

The Cephalometric Neurocranial Index of One-day-old Male Newborns in Kermanshah by Anthropometry

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Abstract

Introduction: The findings of cephalometry studies are widely applied in medical and engineering fields. Cephalometry measurements are affected by genetics, age, gender, and social, economic and geographic factors. This study assesses cephalometry of the neurocranium in male newborns in Kermanshah, Iran by an anthropometry method to confirm or reject the theory of brachycephalization (i.e., a spread in the width of the average head).

Materials and Methods: This was a cross-sectional, descriptive study conducted on 103 healthy male newborns born by natural childbirth in Kermanshah during 2012. The newborns' heights were measured by a stadiometer and their weight was obtained by using a newborn's scale. The neurocranium circumference was determined by a millimeter scaled tape, and the length and breadth of the neurocranium by Martin Saller cephalometry. Data were analyzed by SPSS. Cephalic index and neurocranium classification were determined by the classical cephalometry method.

Results: The mean and standard deviation of the newborns' anthropometry and cephalometry measurements were: 506±20 cm (height), 3219±35 g (weight), 352±12 cm (head circumference), 115±4 mm (neurocranium length), 94±3 mm (neurocranium breadth), and 81±3 (cephalic index). A total of 49% of the newborns were brachycephalic and 3% were dolichocephalic.

Conclusion: The results show that the cephalic index of Kermanshahi male newborns are larger than those of Turkman Qazvin, Native Fars and Tehran, whereas they are less than observed in Sistan and Baluchistan. The study confirms that anthropometry factors (i.e. age, genetic, etc.) impact these newborns. The cephalization theories in these newborns are also confirmed.

Keywords: Cephalometry, Male, Newborn, Iran

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Introduction

Results of anthropology studies are applicable in areas such as medicine, industries, forensics, in addition to civil and non-civil engineering fields [1,2]. Anthropology is a key process that evaluates the status of infant and adult nutrition [3]. Normally anthropometry is used as an indicator of infants' growth [4]. Experts active in the area of social health unanimously believe that anthropometry indices play the most significant role in evaluating newborns' health [5]. For this reason relevant studies are regarded as Iran's second research priority [6]. Additionally, such studies are also one of the most important research priorities in the US and comprises a major part of their annual research budget [7].

The most important part of anthropometry is cephalometry [8,9] which examines the dimensions and contours of the cephalic and prosopic indices and its morphology [9,10]. These indices distinguishes between heads and faces and those defects such as microcephaly and hydrocephalus. It is a marker for assessing the health, development and growth of the community. In the World Health Organization (WHO) it is regarded as an index for confirming the normality of an individual's skull and brain.

Anthropological evidences show that prehistoric humans had a dolichocephalic skull until the paleontological eras. Some brachy-cephalic skulls that date back to paleontological eras have been found in Europe. According to the neurocranium brachycephalization theory which is defined as a spread in the width of the average head, the neurocranium brachycephalic skull type has become the dominant skull type in different communities [11,12].

Cephalometric dimensions are affected by genetics, age and sex, in addition to geographic, climatic, social, and economic factors. Therefore cephalometric studies should be performed with regards to the aforementioned factors in order to

confirm their validity [12,13]. In Iran these factors exist; additionally, cephalometric studies have not been conducted on newborns born in Kermanshah. Thus, the aim of this study is to determine the anthropometry of cephalic index in kermanshahi male newborns. This study also intends to confirm or deny the theory of brachycephalization.

Materials and Methods

In doing this study, Ethics Committee of Beheshti University gave consent to the authors and the entire newborns' parents signed the study consent form.

This was a cross-sectional, descriptive study conducted on 103 Kermanshah healthy.

one-day-old male newborns born in 2012 to parents who were also native-born Kermanshahian. Newborns were delivered via natural childbirth in Mo'etazdei (a hospital in Kermanshah) and Imam Reza Hospitals. The study was undertaken following the coordination of Shahid Beheshti University of Medical Sciences and Kermanshah University of Medical Sciences, in addition to the cooperation of the above-mentioned hospitals' officials.

Of 114 newborns, 103 were diagnosed healthy by a pediatrician and entered into the project. Excluded were 11 newborns who were non-natives or afflicted with musculoskeletal and endocrine diseases, hydrocephalus, microcephaly, and diseases which affected anthropometry. Demographic profiles of newborns that entered the study were recorded in prepared forms. In a time interval between 5 to 10 hours following birth, the weight of the newborn was measured by a newborns' scale that had a 100 g accuracy; height was measured by a stadiometer that had an accuracy of 0.5 mm.

