

EVALUATION OF RACE BY CRANIAL INDEX OF ADULT HUMAN SKULL IN MAHARASTRA POPULATION

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ABSTRACT

Biologists and physical anthropologists attempted to classify human being into races according to phenotypic variations. The latter are based either on one or two phenotypic characters therefore the outcome is unable to give clear distinction among different races. Cranial index seems to be an important tool, which may be used to identify the races in different geographical regions.¹ 75 dried skulls collected from different part of Maharashtra were measured to determine the cranial index. Skulls were classified by the method of Montagu (1960)² Average maximum cranial length and breadth were found to be 17.11 cm and 12.98 cm respectively and maximum & minimum cranial lengths were observed to be 18.50 and 16.60 cm and cranial breadths were noted to be 14.50 and 12.10 cm respectively. Average cranial index (mean \pm SD) was 75.49 ± 3.95 . In our study most of the skulls were grouped under the Mesocranial (46.66%) and Dolichocranial (42.66%) categories when based on Montagu² and Dolichocranial categories when 56% based Comas³. As per the conclusion Maharashtra population belongs to Indo-Dravidian race.

KEY WORDS : Cranial length, Cranial breadth, Cranial index, Race, Maharashtra population

INTRODUCTION

Various phenotypic characters highly variable among individuals are skull shape and size, skin pigmentation, hair color, height and weight. It is well known that genotypic characters are more variable than phenotypic ones.⁴

Biologists and physical anthropologists attempted to classify human being into races according to phenotypic variations. Most classifications are based on one or two phenotypic characters and thus not being the true representative. To give clear distinction among different races several physical anthropologists made use of measurements and indices of skulls for this purpose.^{1, 4,5,6} Thus studying multiple measurements like maximum cranial length, maximum cranial breadth, basal bregma height etc and indices like cranial index, cranial length height index, nasal index, orbital index etc help in measuring the skull which help in making comparisons among races. There are nine major races and variant number of minor races considered to be sub races.^{7,8}

Craniometry helps in identifying fossil man and other primates in comparative study^{1,2}. Multiple cranial

measurements and indices are taken in to account for accurate study of size and shape of skull for valuable information in clinical forensic and dentistry⁹.

Cranial index ranges from 70 to 74, 75 to 75.8 and 80 to 84.9 in Aborigines and pure Aryans, Chinese and Europeans and the Mongoloids respectively^{9,10}. This was the incentive for the present study which was undertaken to evaluate the cranial indices of Maharashtra region from 75 male skulls to find out their racial background.

MATERIAL & METHODS

A random collection of seventy-five adult male human dried skulls were collected from Government Medical Colleges for this study. The measurements of maximum cranial length and breadth (fig. 1; fig.2) on the skulls were taken by using spreading caliper and sliding caliper⁴ Reference points for this purpose are shown below⁶.

1	GLABELLA	Most prominent point on middle of frontal bone between the superciliary arches above nasofrontal suture
2	OPISTHO CRANION	Most posterior point of the skull in median plane from glabella other than external occipital protuberance
3	SUPRAMASTOID CREST	Backward continuation of posterior root of zygoma above the mastoid part of temporal bone on the lateral aspect of skull

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	Measurement	Maximum Reading	Minimum Reading	Mean ± SD
1	Maximum cranial length (cm)	18.5	16.6	17.11 ± 0.89
2	Maximum cranial breadth (cm)	14.5	12.1	12.98 ± 0.54

Table I: Maximum and Minimum Cranial length and breadth

Type	Normal Range of cranial index	No. of skulls (75)	% of cranial index
Dolichocranial	0—74.9	32	42.66
Mesocranial	75—79.9	35	46.66
Brachycranial	80—84.9	6	8.00
Hyperbrachycranial	85 — 89.9	2	2.66

Table III: Cranial Index (%) on the basis of Montagu

Craniometric Indices	Maximum Reading (cm)	Minimum Reading (cm)	Mean ± SD
Cranial index	87.34	68.42	75.49 ± 3.95

Table II: Cranial Index

Type	Normal Range	No. of Adult Skulls (75)	% of Cranial Index
Dolichocranial	0—75.9	42	56.00
Mesocranial	76—80.9	25	33.33
Brachycranial	81—over	8	10.66

Table IV: Cranial Index (%) on the basis of Vallois & Comas³

Name of Worker	Crania Studied	Cranial Index
Chaturvedi & Herneja 1963	Indian	70.75
Shukla 1966 Type 1	Indian	72.20
Shukla 1966 Type 2	Indian	72.60
Shukla 1966 Type 3	Indian	72.00
Shukla 1966 Type 4	Indian	71.40
Singh 1955 Type 1	South East Asia	75.00
Singh 1955 Type 2	South East Asia	70.50
Singh 1955 Type 3	South East Asia	72.40
Tildesley 1921	Marwar	74.60
Horrower 1926	Tamil	73.45
Tildesley 1921	Hindu	75.80
Turner 1913	Bhil	72.90
Turner 1906	Thug	72.90
Turner 1906	Parihas	72.90
Turner 1906	Tamil Shudra	81.00
Jay Singh et al ; 1979	U.P. India	74.35
Herekar 1981	Maharashtra	74.25
Present study	Maharashtra	75.49

Table V: Comparison of Cranial Indices obtain by different workers mainly on Indian Crania with present study on the basis of Herekar 11

