International Journal of Anatomy and Research,
Int J Anat Res 2016, Vol 4(4):3161-65. ISSN 2321-4287
DOI: http://dx.doi.org/10.16965/ijar.2016.429

Original Research Article

THE SHAPES OF HEAD AND FACE IN NORMAL FULL TERM NEWBORNS IN HILLS OF HIMACHAL PRADESH

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ABSTRACT

Introduction: Cephalometric measurements especially in first day after birth are important for assessment of neonatal health status. This study was conducted in the view of the importance of anthropometric indices of head and face in pediatrics, orofacial surgery, forensic medicine, medical imaging and diagnostic comprehension between patient and normal population. There is hardly any published data about the types of head and face shapes in three different zones of Himachal Pradesh.

Methods: 327 normal newborns comprising 177 males, 150 females delivered in labor wards of civil hospitals in Himachal Pradesh, measured in 12-24 hours after birth. Head length, head width, face length, face width with cephalic and prosopic indices were measured by using digital vernier caliper. The study was undertaken to document the various craniofacial forms of newborns in Himachal Pradesh.

Results: The mean and SD for cephalic index of male and female full term newborns in Himachal Pradesh were 80.97±4.18 ($p<0.0054$), the mean and SD value for lower hills and inner Himalaya were 80.34±4.43, 82.12±4.12 respectively. The mean and SD for prosopic index of male and female full term newborns were 68.71±6.1 ($p<0.1507$), and for lower hills and inner Himalaya were 67.29±5.99, 71.75±5.26 respectively. Dominant Brachycephalic type of head shape was found 40.67%, Mesocephalic 33.97% and Dolicocephalic rare type were 7.95% in Himachal Pradesh.

Conclusion: The dominant cephalic index in Himachal was Brachycephalic heads, in lower zone with Mesocephalic head shapes while in inner zone have Brachycephalic. The dominant prosopic index was hypereuryprosopic face in each zone. This study also disagree the statements of all India anthropometric survey that hilly people have long round heads and round faces.

KEY WORD: Anthropometry, newborn, himachal, cephalic Index, prosopic index. brachycephalic, hypereuryprosopic, hills.

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Access this Article online

Quick Response code

DOI: 10.16965/ijar.2016.429

Web site: International Journal of Anatomy and Research
ISSN 2321-4287
www.ijmhr.org/ijar.htm

Received: 08 Oct 2016
Peer Review: 08 Oct 2016
Revised: 13 Oct 2016
Accepted: 28 Nov 2016
Published (O): 31 Dec 2016
Published (P): 31 Dec 2016

INTRODUCTION

Cephalometric measurements is one of the important parts of the anthropometry in which dimensions of head and face are measured and results are used in pediatrics, plastic surgery, oral surgery, forensic medicine, and diagnostic comprehension between patient and normal population [1]. Cephalometric measurements especially in first day after birth are important for assessment of neonatal health status. All health personal having responsibility for the care of newborns should be sufficiently familiar

with normal patterns of growth and milestones so that they can recognize overt deviations from the normal range as early as possible, in order for underlying disorders to be identified and given appropriate attention. [2] The human body dimensions are affected by ecological, biological, geographical, racial, gender and age factors, as the geographical and environmental conditions of Himachal Pradesh are different from rest of the India [1]. The present study was planned for determining normal range of head and face shapes in normal full term newborns in different zones of Himachal Pradesh. In view of this we selected to undertake a cephalometric study of normal full term newborns of Himachal Pradesh and their different geographical zone (according to sea level). As the lower hills (350-1500 mts) and inner Himalaya (1500-4500 mts) are highly populated area but grater zone (above 4500 mts) is sparsely populated. Its unique composition, location, and character all makes it the bounder land. [3,4]. On the bases of cephalic index the head shapes were classified in to four international categories that include Dolichocephalic, Brachycephalic, Masocephalic, and Hyperbrachycephaly. Face shapes were Hypereuryprosopic, Euryprosopic, Mesoprosopic and Leptoprosopic respectively [5].

Aim and objective: To compare the Cephalic & Prosopic index between male and female of Himachal Pradesh. To compare the Cephalic & Prosopic index among lower and mid zone of Himachal Pradesh. To find out the shapes of head and face of newborns in Himachal Pradesh and their different zones. All the cephalometric parameters were significantly ($p<0.001$) correlated to each other. To determine the accuracy of statement -according to all India anthropometric survey (that hilly people have-short stature, long round heads, narrow to below medium noses, round faces, scheduled tribes have broad to medium facial profile.)

