hand the digit II and V shows the higher frequency than the right hand.

Table VI

Digit wise distribution of finger ridge counts between right and left hands

Digit	Male (N=120)			Female (N=108)		
	Right	Left	Difference	Right	Left	Difference
I	15.92	14.24	1.68	14.48	12.92	1.56
II	13.06	14.31	-1.25	12.11	11.89	0.22
III	13.63	12.44	1.19	12.07	13.06	-0.99
IV	14.51	12.41	2.1	12.49	13.31	-0.82
V	12.03	12.64	-0.61	11.13	11.61	-0.48

Among the female the digit I of right hand show higher frequency than the digits II, III, IV and V. On the other hand digit IV and III of left hand shows higher frequency than the all digits of I, II and V. The differences are occurs higher in right hand than left hand in the digits I and II. O the other hand the digit III, IV and V shows the higher frequency than the right hand.

Table VII

Differences in Mean Ridge Counts between Fingers of right and left hands

Digit	Right Hand			Left Hand		
	Male (N=120)	Female (N=108)	Difference	Male (N=120)	Female (N=108)	Difference
I	15.92	14.48	1.48	14.24	12.92	1.32
II	13.06	12.11	0.95	14.31	11.89	2.42
III	13.63	12.07	1.56	12.44	13.06	-0.87
IV	14.51	12.49	2.02	12.41	13.31	0.9
V	12.03	11.13	0.9	12.64	11.61	1.03

The Palm

Table III shows the distribution of mainline termination of each of the main lines D, C, B and A of male. The highest percentage of terminations is shown in the position 4 in both right and left hand which is 40% in line A. The second highest percentage is found in the positions 5 in both hands which is 30.41% and followed by position 3 exhibits 17.08%, 8.75% in the position 5 and only 0.83% are found in the position 11 respectively.

In case of line B. The highest percentage seems to be 44.90% in the position 5'' of both right and left hand. The position 7 show 34.72% in both hands and it is followed by 17.12% in the position 5' and 2.08% in the position 9 and only 1.66% in the position 11 among males in both hands. As for the main line C, it is 43.33% in both right and left hand in the position-9 On the other hand the position-7 exhibits altogether in both hand 36.25% and followed by 18.33 in the position 5''. There are 2.08% are found in the position 5' and only 1.25% are found in the position 11 respectively. The line D, in both right and left hand of male proportion of termination is found in the position-9. The ending of main line-9 exhibits 41.25% in both the hands, followed by the position – 11 shows 35.41%. There are 22.08% proportion of termination is found in the position-7 in both right and left hand among males.

Table VIII

Distribution of Mainline Termination of male (N=120)

Main Lines	Main line ending	Right	%	Left	%	Right + Left	%
D	11	46	42.59	37	34.25	83	38.42
	9	38	35.18	44	40.74	82	37.96
	7	22	20.37	27	25.01	49	22.68
	5''	19	17.59	24	22.23	43	19.90
C	11	1	0.92	-	-	1	0.46
	9	48	44.43	46	42.59	94	43.51
	7	39	36.11	38	35.18	77	35.64
	5'	2	1.85	1	0.92	3	1.38
B	11	1	0.92	-	-	1	0.46
	9	1	0.92	-	-	1	0.46
	7	41	37.96	34	31.48	75	34.72
	5''	46	42.59	51	47.22	97	44.90
A	5'	18	16.65	19	17.59	37	17.12
	11	-	-	-	-	-	-
	5''	31	28.70	39	36.11	70	32.40
	5	13	12.03	16	14.81	29	13.42
	4	47	43.51	43	39.81	90	41.66
	3	19	17.59	13	12.03	32	14.81

Table IX shows the distribution of mainline termination of each of the main lines D, C, B and A of female. The highest percentage of terminations is shown in the position 4 in both right and left hand which is 41.66 in line A. The second highest percentage is found in the position 5'' in both hands which is 32.40 and followed by position 3 exhibits 14.81. In both the hands 13.42% are found in the position 5 respectively.

In case of line B, The highest percentage seems to be 44.90% in the position 5'' of both right and left hand. The position 7 show 34.72% in both hands and followed by 17.12% in the position 5' and th similar percentage 0.46% are found in the position both 9 and 11 among females in both right and left hand.

As for the main line C, it is 43.51% in both right and left hand in the position-9. On the other hand the position-7 exhibits in both hand 35.64% and followed by 19.90% in the position 5''. There are 1.38% are found in the position 5' and only 0.46% are found in the position 11 respectively. In case of line D, in both right and left hand of female proportion of termination is found in the position-11, which is 38.42%. There are 37.96% in both the hands in the position-9. The proportion of termination is found 22.68% in the position-7 in both right and left hand.

