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The variation of head and face shapes in female newborns in the South-East of the Caspian sea (Iran-Gorgan)

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Summary

Anthropometric dimensions are the basis for the evaluation of the health of newborns. This research was conducted in view of the importance of anthropometric indices of the head and face in forensic medicine, surgery, pediatrics and medical imaging.

The study was undertaken on 423 normal one – day old female newborns of the Fars and Turkman race (Turkman group: No=211, Fars group No=212).

Means and SD of cephalic and prosopic indices in the native Fars group were 78.63± 4.7, 74.3±11.5 and in the Turkman group they were 77.85±8.7, 81.6±9.8 respectively. The dominant and rare types of head shape in the native Fars group were mesocephalic (44.98%) and hyperbrachycephalic (8.96%) respectively, while in the Turkman group they were mesocephalic (38.86%) and hyperbrachycephalic (8.05%). The dominant type of face shape in the native Fars group was hypereuriprosopic (71%) and in the Turkman group it was mesoprosopic (39%).

This research determines the possible effects of racial factor on the diversity of head and face shapes in normal female newborns in this region.

Key Words: Cephalometry – Cephalic index – Prosopic index – Newborn – Race

Introduction

The evaluation and measurement of human body dimensions are achieved by physical anthropometry (Banister, 1995; Chamella, 1997). The dimensions of the human body affected by ecological, biological, geographical, racial, gender and age factors (Imami-Mibodi and Mastri-Frahani, 1996; Golalipour et al., 2000; Okupe et al., 1984; Hamill et al., 1979).

On the basis of above factors, anthropometric studies have been conducted on the age, sex and racial groups in certain geographical zones (Banister, 1995; Afak and Turgut, 1998; Aude Onis et al., 1998; Golalipour et al., 2003). Cephalometry is one of the important parts of anthropometry, in which the dimensions of head and face are measured. Cephalometric results are used in forensic medicine, plastic surgery, oral surgery, pediatrics, dentistry, and diagnostic knowledge between patient and normal populations (Banister, 1995).

Although anthropometric studies of newborns, other age groups and their relationship in health and disease have been achieved, there is currently a background for research in different geographical and racial groups. Despite previous determinations of the shapes of heads and faces in male newborns in our area (Golalipour et al., 2003), cephalometry in female newborns has not yet been carried out. The present study aimed at determining the normal range of head and face shapes in normal female newborns in the native Fars and Turkman races of our region.

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Material and Methods

This research was done on 423 normal female newborns (Fars group n=212; Turkman group, n=211).

Turkman group: The Turkman populations have been living in this area for more than two centuries, immigrating from central Asia. The Turkman people only marry among themselves because of religious and ethnic concepts. They are therefore almost a "pure" race.

Native Fars group: The populations of native Fars were selected from three generations who have lived in this region.

All newborns were evaluated 12-24 hours after birth. The head circumference of the newborns was determined by a tape measure without elasticity (±1 mm <n). Other measurements, determined with a Martin spreading caliber, included:

- Head length = Summit of glabella to furthest occipital point.
- Head width = greatest breadth, at right angles to the median plane.
- Face length = nasion – gnathion height.
- Face width = bizygomatic breath.
- Auricular height = vertical distance between vertex to external acoustic meatus.

$$\text{Cephalic Index} = \frac{\text{Head Width}}{\text{Head Length}} \times 100$$

$$\text{Prosopic Index} = \frac{\text{Face Length}}{\text{Face Width}} \times 100$$

The above indices were determined on the basis of international anatomical descriptions (Banister, 1995). Based on these indices the types of head and face shapes were classified following Banister (1995) and Panero (1979).

Head shap	Cephalic index (CI) range (%)
Dolicocephalic	CI < 74.9
Mesochepalic	75<CI<79.9
Brachiocephal	80<CI<84.9
Hyperbrachiocephal	85<CI<89.9 and CI>89.9
Face shape	**Prosopic index (PI) range (%)**
Hypereuriprosopic	75<PI<79.9 and PI<75
Euriprosopic	80<PI<84.9
Mesoprosopic	85<PI<89.9
Leptoprosopic	90<PI<94.9
Hyperleptoprosopic	PI>95

The data for each newborn were recorded in special form and were then analyzed by EPi 6.

To determine morphological indices in racial groups we used the chi-square test and for comparison of the means of the anthropometric measurements Student's t (α=0.05) was used.

Results

The findings of this research were as follows:

I. The means and SD of length, width, and circumference of head and length and width of face and auricular height in Turkman and native Fars are shown in Table1.

II. Indices:

The means and SD of cephalic index in the Turkman and native Fars groups were 77.85±2.7, 78.36±4.6, respectively. There was no significant difference between the two groups. The prosopic indices of two groups were 81.60±9.8, 74.32±11.3, respectively and there was a significant difference between the two groups (P<0.0001).