MATERIALS AND METHODS

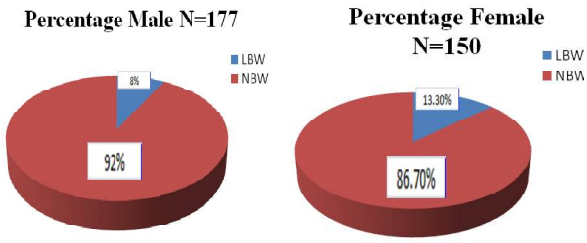
The study was undertaken on 327 normal full term newborns comprising 177 males and 150 females delivered in the labor ward of civil hospitals of Himachal Pradesh. All the parameters were measured in 12-24 hours after birth by using digital vernier caliper. The mean and SD values for different cephalometric dimensions were obtained. Ethical clearance from Geetanjali University,Udaipur, Rajasthan, (India). Informed consent of mother /father /guardians was taken before measurements and permission from Himachal Pradesh government. The anthropometric dimensions do not take into consideration the study of the neonates of high risk or complicated pregnancies having medical illness such as hypertension, diabetes mellitus, infection, autoimmune disease, heart disease etc. Neonate who had caput succedaneum and cephalheamatoma and neonates delivered by caesarean section showing any craniofacial deformity. In males 92% newborns were normal birth weight and 8% were low birth weight. In females 86.70% were normal birth weight and 13.30% were low birth weight newborns (Figure 2). All the parameters mentioned in this study are described in tabular form with their definition and instruments used in the following Table -1 and their photographs in figure 1.

Table 1: Parameters measured and their standard definitions are presented in the following table.

Parameters	Definition	Instruments	Photographs in Figure 1
Head Length (mm)	Glabella to inion	Digital Caliper	Upper raw Right
Head Width (mm)	Maximum transverse diameter between two euryon	Digital caliper	Upper raw Left
Face Length (mm)	Height between nasion to gnathion	Digital caliper	Lower Right
Face Width (mm)	Breadth across the zygomatic bones	Digital caliper	Lower Left

Fig. 1: Upper row showing the measurement of Head length and Head width.
Lower row showing the measurement of Facial length and Ficial width.

Fig. 2: Percentage low birth weight and normal birth weight newborns in Himachal Pradesh.



LBW= Low Birth Weight, NBW= Normal birth weight.

According to international anatomical descriptions [1]

Cephalic index= Head width / Head length x 100

Prosopic index= Face length / face width x 100

Depending upon these indices the type of head and face shapes were classified as given by reference [1]

Head Shape	**Range of Cephalic index (CI) (%)**
Dolicocephalic	< 74.9
Mesocephalic	75 – 79.9
Brachycephalic	80 – 84.5
Hyperbrachcephalic	85 – 89.9
Face Shape	**Range of Prosopic Index (CI) (%)**
Hypereuryprosopic	< 79.9
Euryprosopic	80 – 84.9
Mesoprosopic	85 — 89.9
Leptoprosopic	90 – 94.9
Hyperleptoprosopic	> 95

The data for each newborn was recorded in a special form and analyzed. For comparison of the means of the anthropometric measurements unpaired t- test was used.

OBSERVATIONS AND RESULTS

Table 2: Mean and standard deviations of full term newborns anthropometric parameters categorized by sex in Himachal Pradesh.

S.No	Parameters	Male (N-177)	Female (N-150)	P Value
1	Head length (mm)	112.85±5.44	109.67±9.9	0.0003
2	Head width (mm)	90.54±4.5	89.94±4.99	0.254
3	Face length (mm)	54.99±5.04	53.88±5.25	0.0524
4	Face width (mm)	79.24±7.3	78.68±6.4	0.4652

The present study was conducted to obtain a baseline standard criterion (Mean±SD) of normal full term newborn's head and facial parameters and there correlation.Head length shows high statistically significant value for male and female (p= 0.0003). (Table-2)

On the basis of international description by William et al, Cephalic index was calculated using the standard formulae. All measurements were described in millimeters. The mean cephalic index in Himachal Pradesh (80.97±4.18) shows statistically significant value (p=0.0054) for male and female (Table-3). Mean cephalic index for lower hills (80.34±4.43) has no significant value (p=0.1075) for male and female (Table-4) and mean cephalic index for inner Himalaya (82.12±4.12) have significant value (p=0.0001) in male and females. (Table-5) Prosopic index for all different zones shows no significant value. (Table-3, 4, 5)

Table 3: Cephalic and Prosopic index of new borns in Himachal Pradesh categorized by sex.

