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A Comparative Study on Palmar Dermatoglyphics of Brahmin and Muslim Populations in Manipur

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Abstract: Dermatoglyphics of the palm, sole, fingers and toes are very often considered to be one of the important biological parameters for study of population variation as dermatoglyphics configurations are generally believed to have a strong genetic bearing.
Objectives: The objective of the present study is to examine the main line formulae, main line ending of D, C, B, and A, and main line Index of the palm of Brahmin and Muslim populations in Manipur. **Design:** A cross-sectional study.
Materials and methods: A total of 400 unrelated normal individuals (200 Brahmins and 200 Muslims) representing males (100) and females (100) in each population were collected using ink-print method. The age of the subjects ranges from 10 to 40 years.
Results: The frequency termination of all Main line terminations A, B, C and D is most frequent at Position 3,position 5, ulnar model and in position 9 in the two populations. Comparison of Main line A of the same sex and inter population showed statistically significant differences, (λ^2=18.093, 8.1624 and 6.019, P<0.05), while the males shows significant difference in Main lines termination B and C (λ^2=8.544, and 611.020, P<0.05).The percentage frequency distribution of the three important main line formulae shows a preponderance order of 9.7.5 >7.5.5 >11.9.7 in both the Brahmin and the Muslim populations. The highest frequencies in both populations occur in the formula 9.7.5 in Brahmins and Muslims with 37.0% and 35% respectively. Tiwari (1952) opined that 9.7.5 is a mongoloid formula, which indicates that these two populations acquired the mongoloid elements after intermarrying with the Meitei women even though they came from different origins.
Conclusion: The females of the two populations show more homogeneity with difference only in A main line ending, but males show more differences in three traits, out of the six traits studied, indicating more heterogeneity.

Keywords: Brahmins, Main line formulae, Main line ending, Main line index, Muslims

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I. INTRODUCTION

In anthropological research, especially in Physical Anthropology, dermatoglyphics of the palm, sole, fingers and toes are very often considered to be one of the important biological parameters for study of population variation[1,2,3,4,5] since dermatoglyphics configurations are generally believed to have a strong genetic bearing [6,7,8]. Dermatoglyphic characters remain permanent and unchanged in the later life unless destroyed by extreme environmental stress [9]. This permanency is a keystone in various biological investigations involving studies of inheritances, legal aspects and population differences. Law enforcement agencies indicate that at least 30% of the prints lifted from crime scenes from knife hilts, gun grips, steering wheels and window panes are of palm, not fingers[10]. For this reason, capturing latent palm prints is becoming an area of interest among the law enforcement agencies. Moreover, dermatoglyphics features are not affected by environmental factors and no developmental changes take place either in the detailed structure of the ridges or in the ridge patterns.

1.1 Ethno-history of the Brahmin and Muslim of Manipur:

The first Indo - Aryan Brahmin came to Manipur during the reign of Kyamba in the early part of 15th century A.D. A fairly steady stream entered the state from various part of India during the reign of different kings. They were allowed to settle by the then kings. Most of the immigrants were male usually without their women. The king allowed them to marry with Meitei women. They were allotted lineage *(sagei)* names, which they bear today. Thus, all Brahmin immigrants became *Meiteis*. They were later known as *Meitei-Bamon*. The word *'Bamon'* is a Manipuri style of the name of Brahmin[11]. After the acceptance of the *Vaisnavite* religion, the Hindu form of society was adopted. Since then the Meitei occupied the second position in the Hindu caste hierarchy and the *Bamon* occupying the highest social status in the society. With the passage of time a number

of generations had brought about changes. They have assimilated by degrees into the Meitei society. As such, there is sizable Brahmin population with highest concentration in the Imphal valley.

The Muslim population in Manipur, on the other hand, is known as *'Pangan'*, which comes from the word 'Bengal'. The Manipuri corrupted the word 'Bengal/Bangal' into *Pangan* [12]. At present they are generally known as "Muslim" or "Meitei Pangan". Muslim settlements are found in different parts of Manipur valley. They were originally Bengali speaking population. A large band of Muslim sepoys entered from Sylhet to Manipur during the reign of Khagemba Maharaja (1597-1652). They rendered physical support and came to the service of Sanongba[13] who raised an army to take revenge against his stepbrother Khagemba Maharaj. The king defeated and captured them as prisoners of war and later rehabilitated them in Manipur and the erstwhile enemies were turned into useful, patriotic subjects of Manipur [14, 15]. They married local Meitei women and finally settled in the valley. They were given lineages. About 61 lineages (*sagie*) have been recorded amongst them[16].

