Somatometric Measurement of the Meitei Population of Manipur Valley.

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Abstract: *Somatometric measurements on 600 males and 400 females in the age group 18 yrs to 25 yrs of Meitei population of Manipur valley only had been grouped into the range variation of certain measurements and indices used by Saller, Martin, Lebzelter and others. The present findings on these " stock" on high prevalence rates after being grouped into the given "range variation" of the sexes were: - (i) From the measurements – lower medium stature, medium head length and breath, medium breath of bizygomatic arch, low facial height for males and medium facial height for females; and above medium nasal breadth for males. (ii) From indices – (a) cephalic index showed Brachycephalic – tendency to Mesocephalic in males, but Hyper-brachycephalic in females (b) Mesoprosopic, Euryen (c) very narrow Jugo-mandibular index, Mesorhinae (d) narrow chest girth-stature index in males whereas medium chest in females (e) Robusticity - tendency to very weak in case of males and good in case of females. As cephalic index showed varied range, it could not represent the mongoloid feature of Meiteis.*
Key word: *Meitei, Manipur, somatometric, measurement, indices and mongoloid.*

I.   Introduction:

The Meiteis having a population of about 14 lakhs are inhabitant of Manipur valley, containing an area of 2 258 sq km and lies between 23.47^0 and 25.41^0 North latitude, and $93.6^0$and 94.48^0 East longitudes. The height of the valley is about 750 m above the sea level. The Meiteis are mostly Hindus and belong to Tibeto-Burman stock. Among Meiteis cross – cousin marriage is not practiced and clan exogamy is strictly observed. The Mongolian feature is predominant in the Meiteis population. About the feature of Meiteis, Brown R[1] wrote". Although in general, facial characteristics of the Manipuris are of Mongolian type, there is a great diversity of features among them, some of them showing a regularity approaching Aryan type. Among both men and women the stature is vary various differing about as much as is found among Europeans".

Dun EW[2] described as "There can be no reasonable doubt that a great Aryan wave of very pure blood passed through Manipur into Burma in pre-historic times. I see traces of this in the finely cut features seen now and then among the Manipuris". Sir James Johnstone[3] gave his view, as "The Manipuris themselves are a time stalwart race descended from an Indo-Chinese stock with some admixture of Aryan blood, derived from the successive waves of Aryan invaders that have passed through the valley in prehistoric days". The present day Meitei population appears to be formed out the mingling of several waves of immigrants in the fertile valley in the remote post. At different periods, the Nagas the kukis, Shan, the Chinese had settled in this land and merged themselves into the Manipuri (Meiteis) community. Roy J[4] described about the presence of the Dravidian features are also found in them.

Studies in physical anthropology of the Meiteis have not been taken up adequately. Anthropometrics measurements recorded by British Administrators like Hudson TC [5] are found to be meager. Due to custom and less population dry skull/skeleton measurements are not possible a significant data of anthropometrics measurements of Meiteis population. Because of this, the present study has been taken up.

II.   Materials and methods:

This cross sectional study on the anthropometrics measurements of the Meiteis were studied in 600 men and 400 women, aged 18 to 25 years attending higher secondary schools and colleges in the Manipur valley and inhibited in the valley district of Manipur. Consent from the individuals and permission from the Institutional Ethical Committee, RIMS, Imphal were taken for this study. During the selection of the individuals, other parameters like nutritional status, illness during childhood, siblings and relevant prenatal history were also considered. The methods of measurements were followed as given in Anthropometry by Singh I P and Bhasin M K.[6]

Inclusion criteria: male and female of 18 to 25 years of age, inhibited in the valley of Manipur without family history of inter racial marriage.