Different Parameters	Male Newborns N=177 Mean±SD	Female newborns N=150 Mean±SD	Mean N= 327	P value
Cephalic Index (mm)	80.32±4.17	81.62±4.20	80.97±4.18	0.0054
Prosopic Index (mm)	69.20±6.39	68.22±5.81	68.71±6.1	0.1507

Table 4: Cephalic and Prosopic index of male and female new borns in Lower Hills.

Different Parameters	Male newborns N=116 Mean±SD	Female newborns N=104 Mean±SD	Mean N=220	P value
Cephalic Index (mm)	79.86±3.86	80.83±5	80.34±4.43	0.1075
Prosopic Index (mm)	67.80±6.55	66.79±5.44	67.29±5.99	0.2192

Table 5: Cephalic and Prosopic index of male and female new borns in Inner Himalaya.

Different Parameters	Male newborns N=61 Mean±SD	Female newborns N=46 Mean±SD	Mean N=107	P value
Cephalic Index (mm)	81.18±4.64	83.06±3.61	82.12±4.12	0.0001
Prosopic Index (mm)	71.75±5.17	71.46±5.35	71.60±5.26	0.7777

Fig. 3: Comparison of Various Index.

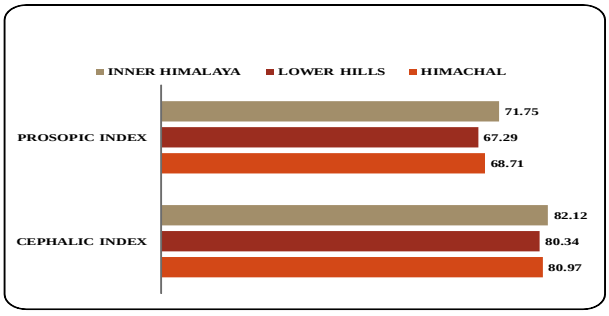


Table 6: Distribution of Head Shapes in different zones of Himachal Pradesh.

Head Shapes	Ranges	Himachal Pradesh N=327		Lower Hills N=220		Inner Himalaya N=107	
		Male	Female	Male	Female	Male	Female
Dolicocephalic	< 74.9	18 (10.17)	08 (05.33)	11 (09.48)	07 (06.73)	06 (09.84)	01 (02.17)
Mesocephalic	75– 79.9	66 (37.29)	45 (30.00)	52 (46.55)	37 (35.58)	15 (24.59)	07 (15.22)
Brachycephalic	80– 84.5	69 (38.98)	64 (42.67)	40 (34.48)	39 (37.50)	31 (50.82)	25 (54.35)
Hyperbrachycephali	8 – 89.9	24 (13.56)	33 (22.00)	13 (11.21)	21 (20.19)	09 (14.75)	13 (28.26)

Table 7: Distribution of face shapes.

Face Shapes	Ranges	Himachal Pradesh N=327		Lower Hills N=220		Inner Himalaya N=107	
		Male	Female	Male	Female	Male	Female
Hypereuryprosopic	< 79.9	171 (96.61)	146 (97.33)	113 (97.41)	103 (99.04)	58 (95.08)	42(91.30)
Euryprosopic	80– 84.9	05 (2.82)	03 (2.00)	02 (1.72)	00 (00.00)	03 (04.92)	04(08.70)
Mesoprosopic	85– 89.9	00 (00.00)	01 (0.67)	00 (00.00)	01 (0.96)	00(00.00)	00(00.00)
Leptoprosopic	90– 94.9	01 (0.56)	00 (00.00)	01 (00.86)	00 (00.00)	00(00.00)	00(00.00)

Fig. 4: Mean % comparison of different zone of himachal pradesh.

