

## Mesocephaly to Brachycephaly shift as seen in Punjabi children

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### ABSTRACT

Anthropometric Parameters are useful tools in evaluating growth and development. Cephalic Index helps in estimation of intracranial volume in vivo & thus the brain growth. This prospective longitudinal study was initiated to compare the ethnic variations in cephalic index in specific defined ethnic groups of Punjab Jat Sikh and Bania infants.

It was observed that Jatsikh infants had a brachycephalic type of skull throughout the study whereas Bania infants displayed mesocephalic type of skull till 7<sup>th</sup> month of their lives and later on even they became brachycephalic in their skull shapes. It is apparent that the trend in replacing mesocephaly by brachycephaly in northern Indian children, wherein possibly Jatsikh children are ahead of Bania children in this process.

**Key Words:** Cephalic index, brachycephalic, mesocephaly

### Introduction

Anthropometric Parameters are accurate, easy & inexpensive in evaluating growth and development. Measurement of Cephalic Index helps in estimation of intracranial volume in vivo. It is an easy, non-invasive assessment of incremental brain growth. It has already been established that the cranial capacity of males and females differs, but this parameter can only be studied in the dead subjects. [1] Therefore, cephalic index attains greater importance in the living.

Maximum cranial breadth / maximal cranial length x 100 is the Cephalic Index measured in a living

subject. Its recorded range of variation is high, as with other skull or head indices. In all of these, the range of values encountered is arbitrarily divided into several steps, usually covering 5% sections of the total range, and to each of the steps an appropriate term is applied.

Cephalic index is further divided into three categories. [1]

- Upto 74.9 = Dolichocephalic
- 75.0 to 79.9 = Mesocephalic
- 80.0 to 84.9 = Brachycephalic

The present study, a prospective longitudinal study of growth pattern in first year of life was taken up in specified

contrasting ethnic groups of Punjab. Cephalic index was the parameter used for assessment in 120 infants (male & female) for a period of one year at monthly intervals from two ethnic groups Jatsikhs & Baniyas having similar socioeconomic conditions, belonging to upper middle class. [2] The Jat Sikhs constitute a dominant rural population of Punjab who represent primarily farming community, indulge in strenuous physical hard work. Most of the population of Baniyas community resides in the cities. They are usually shopkeepers or businessman & had sedentary lifestyle. [3]

### Material and Methods

The present study was conducted at Govt. Medical College Patiala on a population sample comprising of 120 infants belonging to upper middle socioeconomic status.

Anthropometric measurements were taken which included maximal cranial breadth and maximal cranial length. The maximal cranial breadth and maximal cranial length was used to compute cephalic index.



Fig.1 Measuring Maximal Cranial Breadth

Maximal cranial breadth was measured as maximum breadth in the transverse plane wherever it occurs (Fig.1), whereas the maximal cranial length was measured as maximum length in the sagittal plane from glabella to the

most salient point on the occiput [4] (Fig.2) with the help of spreading callipers (Fig.3).



Fig. 2 Measuring Maximal Cranial Length

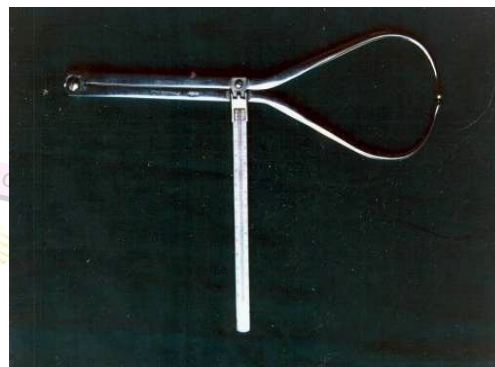


Fig.3 Sliding Callipers

These measurements were conducted from birth of the child (zero months) till the age of one year at an interval of one month. Means and standard deviations were computed and comparisons of groups were made by using Unpaired 't' test.

### Results

Out of total 120 infants, 60 infants were from Jat-Sikh community and the other 60 belonged to Bania community. Equal number of males and females i.e. 30 each were present in either subgroup.

Among Jatsikhs and Baniyas it was observed that at all age groups, Mean Cephalic Index (MCI) of Jatsikhs was greater than 80% whereas that of Baniyas was between 75% to 80% till 7<sup>th</sup> month and later on it became about 80%. It means that Jatsikh infants had a

