Mesocephaly to Brachycephaly shift as seen in Punjabi children

Kaur H¹, Singh S², Patnaik VVG³, Kaushal S⁴, Agnihotri G⁵

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 Jat Sikh infants had a brachycephalic type of skull throughout the study whereas Bania infants displayed mesocephalic type of skull till 7th 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 Jat Sikh 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 & Banias 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 Banias 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.

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).

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 Banias it was observed that at all age groups, Mean Cephalic Index (MCI) of Jatsikhs was greater than 80% whereas that of Banias was between 75% to 80% till 7th month and later on it became about 80%. It means that Jatsikh infants had a
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Table 1: Age Wise Distribution of Mean Cephalic Index in Different Groups & Subgroups

<table>
<thead>
<tr>
<th>AGE (Months)</th>
<th>CEPHALIC INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jat Sikh M±SD</td>
</tr>
<tr>
<td>BIRTH</td>
<td>81.30±3.734</td>
</tr>
<tr>
<td>1</td>
<td>81.65±4.405</td>
</tr>
<tr>
<td>2</td>
<td>82.10±4.463</td>
</tr>
<tr>
<td>3</td>
<td>82.76±4.842</td>
</tr>
<tr>
<td>4</td>
<td>82.65±4.542</td>
</tr>
<tr>
<td>5</td>
<td>82.90±4.641</td>
</tr>
<tr>
<td>6</td>
<td>83.00±4.854</td>
</tr>
<tr>
<td>7</td>
<td>83.54±4.367</td>
</tr>
<tr>
<td>8</td>
<td>83.60±4.283</td>
</tr>
<tr>
<td>9</td>
<td>83.67±4.306</td>
</tr>
<tr>
<td>10</td>
<td>83.76±4.257</td>
</tr>
<tr>
<td>11</td>
<td>83.78±4.151</td>
</tr>
<tr>
<td>12</td>
<td>83.80±4.180</td>
</tr>
</tbody>
</table>

brachycephalic type of skull throughout the study whereas Bania infants displayed mesocephalic type of skull till 7th 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 7th month and 10th to 12th month, but for 8th and 9th 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 10th month, significant for 11th month and highly significant in 12th 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 6th month and thereafter brachycephalic type of skull. While female Bania infants showed MCI values indicating that infants had mesocephalic type of skull till 9th month thereafter it was brachycephalic. The significance of these results was not proven till 4th month, but was found to be significant on 5th 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 in all the age groups Jatsikh were ahead of Bania male infants and MCI were observed to be highly significant throughout.

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 9th 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. 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. 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. 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 is not observed in any of these children.

References