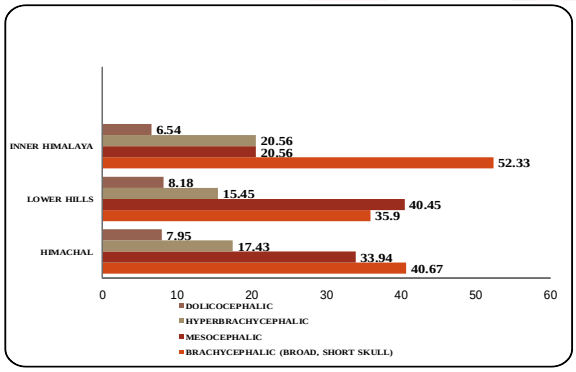
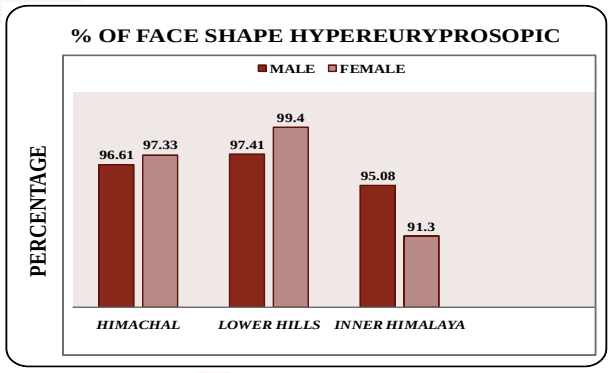


Fig. 5: Percentage of face shape Hypereuryprosopic.



Morphological classification for head and face: According to William et al classification of head as cephalic index that Dominant Brachycephalic type with (38.98%) male and (42.67%) female and rare Dolicocephalic with (10.17%) male, (5.33%) female were in Himachal Pradesh. In lower Himachal Dominant was Mesocephalic with (46.55%) in males and Brachycephalic with (37.50%) in females. Rare type Dolicocephalic (9.48%) in males, (6.73%) in females respectively. In Inner Himachal Dominant type Brachycephalic (50.82%) male, (54.35%) in female and rare type Dolicocephalic (9.84%) male, (2.17%) female were present (Table-6). Percentage means comparisons of different zone presented by bar chart (Figure-3, 4). Hypereuryprosopic (Round face) face shapes was found in all three zones (Figure-5)

DISCUSSION

In the present study the mean cephalic index for full term newborn in lower hills and inner himalaya males was 79.86±3.86, 81.18±4.64 respectively, while that of lower hills and inner himalaya females 80.83±5, 83.06±3.61 respectively. According to the standard anatomical classification for head shapes by William et al the Mesocephalic head shape was dominant in lower hills full term newborns (40.45%), while the Brachycephalic type was dominant in inner himalaya newborns (52.33%) and whole Himachal Pradesh (40.67%). Statistically analysis with t-test showed significant difference in cephalic index of inner Himalaya and whole Himachali males and females. There was no statistical significant in lower hills males and females [2,6-8].

The mean cephalic index in our study was (80.97±4.18) which is same as by Jordaan et al, (1976) and lower by Rajlakshmi et al, (2001) [6, 5]. Variation of head shape in various races and geographical zone, hereditary factors primarily affects the shape of head, however environment also place a secondary effect [1]. The different geographical zones, environmental and climatic conditions, food habits, people of different races

in Himachal Pradesh and migrants came in different forms like Kinner, Mongolians and Aryans etc. all affects the variation in their head shapes. Prosopic index for full term newborn in lower hills and inner himalaya male was 67.80±6.55, 71.75±5.17 respectively. While that of lower hills and inner himalaya females was 66.79±5.44, 71.46±5.35 respectively. The obtained prosopic indices showed that the Hypereuryprosopic type of face was dominant in lower hills (98.18%). According to all India anthropometric survey (that hilly people have-short stature, long round heads, narrow to below medium noses, round faces, scheduled tribes have broad to medium facial profile). We disagree with the statement given by all India anthropometric survey that hilly people have long round heads but Himachal Pradesh with cephalic index over 80% was Brachycephalic heads (broad, short skull breadth at least 80% of the length) in lower zone with Mesocephalic head shapes (medium proportions) while in inner zone have Brachycephalic with CI over 80% (broad, short skull). We also disagree with the statement of all India anthropometric survey, as in all the different zones have Hypereurycephalic faces with PI <79.9 (very broad).

Conflicts of Interests: None

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How to cite this article:
Soni Pankaj, K. Prabhakaran, Kapoor Kanchan. THE SHAPES OF HEAD AND FACE IN NORMAL FULL TERM NEWBORNS IN HILLS OF HIMACHAL PRADESH. Int J Anat Res 2016;4(4):3161-3163.
DOI: 10.16965/ijar.2016.429