The dimensions and anthropometric sizes of

each neonate's neurocranium was measured in millimeters by using a calibrated Martin Saler cephalometer from cephalometric reference points according to international anthropometric protocols [8]. Relevant data was entered in the data collection form and subsequently analyzed by SPSS version 20 software. Neurocranium sizes of the newborns were measured and recorded as mean±standard deviation. Data were extracted in the form of tables.

Measurement parameters included the length of the neurocranium (direct distance between glabella points to the inion and breadth of the neurocranium (direct distance between two euryons in the middle of the protruding points of the right and left parietal bones). The cephalic index is a percentage obtained by dividing the neurocranium breadth by its length (mm) and multiplying by 100. The index ranges from approximately 65% to 90%. Based on the cephalic index, cephalic profiles from all societies are divided into four types (neurocranium classification) [8] and include the following ranges: dolichocephalic (<70% to 74.09%), mesocephalic (75% to 79%), brachycephalic (80% to 84.09%), and hyperbrachycephalic [85% to 89.09% (or more)] [14].

Results

As seen in Table 1 the anthropometric indices of one-day-old males indicates that their mean height was 506±20 mm and their weight was 3219±358 g.

Table 1. Anthropometric data on male newborns from Kermanshah.

Variable	Mean	Standard deviation	Maximum	Minimum
Height (mm)	506	20	550	440
Weight (mm)	3219	358	4250	1950

Secondly, the mean neurocranium circumference was 352±12 mm, the mean neurocranium length was 115±4 mm, and the mean neurocranium breadth was 94±3 mm. The calculated cephalic index was 81±3% (Table 2).

Table 2. Cephalometric data on male newborns from Kermanshah.

Neurocranium	Mean	Standard deviation	Maximum	Minimum
Circumference (mm)	352	12	380	320
Length (mm)	115	4	128	107
Breadth (mm)	94	3	103	78
Index (%)	81	3	89	67

Neurocranium classification

The newborns were classified by neurocranium indexing. The dominant type of neurocranium observed was brachycephalic (49.05%) whereas the least observed was dolichocephalic (3.09%). There were 29.01% mesocephalic and 17.05% hyperbrachycephalic (Table 3).

Table 3. Classification of male newborns according to neurocranium indexing.

Neurocranium type	Number	Percent
Dolichocephalic	4	3.9
Mesocephalic	30	29.1
Brachycephalic	51	49.5
Hyperbrachycephalic	18	17.5
Total	103	100

Discussion

In the current study the newborns had a cephalic index of 81%, which was lower than the results of a study by Heidari on one-day-old newborns from Zahedan, Sistan and Baluchistan who had a cephalic index of 83% and 83% [15]. However the cephalic index in our study was higher than the

results of a study conducted in Gorgan on one-day-old newborns in which the cephalic index of those who were native Fars was 77.09% and those who were Turkman was 77% [16].

Both the cephalic indices of a study conducted by Imami Meibodi in Qazvin (Northwestern Iran) and in a study of newborns delivered at Shohadai-e-Tajrish Hospital in Tehran were 78%, which were lower than the current study [1,17].

In this study, the head phenotype was determined according to the cephalic index. The dominant type of head shape in our study was brachycephalic (49.05%), which was the same finding observed by [15]. However, in contrast to our study, mesospheric was the dominant type in native Fars (36.05%) and Turkman (38.01%) newborns' head shapes [16]. In addition, the dominant type of newborns' head shape in a Qazvin study was mesocephalic (40%) [1]. The dominant type of newborns' head shape at Tehran Shohadai-e-Tajrish Hospital was mesocephalic (45%) which was not consistent with our study [17].

The least common head shape among newborns in Sistan and Baluchistan [15] was dolichocephalic, which was the same as our

study. However, the least common observed among native Fars and Turkman newborns in Gorgan was hyperbrachycephalic [16]; in Qazvin and Tehran Shohadai-e-Tajrish Hospital, it was brachycephalic, both of these observations were confirmed by the current study [1,17].

The results obtained from the anthropometric index of one-day-old Kermanshahian male newborns confirmed the effect of factors including age, gender, genetics, etc [18]. Secondly the results clearly showed the process of brachycephalization in communities located in different areas of Iran and confirmed the presence of brachycephalization in male new-borns from Kermanshah.

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