Exclusion criteria: male and female with congenital or acquired external deformities and   with family history of inter racial marriage or migrated from other state / country

The measurements and instruments used were the followings; -

1. Body weight (BW)   weighing machine
2. Chest girth(CG)   measuring tap
3. Height vertex (vertex to floor)(HV)   anthropometrics rod
4. Height tragus (tragion to floor)   - do -
5. Head height (HH)   - do -
6. Total head height (vertex to gnathion)   spreading caliper
7. Maximum head length(MHL)   - do –
8. Maximum head breadth(MHB)   - do –
9. Bigonial breath (angle of mandible)(BB) - do –
10. Breath of Bizygomatic arch   (BBA)   - do –
11. Morphological facial height   (MFH)   sliding caliper
    (between nasion and gnathion)
12. Morphological upper facial height (MUFH)   -do
    (between nasion and prosthion)
13. Physiognomic upper facial height(PUFH)   - do -
    (between nasion and stomion)
14. Height of lower face (HLF)   -do -
    (between stomion and gnathion)
15. Physiognomic facial height (PFH)   - do -
    (between trichion and gnathion)
16. Nasal height (nasion to sub-nasal)(NH)   - do –
17. Nasal breadth (alar to alar)(NB)   - do –

From the above measurements the following indices were recorded.

Indeces

1   Chest girth – stature index (CGSI) = $\dfrac{\text{chest girth} \times 100}{\text{height- vertex}}$

2.   Cephalic index (CI)   = $\dfrac{\text{maximum head breadth} \times 100}{\text{maximum head length}}$

3.   Nasal index (NI)   = $\dfrac{\text{nasal breadth} \times 100}{\text{nasal height}}$

4.   Jugo – mandibular index(JMI)   = $\dfrac{\text{bigonial breadth} \times 100}{\text{breadth of Bizygomatic arch}}$

5   Morphological facial index(MFI)   = $\dfrac{\text{morphological facial height} \times 100}{\text{breadth of Bizygomatic arch}}$

6. Morphological upper facial index (MUFI)= $\dfrac{\text{morphological upper facial height} \times 100}{\text{breadth of Bizygomatic arch}}$

7.   Length- Height index of head (LHIH) = $\dfrac{\text{head height} \times 100}{\text{maximum head length}}$

8.   Breadth – Height index of head(BHIH) = $\dfrac{\text{head height} \times 100}{\text{maximum head breadth}}$

9.   Robusticity index (RI) = height vertex – (chest girth + weight)

The statical analysis – ranges of all the measurements and indices were calculated using " t" test.

III.   Observations:

The findings of the various measurements were the followings and the findings of the study were statistically analysed using "t" test.