Intermarriage between the Brahmins and Muslims before and after their migration to Manipur was strictly prohibited because of their strict religious boundaries. The male progenitors of these two migrant groups acquired female partners (wives) from the local autochthonous Manipuri community at the beginning [17]. This marital relationship of the Meitei with the Brahmin and Muslim is of one-way direction. The Hindunised, tradition Meitei Society has adopted the concept of hypergamy tradition of the Hindu social system. That is why there is restriction in marriage between Meitei boys (i.e. Kshetriya boy) and Brahmin girls while the reverse of it is permissible. The Meitei on the other hand do not prefer marriage with Muslim girls due to religious difference and stigmatization. Moreover, Islamic restrictions of out-marriage (exogamy) of Muslim girls to any people of other religious group virtually check reciprocal exchange of genetic material between the Meitei and Muslim population. This social and cultural isolation makes the Brahmin and Muslim into two distinct populations.

1.2 Objective of the study

The present research paper aims at examining the qualitative and quantitative palmar dermatoglyphical features of Brahmins and Muslims in Manipur and also to make comparisons to find if there exists any homogeneity or heterogeneity between the two groups.

II. METHOD OF DATA COLLECTION

Bilateral palmar prints have been collected from willing unrelated normal 400 (four hundred) individuals comprising males (100) and females (100) in each group by ink-print method. All subjects of the present study belong to the age range of 10 to 40 years.

III. ANALYSIS AND STATISTICAL APPLICATION

The present study examines the variation of main line formulae, main line ending of D, C, B, and A, and main line Index of the palm. Depending upon the variability of the data, qualitative or quantitative parameters, Mean ($\bar{X}$), Standard deviation (σ) and Standard error (S.E), Chi- square and't'- test were computed using SPSS version 16 and f x -82MS.

IV. RESULTS

Main line A terminates most frequently at type 3 followed by type 5with 80.75% and 18.75% among Brahmins and 78% and 19.25% among Muslims respectively. Very low frequencies of termination of 'A' line ending among the two groups are observed at position1, 7,11and 13, which come under the category of others (Table 1). Comparisons in A-line ending in between Brahmin and Muslim males (λ^2= 18.093, P<0.05), in between females (λ^2 = 6.019, P<0.05) and in between inter populations (λ^2 =8.162, P<0.05) have revealed significant statistical differences.

Table 1: Frequency distribution of different palmar line –A ending and λ^2 values

A-line ending	Male			Female			Inter population		
	Brahmin	Muslim	λ^2	Brahmin	Muslim	λ^2	Brahmin	Muslim	λ^2
3	178 (89.0)	148 (74.0)	18.093*	145 (72.5)	164 (82.0)	6.019*	323 (80.75)	312 (78.0)	8.162*
5	22 (11.0)	44 (22.0)		53 (26.5)	33 (16.5)		75 (18.75)	77 (19.25)	
Others	-	08 (4.0)		02 (1.0)	03 (1.5)		02 (0.25)	11 (2.75)	

Notes: - d f = 2, $\lambda^{2=}$ 5.991**;** figures in the parentheses indicate percentages.

The frequency termination of Main line B ending is the highest at position 5 in the two populations in Brahmins (73.5%) and in Muslims (72.75%). It is followed by the position 7 21.75% for Brahmins and 23.25% for Muslims and lastly, by position 9 with 4% and 3% in the two different groups. Termination at position 3, 8 and 11 are found low in both cases and put together as others (Table 2). Statistically, no significant variations have been shown except in between the Brahmin and Muslim males (λ^2= 8.544, P<0.05),in the comparison of B line ending.

Table 2: Frequency distribution of different palmar line –B ending and λ^2 values

B-line ending	Male			Female			Inter population		
	Brahmin	Muslim	λ^2	Brahmin	Muslim	λ^2	Brahmin	Muslim	λ^2
5	146 (73.0)	138 (69.0)		148 (74.0)	153 (76.5)		294 (73.5)	291 (72.75)	
7	41 (20.5)	58 (29.0)		46 (23.0)	35 (17.5)		87 (21.75)	93 (23.25)	
9	12 (6.0)	03 (1.5)	8.544*	04 (2.0)	09 (4.5)	3.700	16 (4.0)	12 (3.0)	0.929
Others	01 (0.5)	01 (0.5)		02 (1.0)	03 (1.5)		03 (0.75)	04 (1.0)	

Notes: d f = 3, λ^2 =7.815

Following Plato [18] the main line C terminates more frequently found at ulnar model in both the populations having with 73.75% and 69.00% for Brahmins and Muslims respectively. This is followed by 22% and 27.50% representing the two populations of the radial model and only Brahmin males have proximal ending (0.50%). Main line C is also found absent in both the population of Brahmin (4.0%) and Muslim (3%). The Chi-square values in the comparison of C- line ending in between two male groups (λ^2= 10.220, P< 0.05) show, statistically, significant at 5% level whereas the female comparing groups and the inter populations do not show significant differences in this comparisons (Table 3).