Table X

Wilder's three principal main line formula (male, N=120)

Principal main line formulae	Right hand		Left hand		Combined	
	No	%	No	%	No.	%
11 9 7	37	30.83	23	19.16	60	50.00
9 7 5''	32	26.66	35	29.16	67	55.83
7 5'' 5''	24	20.00	21	17.5	45	37.5

Table X reveals the distribution of main line formula according to Wilder's classification. Among the male, formula 11 9 7 appears in highest frequency (30.83%) followed by 9, 7 5'' (26.66%) and 7 5'' 5'' (20%) in right hand. In case of left hand the highest frequency is found in formula 9 7 5'' which is (29.16%). The formula 11 9 7 shows (19.16% and 7 5'' 5'' appeared (17.5%). On the other hand the

frequency shows highest percentage in formula 9 7 5'' (55.83) followed by (50%) in 11 9 7 and (37.5%) in the formula 7 5'' 5'' respectively.

Table XI

Wilder's three principal main line formulae (female, N=108)

Principal main line formulae	Right hand		Left hand		Combined	
	No	%	No	%	No.	%
11 9 7	31	28.70	20	18.51	51	47.22
9 7 5''	19	17.59	24	22.23	43	39.81
7 5'' 5''	27	25.00	47	43.51	74	68.51

Table XI shows the distribution of main line formula of female according to Wilder's classification. Formula 11 9 7 appears in highest frequency (28.70%) followed by 7 5'' 5'' (25%) and 9 7 5'' (17.59%) in right hand. In case of left hand highest frequency is found in formula 7 5'' 5'' (43.51%). The formula 9 7 5'' shows (22.23%) and 11 9 7 lowest frequent which is (18.51%). On the other hand the frequency shows highest percentage in formula 7 5'' 5'' (68.51%) followed by (47.22%) in 11 9 7 and (39.81%) in the formula 11 9 7 respectively.

Comparison of Dermatoglyphics Traits

The percentile distribution of finger patterns among the different tribal population groups of Assam are shown in the table III. Among them Deori, Mishing, Tai Phake and Hajong groups occur in higher percentages of loop than the whorls. On the other hand the Tiwa, Rabha and Kachari groups reverse is true, where whorls are exhibits in higher percentage than the loops.

Table XII

Percentile Distribution of finger patterns among the tribal populations of Assam

Populations	No. Of Individuals	Whorl (%)	Loop (%)	Arch (%)	Source
Deori	120	36.83	58.16	5.00	Present Study
Mishing	57	37.67	60.18	3.18	Das et. al (1980)

Tiwa	52	50.19	47.50	2.31	Das et. al (1980)
Rabha	295	50.66	47.79	1.55	Das, 1960
Kachari	109	51.66	43.41	1.84	Das, 1960
Tai Phake	100	42.76	52.15	5.07	Baruah, 1992
Hajong	67	37.61	60.59	1.79	Bhuyan, 2013

Table XIII reveals the value of Furuahata's Index, Dankmejer's Index and Index of Pattern Intensity of some respective tribal population groups of Assam. The lowest value of Furuahata's Index is rises from the Deori group (54.45) to Tai Phakes (185.08), while the Dankmejer's Index is occur in lowest percentage among the Tiwa, Kachari (2.90) and highest percentage is found among the group Tai Phakes (24.44). The value of Pattern Intensity index is found highest in Tiwa and lowest in Hajong.

Table XIII

Comparative occurrence of Indices among the tribal population groups of Assam

Populations	No. of Individuals	Furuhata's Index	Dankmejer's Index	Index of Pattern Intensity	Source
Deori	120	54.45	18.63	12.69	Present Study
Mishing	57	60.90	8.60	13.35	Das et. al 1980
Tiwa	52	107.40	2.90	15.00	Chakravarty & Mukharjee, 1961
Rabha	295	69.50	17.50	13.20	Chakravarty & Mukharjee, 1961
Kachari	109	126.30	2.90	15.40	Chakravarty & Mukharjee, 1961
Tai Phake	100	185.08	24.44	13.91	Baruah, 1992
Hajong	67	58.00	7.94	3.61	Bhuyan, 2013

Table XIII shows the percentile occurrence of Wilder's three principal mainline formulae 11, 9, 7 ; 9, 7, 5 ; and 7, 5, 5 of different tribal population groups. The 11, 9, 7 type appears higher in Deori (30.83) while Rabha exhibits as the lowest (4.88). The type 9, 7, 5 appears to be most frequent in

Mishing, followed by 7, 5, 5 types is show higher frequency among the Kachari and lowest frequency is seen in Tai Phake group.

Table XIV

Percentile Occurrence of Wilder's Three Principal Mainline Formulae of tribal population groups of Assam

Populations	11, 9, 7 (%)	9, 7, 5 (%)	7, 5, 5 (%)	Source
Deori	30.83	26.66	20.00	Present study
Mishing	19.61	44.11	18.63	Das et. al (1980)
Tiwa	15.09	26.89	36.36	Chakravarty & Mukharjee, 1961
Rabha	4.88	21.42	26.69	Das, 1960
Kachari	12.00	31.33	35.33	Das, 1980
Tai Phake	5.00	54.0	15.0	Baruah 1992

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