Table 1.- Showing various parameters of head and face in Turkman and Fars female newborns

	Turkman female newborn		Fars female newborn		p-value
	Mean	SD	Mean	SD	
Head length	113.460	6.875	113.085	5.609	NS
Head width	87.938	6.465	88.538	5.613	NS
Face length	55.308	7.529	49.075	7.225	0.00000
Face width	67.938	6.297	66.462	7.070	0.022461
Auricular height	78.213	6.230	78.057	7.002	NS
Circumference of head	346.427	14.066	346.392	17.821	NS

Not Significant: NS

III. Morphological classification of heads (Table 2).

The heads were classified by the cephalic index, such that the mesocephalic type, with 38.86%, was dominant and the hyperbrachycephalic type, with 8.05%, was rare in Turkman female newborns (table 2). The dominant and rare types in the native Fars were mesocepahalic (41.98%) and hyperbrachycephalic (8.96%), respectively. There were no significant differences between the dominant and rare types in the two racial groups.

Table 2.- Distribution of head shapes in female newborns

Head shapes	Turkman Race N (percent)	Fars Race N (percent)	p-value
Dolicocephal	67 (31.75)	43 (20.28)	0.00993218
Mesocephal	82 (38.86)	89 (41.98)	NS
Brachycephal	45 (21.32)	61 (28.77)	NS
Hyperbrachycephal	17 (8.05)	19 (8.96)	0.44727672

Not Significant: NS

IV. Morphological classification of the face (Table 3):

The mesoprosopic type (36.01%) and hyperleptoprosopic type (1.89%) were dominant and rare in the Turkman newborns (Table.3) and the dominant and rare types of face in native Fars newborns were hypereuryprosopic (71.22%) and hyperleptoprosopic (4.24%), respectively (table 3). From this study it was concluded that there is significant difference between the dominant types of faces in the Turkman and native Fars racial groups.

Table 3.- Distribution of face shapes in female newborns

Face shapes	Turkman Race N (percent)	Fars Race N (percent)	p-value
Hypereuryprosopic	59 (27.96)	151 (71.22)	0.00000
Euryprosopic	54 (25.59)	24 (11.32)	0.00025318
Mesoprosopic	76 (36.01)	15 (7.07)	0.0000
Leptoprosopic	18 (8.53)	13 (6.13)	NS
Hyperleptoprosopic	4 (1.89)	9 (4.24)	NS

Not Significant: NS

DISCUSSION

In this research, the cephalic indices were 78.85±8.77 and 78.36±4.69 in the Turkman and Fars races, respectively. The cephalic indices of this study were lower than Jordaan's study in South Africa (80.29±0.89) (Jordaan, 1976) and India (88.4±1.1) (Rajlakshmi et al., 2001) and resemble those of Imami-Mibodi's study in North-West of Iran (78±6.4) (Imami-Mibodi and Mastri-Frahani, 1996), and they are higher than those of another study (77.97±3 and 77±5) in the Turkman and Fars groups in male newborns in North of Iran (Golalipour et al., 2003).

The dominant type of head shape in the native Fars group was mesocephalic (41.98%). In the Turkman race, the dominant type was also mesocephalic (38.86%). Our results are similar to those of Imami-Mibodi's study in Quzvin - Iran (Imami-Mibodi and Mastri-Frahani, 1996) (40% mesocephalic) and of another study in the North of Iran (36.5 to 38.2%) (Golalipour et al., 2003). The dominant type of head did not resemble those reported in Jordaan's study in South Africa (Tuli et al., 1995) (Brachiocephalic) and in India (Nakashima, 1986) (dolicocephalic).

With respect to the variation in head shape in different races and geographical zones, we believe that head shape is primarily affected by hereditary factors and that the environment has a secondary effect on it.

It must be recalled that the reaction to a given environment represents the interaction of the genotype of the population being studied with the environment (Jordaan, 1976).

Anthropological studies based on racial changes have determined that the peoples of Africa, India, Australia and the central part of Europe and North America are dolicocephalic; The head shapes of peoples in the Pacific Ocean are of the bracycephalic type, while in the Middle East, Russia and central part of Europe they are mesocephlic and that most people in on Atlantic Ocean border are of the mesocephalic type (Chamella, 1997).

Head shape is affected by the factor of time, as repeated in Nakashima's study determining head shape, which changed over 30 years (Nakashima, 1986).

The obtained prosopic indices in the native Fars and Turkman groups were not same as Imami-Mibodi and Mastri-Frahani findings in 1996; however, the findings were shown a comparison with our previous results on male newborns (Golalipour et al., 2003). The dominant type of face shape in the native Fars group was obtained hypereuryprosopic (72%), which is the same findings of other studies performed by Imami-Mibodi and Mastri-Frahani (1996) and Golalipoure et al. (2003), but dominant type of face shape in Turkman group was mesoprosopic (36%).

This study therefore determines the possible effects of the racial factor on the diversity of head and face shapes. We suggest that further efforts are necessary to determine the role of environmental, gene and racial factors on the shapes of the head and face.

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