**Table 1: Age Wise Distribution of Mean Cephalic Index in Different Groups & Subgroups**

AGE (Months)	CEPHALIC INDEX					
	Jat Sikh M±SD	Bania M± SD	Jat Sikh Male M± SD	Jat Sikh Female M±SD	Bania Male M± SD	Bania Female M±SD
<b>BIRTH</b>	81.30± 3.734	78.87± 1.050	81.96± 4.809	81.32± 3.833	78.91± 1.049	78.83± 1.054
<b>1</b>	81.65± 4.405	78.49± 1.090	81.73± 4.581	81.61± 4.341	78.58± 1.156	78.45± 1.079
<b>2</b>	82.10± 4.463	78.98± 1.037	82.18± 4.541	82.04± 4.412	79.06± 0.078	78.93± 1.132
<b>3</b>	82.76± 4.842	78.60± 1.307	83.16± 4.722	82.42± 4.819	78.79± 1.138	78.28± 1.409
<b>4</b>	82.65± 4.542	78.45± 1.034	82.75± 4.192	82.56± 4.647	78.5± 1.027	78.20± 1.049
<b>5</b>	82.90± 4.641	78.33± 1.305	83.09± 4.163	82.81± 4.804	78.49± 1.407	78.113± 0.912
<b>6</b>	83.00± 4.854	78.45± 1.106	83.2± 4.269	83.00± 4.949	78.37± 1.156	77.85± 1.022
<b>7</b>	83.54± 4.367	78.39± 1.045	83.21± 4.761	83.04± 4.848	78.47± 1.277	77.95± 1.022
<b>8</b>	83.60± 4.283	80.79± 1.026	83.54± 4.827	83.22± 4.642	80.45± 1.026	78.34± 0.981
<b>9</b>	83.67± 4.306	81.76± 1.336	83.54± 4.645	83.32± 4.456	80.64± 1.036	78.45± 0.991
<b>10</b>	83.76± 4.257	80.87± 1.370	83.44± 4.583	83.44± 4.437	81.72± 1.055	80.64± 0.971
<b>11</b>	83.78± 4.151	81.79± 1.388	83.66± 4.623	83.54± 4.538	82.78± 1.125	81.64± 0.541
<b>12</b>	83.80± 4.180	82.58± 1.351	83.78± 4.284	83.59± 4.297	82.88± 1.211	82.74± 0.781

brachycephalic type of skull throughout the study whereas Bania infants displayed mesocephalic type of skull till 7<sup>th</sup> month of their lives and later on even they became brachycephalic in their skull shapes (Table 1).

On the basis of cephalic index significant differences were observed between males and females of same

communities as well as between the two communities i.e. Jatsikh and Banias.

Regarding sexual dimorphism, differences among the two groups were found to be statistically non significant from birth till 7<sup>th</sup> month and 10<sup>th</sup> to 12<sup>th</sup> month, but for 8<sup>th</sup> and 9<sup>th</sup> month the change was significant.

Jatsikh male and female infants also exhibited the similar pattern as that

of total population. The difference between these two subgroups was found to be statistically non significant till 10<sup>th</sup> month, significant for 11<sup>th</sup> month and highly significant in 12<sup>th</sup> month.

Bania male and female infants also followed the same guide as far as their MCI is concerned. The males had mesocephalic type of skull till 6<sup>th</sup> month and there after brachycephalic type of skull. While female Bania infants showed MCI values indicating that infants had mesocephalic type of skull till 9<sup>th</sup> month thereafter it was brachycephalic. The significance of these results was not proven till 4<sup>th</sup> month, but was found to be significant on 5<sup>th</sup> month and highly significant thereafter. This shows evident trend to shift towards brachycephaly.

When males of Jatsikhs and Banias were compared for their MCI, it was observed that at in all the age groups Jatsikh were ahead of Bania male infants and MCI were observed to be highly significant throughout.

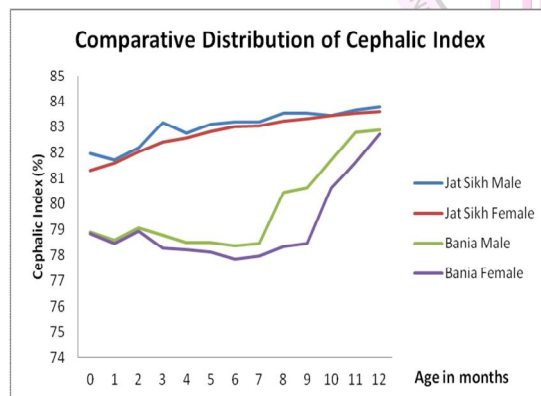


Fig. 5 Comparative Distribution of CI in different subgroups

When females of Jatsikhs and Banias were compared for their MCI, it was observed that Jatsikh females were leading in all the age groups indicating brachycephalic type of skull. On the other hand, Bania females had mesocephalic type of skull till 9<sup>th</sup> month and brachycephalic thereafter and comparisons, when analyzed statistically,

were found to be highly significant throughout.

## Discussion

On the basis of cephalic index, statistically significant differences were observed between males and females of same communities as well as between the two communities i.e. Jatsikh and Banias. But on the whole males and females of Jatsikh community showed a brachycephalic, whereas, Bania infants exhibited a tendency to shift from mesocephaly to brachycephaly during later months of growth period, as was suggested over half a century back by Shapiro. [5] None of these Punjabi children from birth to 1 year are dolichocephalic.

As observed and opined by Fraser it is worthy to note that, all early types of men were dolichocephalic. [5] In Europe it was observed almost half a century back that brachycephaly once treated as a Mongolian type has become dominant over dolichocephaly. It was also pointed out that at one time it was thought that particular cephalic indices were characteristic of the different races of mankind, and that they were relatively Immutable. However, it would appear that considerable variation can occur in the index within a given racial group, besides which, it is now known that the index of a group may change in a comparatively short period of time and apparently through the influence of environmental factors.

Thus, Shapiro found a significant group change towards brachycephaly in the index of the children of Japanese immigrants to Hawaii, and a similar tendency has been noted in American born children of European parentage. [5] In Europe, there has been a definite shift towards general brachycephaly in historical times, and it is now dominant to dolichocephaly.

Analyzing the present data, in light of this, it is apparent that the trend in replacing mesocephaly by brachycephaly in northern Indian children, wherein possibly Jatsikh children are ahead of Bania children in this process. Incidentally, what was claimed to be an Aryan trait <sup>[5]</sup> is not observed in any of these children.

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