IV.   Findings Of The Measurements
Table.1

Measurements	Male		Female	
	Variation	Range In cm	Variation	Range In cm
Body weight (BW)		40-65.3kg P<0.001		40-63kg P<0.001
Chest girth (CG)		72-95.5 P<0.001		74-89 cm P<0.001
Height vertex or stature (HV)	Very short (130-149.9) Short (150 –159.9) Lower medium (160-163.9) Medium (164-166.9) Upper medium (167-169.9) Tall (170-179.9)	150-174.3 Nil 25.4% 33.3% 21.3% 12.9% 7.1% P<0.001	I Very short(121-139.9) Short (140-148.9) Lower medium (149-152.9) Medium (153-155.9) Upper medium (156-158.9) Tall (159-167.9)	138-165.8 1.3% 20% 40% 18.8% 8.8% 11.3% P<0.001
Head height(HH)		11.6 -16.5 P<0.001		11.7-15.2 P<0.001
Maximum head length (MHL) use by Lebzelter and Saller	Very short (x-16.9) Short (17.0-17.7) Medium (17.8-18.5) Long (18.6-19.3) Very long (19.4-X)	15.7-20.5 1.3% 14.6% 46.3% 31.3% 6.7% P< 0.001	Very short (X-16.1) Short (16.2-16.9) Medium (17.0-17.6) Long (17.7-18.4) Very long (18.5-X)	16-18.7 1.3% 16.3% 46.3% 32.5% 3.8% P <0.001
Maximum head breadth(MHB)use by Lebzelter and Saller	Very narrow (X-13.9) Narrow (14.0-14.7) Medium (14.8-15.5) Broad (15.6-16.3) Very broad (16.4-X)	13.7 – 16.5 0.8% 15.4% 48.8% 32.5% 2.5% P<0.001	Very narrow (X-12.0) Narrow (12.1-12.7) Medium (12.8-13.5) Broad (13.6-14.2) Very broad (14.3-X)	13.7 – 16 Nil 1.3% 60% 36.3% 2.5% P<0.001
Breadth of Bizygomatic arch(BBA) use by Lebzelter and Saller	Very narrow (X-12.7) Narrow (12.8-13.5) Medium (13.6-14.3) Broad (14.4-15.1) Very broad (15.2-X)	12.3-15.3 1.7% 32.5% 50.8% 14.2% 0.8% P<0.001	Very narrow (X-12.0) Narrow (12.1-12.7) Medium (12.8-13.5) Broad (13.6-14.2) Very broad (14.3-X)	11-14.4 1.3% 3.85 61.3% 32.3% 1.3% P<0.001
Bigonial breadth(BB)		7.2 –10.8 P<0.001		7 – 8.9 P<0.001
Morphological facial height (MFH) use by Lebzelter and Saller	Very low (X-11.1) Low (11.2-11.7) Medium (11.8-12.3) High (12.4-12.9) Very high (13.0-X)	9.6 -13.7 18.8% 39.2% 29.6% 9.6% 2.9% P<0.001	Very low (X-10.2) Low (10.3-10.7) Medium (10.8-11.3) High (11.4-11.9) Very high (12.0-X)	9.3 – 13.1 11.3% 21.3% 51.3% 15.0% 1.3% P<0.001
Morphological upper facial height(MUFH)	I	5.1-7.9 P<0.001		5-7.1 P<0.001
Height of lower face(HLF)		3.8-5.9 P<0.001		3.7-5.1 P<0.001
Physiognomic facial height(PFH)		15.9-20.5 p>0.05		15.5-18.9 p>0.05
Physiognomic upper facial height (PUFH)		6.1-8.7 p>0.05		5.8-7.7 p>0.05
Nasal height (NH)		4.2-6.3 P<0.001		3.8-5.5 P<0.001
Nasal breadth (NB)use by Lebzelter and Saller	In cm Short (X-2.4) Below medium (2.5-2.9) Medium (3.0-3.4) Above medium (3.5-3.9) Large (4.0-X)	3.2-4.5 Nil Nil 10.4% 76.3% 13.3% P<0.001	Short (X-2.4) Below medium (2.5-2.9) Medium (3.0-3.4) Above medium (3.5-3.9) Large (4.0-X)	3.0-3.9 Nil Nil 53.8% 46.3% Nil P<0.001

From the findings of measurements (Table1) the following observations were revealed:

In male: BW- 40 to 65kg, CG- 75 to 93cm, HV- short to medium, head height 11.6 to 16.5cm, MHL – medium to long, MHB - medium to broad, BZA - narrow to medium, BB – 7.2 to 10.8cm, MUFH - 5.1 to 7.9cm, HLF - 3.8 to 5.9cm, PFH - 15.9 to 20.5 cm, PUFH - 6.1 to 8.7cm, NH - 4.2 to 6.3cm, and NB - medium.
In female:- BW - 40 to 63kg, CG - 75 to 84cm, HV - short to medium, HH - 11.7 to 15.2cm, MHL - medium to long, MHB - medium to broad, BBA - medium to broad, BB - 7 to 8.9cm, MFH - medium, MUFH - 5 to 7.1cm, HLF - 3.7 to 5.1cm, PFH- 15.5 to 18.9cm, PUFH - 5.8 to 7.7cm, NH -3.8 to 5.5cm and NB - medium to above medium.

From the above measurements the followings indices were deducted.

Indices

Table 2.