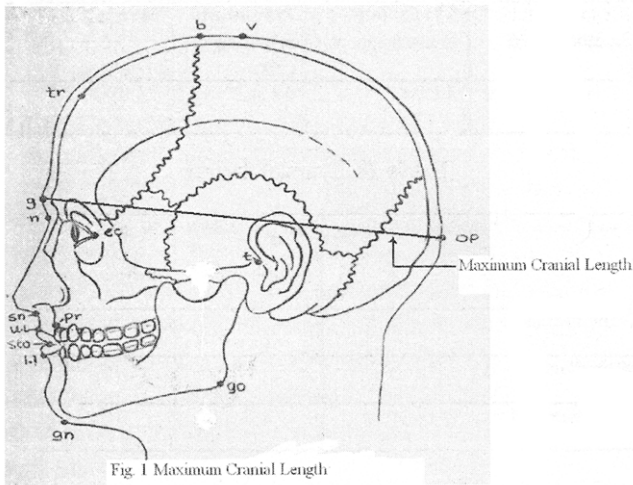


Fig.1: Maximum Cranial Length
Landmarks or points on the head (norma lateralis) v-vertex, b-bregma, tr-trichion, g-glabella, n-nasion, sn-subnasale, pr-prosthion, ul-upper labial, ll-lower labial, gn-gnathion, ec-ectocanthion, t-tragion, op-opisthocranium

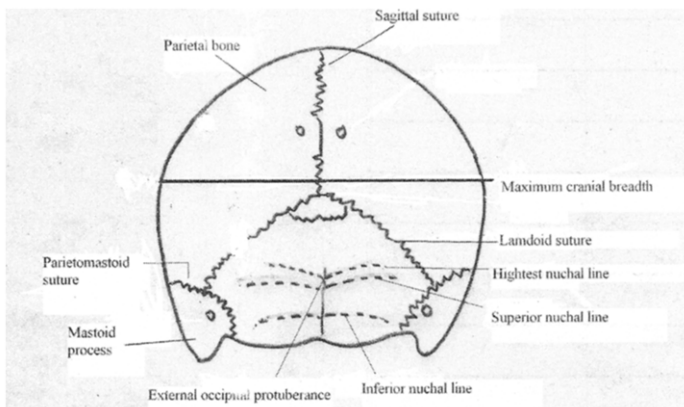


Fig-2: Maximum Cranial Breadth (Norma Occipitalis)

Parameters

The maximum cranial length and breadth were measured by using spreading caliper.

1. Maximum cranial length: This is the distance between glabella and opisthocranium⁴
2. Maximum cranial breadth: Maximum breadth of skull was measured just above the level of supramastoid crest.
3. Cranial Index: Cranial index is calculated by multiplying maximum cranial breadth by 100 and dividing it by maximum cranial length⁷

$$\text{Cranial index} = \frac{\text{Maximum cranial breadth}}{\text{Maximum cranial length}} \times 100$$

OBSERVATION & RESULTS:

In the present study, 75 male adult dried human

crania were examined (Table I & II) for the cranial index.

This study indicated that out of total 75 skulls, the maximum belonged to Mesocranial (46.66%) and Dolichocranial (42.66%) groups, however low percentage were noticed in Brachycranial (8%) and Hyperbrachocranial (2.66%) groups as per of skulls by Montagu classification².

Juam Comas³ classification, our result manifested out of total 75 skulls, the maximum percent belonged to Dolichocranial (56%) and Mesocranial (33.33%) groups (Table IV).

DISCUSSION:

Calculation of Cranial Index in 75 human skulls belonging to Maharashtra region revealed that the mean value was 75.49 with the range being 68.42 to 87.34. This finding was quiet close to one reported by other workers^{11,12,13} in Hindu population. However, the maximum and minimum values were similar to one reported by Shukla¹⁴ with range 64 to 86 (Table. V). Physical anthropology has given maximum importance to skulls as our knowledge of human evolution was based on cranial observation. Scientific data suggested that early humans were generally Dolichocranial group which migrated to different geographical areas. Independent and repeated mutation resulted in Brachycranial group. People of India and Ceylon were basically Mediterranean who exhibited some evidences of Negrioid and possibly protoAustraloid admixture. The head form varied from Dolichocranial to Brachycranial, the average cranial index being 74.3¹. In European population, brachycranial group was dominant, mesocranial group was heterogenous and dolichocranial group was recessive. No major post-natal changes were recorded in cranial index of individual at birth or shortly after birth. This index was likely to be one or two unit higher in female than in male of the same stock presumably because of greater development of glabella and brow ridges in male which increased the length disproportionately¹⁵. The cranial index is apparently subjected to modification within limits by radical environmental changes. In starvation diet seems to reduce the index apparently because the thickness of temporal muscle on the side of head decreased the cranial. It may also be modified by artificial deformation of the head brought by pressure on occiput. It was noticed that masticatory function affects head shape even in the case of Eskimo.

The IndoDravidian race is nothing but the mixture of various sub races like classic Mediterranean, Austrloid (Veddoid), Negrito, minor fraction of Iranian plateau or Armenoid, Nordics (Indo Aryan-branch of Indo Dravidian)¹.

Based on the mean cranial index value, it may be concluded that population of Maharashtra belongs to Indo-Dravidian race under this study conditions.

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