Table 3: Frequency distribution of different palmar line-C ending and λ^2 values

C-line ending	Male			Female			Inter population		
	Brahmin	Muslim	λ^2	Brahmin	Muslim	λ^2	Brahmin	Muslim	λ^2
Ulnar	144 (72.0)	119 (59.5)		151 (75.5)	157 (78.5)		295 (73.75)	276 (69.0)	
Radial	45 (22.5)	73 (36.5)	10.220*	43 (21.5)	37 (18.5)	0.566	88 (22.0)	110 (27.50)	4.209
Proximal	01 (0.5)	-		-	-		01 (0.25)	-	
Absent	10 (5.0)	08 (4.0)		06 (3.0)	06 (3.0)		16(4.0)	14 (3.5)	

Highest frequency of Termination of main line D occurs in type 9 (43.25%), followed by type 7 (30.25%) and 11 (26.5%) in Brahmins. The Muslims also show the same trend as the Brahmins having type 9 (44.0%), followed by type 7 (30%) and 11 (25.5%). The highest termination is indicated at type 9 in male Brahmins (46%). The Chi-square values in the comparisons of D-line ending in between the males, in between females and inter populations of Brahmin and Muslim show no significant differences(λ^2= 0.3272, P>0.05; λ^2 = 1.2918, P>0.05 and (λ^2 = 0.1522, P<0.05)) at 5% level (Table 4).

Table 4: Frequency distribution of different palmar main line –D ending and λ^2 values

D-line ending	Male			Female			Inter population		
	Brahmin	Muslim	λ^2	Brahmin	Muslim	λ^2	Brahmin	Muslim	λ^2
7	56 (28.0)	55 (27.5)		65 (32.5)	65 (32.5)		121 (30.25)	120 (30.0)	
9	92 (46.0)	88 (44.0)	0.327	81 (40.5)	90 (45.0)	1.291	173 (43.25)	178 (44.5)	0.152
11	52 (26.0)	57 (28.5)		54 (27.0)	45 (22.5)		106 (26.5)	102 (25.5)	

Notes: - d.f. =2 ,λ^2=5.991.

Below table 5 shows the frequency percentage distribution of three important main line formulae[19]. Table highlights that a preponderance order of 9.7.5 >7.5.5 >11.9.7 in both Brahmin and the Muslim populations have been seen. The highest frequency of formula 9-7-5 occurs in male Brahmins (38%) and female Muslims (38.5%). The Brahmins show higher frequency (37%) than the Muslims (35.75%) in the mainline formula 9.7.5. Statistically, no significant differences are found in all comparisons in the main line of palms (Table 5).

Table-5: Frequency of Wilder's main line formulae and λ^2 values of Brahmin and Muslim Populations

Main lines	Male			Female			Inter population		
	Brahmin	Muslim	λ^2	Brahmin	Muslim	λ^2	Brahmin	Muslim	λ^2
11 9 7	28 (14.0)	42 (21)		31 (15.5)	23 (11.5)		59 (14.75)	65 (16.25)	
9 7 5	76 (38.0)	66 (33)		72 (36.0)	77 (38.5)		148 (37.0)	143 (35.75)	
7 5 5	50 (25.00)	42 (21)	4.366	58 (29.0)	59 (29.5)	1.411	108 (27.0)	101 (25.25)	0.815
Others	46 (23.0)	50 (25)		39 (19.5)	41 (20.5)		85 (21.25)	91 (22.75)	

Notes: d.f. = 3, λ^2= 7.815

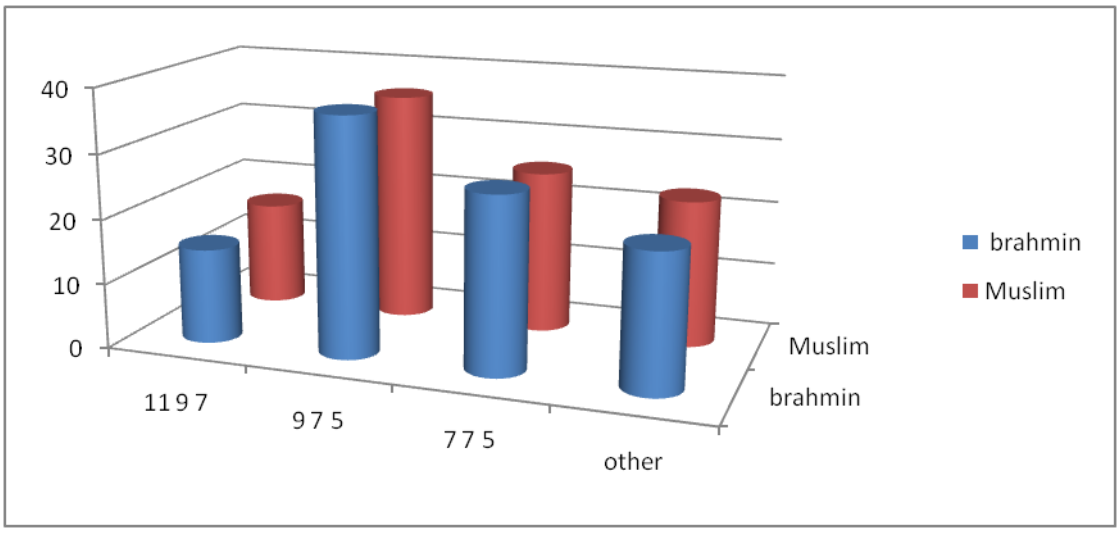

Fig.2: Graph showing different percentages of Wilder's main line formulae of Brahmin and Muslim populations.