Indices	Variation		Male	Female
Chest girth -Stature Index (CGSI)	Narrow chest (X—50.9)		60.8%	22.5%
	Medium chest (51.0—55.9)		35.4%	65%
	Broad chest (56.0—X)			
			3.8%	.5%
			P<0.001	P<0.001
Cephalic Index (CI) (Martin & Saller)	Male	Female		
Dolichocephalic	(71-75.9)	(72-76.9)	2.5%	1.3%
Mesocephalic	(76—80.9)	((77-81.9)	26.3%	16.3%
Brachycephalic	(81 – 85.4)	(82-86.4)	43.8%	43.8%
Hyperbrachycephalic	(85.5-90.9)	(86.5-91.9)	23.3%	36.3%
Ultra-brachycephalic	(91- X)	(92- X)	4.2%	2.5%
			P<0.001	P<0.001
Nasal index (NI) (Martin & Saller)				
Hyper-leptorhinae	X—54.9	same range	nil	nil
Leptorhinae	55-69.9		29.6%	38.8%
Mesorhinae	70-84.9		67.1%	51.3%
Chamaerhinae	85—99.9		3.3%	10%
Hyper-chamaerhinae	100—X		nil	nil
			P<0.001	P<0.001
Jugo-Mandibular index(JMI) (Lund Borg –Linders & Saller				
Very narrow	X - 69.9	X – 67.9	98.8%	98.8%
Narrow	70 – 74.9	68 –72.9	1.3%	1.3%
Medium broad			Nil	Nil
Very broad			Nil	Nil
			P<0.001	P<0.001
Morphological facial index (MFI) (Martin & Saller)	X-78.9	X-76.9	15.8%	15%
Hyper-euryprosopic	79-83.9	77-80.9	28%	30%
Euryprosopic	84-87.9	81-84.9	30.8%	36%
Mesoprosopic	88-92.9	85-89.9	20%	15%
Leptoprosopic	93-X	90-X	5.4%	3.8%
Hyperprosopic			P<0.001	P<0.001
Morphological upper facial index (MUFI) (Martin & Saller)				
Hypereuryer	X-42.9	same	10%	27.5%
Euryer	43-47.9	range	43.8%	50%
Mesen	48-52.9		36.3%	20%
Lepten	53-56.9		8.3%	2.5%
Hyperlepten	57-X		1.7%	Nil
			P<0.001	P<0.001
Length height index of head (LHIH) (Martin & Saller)				
Chamaecephalic	X- 57.9	same	Nil	Nil
Orthocephalic	58 – 62.9	range	0.4%	Nil
Hypsicephalic	63 - X		99.6%	100%
			P<0.001	P<0.001
Breadth - height index of head (BHIH) (Martin & Saller)				
Tapeicephalic	X-78.9	same range	10%	Nil
Matriocephalic	79-84.9		16.7%	10%
Aerocephalic	85-X		81.7%	90%
			P<0.001	P<0.001

Robusticity index (RI) (According to Tschernorutzky)				
Very strong	X-10	same range	2.8%	6.1%
Strong	11-15		3.4%	15.2%
Good	16-20		13.8%	24%
Medium	21-25		16.6%	21.2%
Weak	26-30		18.6%	18.2%
Very weak	31-35		28.3%	12.1%
Bad	36-X		16.6%	nil
			P<0.001	P<0.001

From the deducted indices (Table 2), the followings were observed:

CGSI: narrow to medium in male and medium to narrow in female.
CI: mesocephalic to upper brachycephalic in male , brachycephalic to hyper brachycephalic in female. But, mostly brachycephalic in both sexes.
NI :   mesorhinae both in male and female.
JMI: very narrow both in male and female.
MFI: euryproscopic to mesoproscopic both in male and female.
MUFI: euryer to mesen in male and euryer in female.
LHIH: hypsicephalic both in male and female.
BHIH: aerocephalic both in male and female.
RI: very weak to good in male and weak to strong in female. Long range in both sexes with tendencies to very weak in male and good in female,

V.   Discussion:

The result of the study has shown a great diversity of features as it had been commented by many authors i.e. Brown R [1], Dun EW3 & Roy J [4]. The result of the study by Waddell LA [7] had similar findings even though the sample size was a few male only belonging to higher age group from different parts of the Eastern India of that period.

In this study, to avoid the influence of altitude the residents of the valley only has been chosen.[8]According to Ripley WC,[9] there are different practices in different countries about the age group for the measurement of the stature. The present study has chosen the age group between 18yrs to 25 yrs and the result has not shown significant variation. Further, the resident of the different districts has also been noted and the result shows no significant variation. In both male and female, most of the measurements and indices were in the same range with wide ranges except in few of them. These variations and wide ranges may be due to evolutionary changes or due to other genetically influences.

Even though cephalic index does not express of any absolute quantity and it is higher by two units than that of the cranial index [9], it has been incorporated with other cranio-facial measurements to attempt a represent able configuration of the Meiteis population.

The measurement finding of the present study is compared with the finding of other workers whose have studied on Meitei inhabited at different part of Manipur other than valley of Manipur i.e. SinghS.J [10] on Meitei inhabited in Assam and Manipur, Devi K R [11] on Meitei of Kwatha Village near Myanmar as shown in Table 3.

Comparison of Data Table 3.

Measurement	Range in mm in both sex		
	SinghS.J	Devi K R	Present
MHL	16.8 – 19.5	16.5 – 21.5	15.7-20.5
MHB	14.0- 16.2	13.0 – 17.5	13.7 -16.5
HH	11.0 – 15.1	9.8 – 16.0	11.6 -16.5
BBA	11.0 – 14.9	11.3 – 16.5	11.0 – 15.3
BB	8.8 – 12.5	8.1 – 13.5	7.0 10.8
UFH	5.6 – 7.7	5.6 – 8.0	5.0 – 7.9
TFH	10.0 – 12.9	9.9 – 12.6	9.3 – 13.7
Nasal leangth	4.0 – 5.7	3.8 – 5.5	3.8 - 6.3
Nasal breadth	3.1 – 4.3	3.1 – 4.3	3.2 – 4.5

The finding of the present study is more similar to the finding of SinghS.J[10], but the finding of , Devi K R[11] on Meitei of Kwatha Village has shown comparatively higher Bizygomatic breadth and Bi gonial Breadth. This difference in facial configuration may be because of other racial influences even though all are belong to mongoloid group.

Further, some of the indices of present study is also compared with that of SinghS.J[10] on Meitei inhabited in Assam and Manipur as shown in table 4.

Cephalic index in %			
Type	SinghS.J In both sex	Present	
		Male	Female
Dolicochephalic	3	2.5%	1.3%
Mesocephalic	29	26.3%	16.3%
Brachycephalic	41	43.8%	43.8%
Hyperbrachycephalic	24	23.3%	36.3%
Ultrabrachycephalic	2	4.2%	2.5%
Nasal index in %			
Hyper-leptorhinae	0	nil	15%
Leptorhinae	19	29.6%	30%
Mesorhinae	65	67.1%	36%
Chamaerhinae	16	3.3%	15%
Hyper-chamaerhinae		nil	3.8%
Morphological facial index in %			
Hyper-euryprosopic	20	15.8%	15%
Euryprosopic	42	28%	30%
Mesoprosopic	25	30.8%	36%
Leptoprosopic	9	20%	15%
Hyperprosopic	4	5.4%	3.8%

In cephalic index , finding of the present study is comparatively similar to the finding of SinghS.J[10] In nasal index , finding of the present study has shown prevalence of Hyper-leptorhinae and Hyper-chamaerhinae among female which is absent in the study of SinghS.J[10]. In Morphological facial index, the finding of the present study is comparatively similar to that of SinghS.J.[10]

 To avoid controversies, the result of this study is not compared with the result of other studies on other races.

VI.   Conclusion
From the finding of the present study, it has been concluded that Cephalic index alone does not represent Meitei of the Manipur valley and even though it belongs to mongoloid group, its somotometric finding showed wide range of variations as it has been mentioned by the earlier authors.

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