Mean values of palmar main line index of males and females with 7.15 ± 0.16 and 7.52 ± 0.19 of Brahmin population show more less the same with those of Muslim males (7.58 ± 0.21) and females (7.18 ± 0.18).Statistically, no significant variations can be seen in between Brahmins and Muslims in all comparisons of mean values of palmar main line index of (Table-6).

Table 6: Statistical constants of mean, standard deviation and standard Errors and t values of palmar main line Index

Sex	Brahmin			Muslim		
	Mean ± SE	SD ± SE		Mean ± SE	SD ± SE	't' values
Male	7.15 ± 0.16	1.49 ± 0.11		7.58 ± 0.21	1.84 ± 0.15	1.653
Female	7.52 ± 0.19	1.88 ± 0.14		7.18 ± 0.18	1.59 ± 0.14	1.307
Total	7.34± 0.14	1.98 ± 0.10		7.38 ± 0.12	1.73 ± 0.09	0.222

Note: df. =198,'t'= 1.96

V. DISCUSSION

The present study has revealed that in both populations, maximum number of subjects of both sexes show A - main line ending at position 3 and D main line ending at position 9. Cummins [20] observed that the termini of two main lines A and D alone can adequately reflect the ridge direction. Mail line index is based on

the sum of the two numbers corresponding to the exits of main line A and D. Low resulting value indicates vertical alignment, whereas, high value reflects a tendency for the palmer ridge direction to be horizontal. The two populations, in the present study, show mean of main line index ranges from 7.15 to 7.58 which indicates slightly vertical alignment. Mongoloid hand show greater tendency of the longitudinality [9, 21]. The present study having higher number of frequency in A main line ending at position 3 and D main line ending at position 9 shows the conformity and can be presume that the Muslim and the Brahmin even though they originated as non Mongoloid have acquired the mongoloid traits from the Meitei population. Further, the main line index does not show any significant difference when compared between males groups, female groups and population group wise. The predominant main line type (11-9-7) was found among the in Sunni Muslim[22], Muslim of Hooghly West Bengal[23], caste [24] and tribal[25] populations of India as such, the present populations who have 9-7-5 as the highest number of main line type in both sexes; do not show any similarity. However, this finding is in conformity with the earlier study of Singh [26] who worked among the five populations of Manipur, but in contrast with the findings of the mongoloid population of Manipur and Nagaland[27,28]. In the later study, the highest main line type was found as 7-5-5 among the Mongoloids which is the second highest among the Brahmins and Muslims.

Further, it also observed the highest frequency of 7-5-5 among the Limbu[29] tribes of Sikkim. Interestingly, Tsiapia[30] reported the highest number of individuals having main line type 9-7-5 among the males of Arunachal Pradesh and War Jaintia hills, which is in similar trend with the present study with respect to this particular palmar characteristic. But the female shows higher frequency in main line type 7.5.5 where such kind of sexual difference is not found in the present study. However, other main line formulae type such as 9-5-5 and 11-9-7 are also found in least frequencies in the present study which indicates that traits other than 9-7-5 are also still exist among these Brahmins and Muslims. Tiwary [31] reported as early as in 1952 that such a peculiar main line formula is a mongoloid formula.

While observing the population variation of the Brahmin and Muslim populations of Manipur certain significant variation is observed, particularly, among the males. The females of the two populations show more homogeneity except the A-line ending, but males show differences of three traits out of the six traits studied indicating more heterogeneity. The difference that is found in the palmar is rooted from the male's progenitor resulting in the differences of the population.

VI. CONCLUSION

The homogeneity observed in the females of the Brahmin and Muslim of Manipur may relate to the acquiring of genes as both the population married the female from the Meitei population. The differences thus observed might also be of restricted intermarriage between the Brahmin, Muslim and other population in the later part of settlement because of their strict religion, newly introduced caste system after converting the Meitei in a Hindu based society and stigma and above all the different in their origin of male progenitor resulting in the establishment of two separate Mendelian populations. From the above study it can also be safely presume that the Brahmin and the Muslim of Manipur have more inclination towards the mongoloid features rather than having non mongoloid.

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