Original Research Article

Cephalometry to determine the head index of children younger than 6 years in kindergartens at the Ministry of higher education in Kabul, Afghanistan

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ABSTRACT

Background: A part of the anthropometry that measures and studies the dimensions of the head and the faces is called cephalometric, the results of which are used in various medical branches. The standard of this measurement is different in each country because different racial factors and geographic impact on it, so the values obtained by researchers in other countries cannot be a criterion for determining the normal growth of head in other countries. The aim of this study was to determine the head standard index and the prevalence of head anatomic types in children younger than 6 years old in Kabul ministry of higher education Kindergartens in order to determine the head standard index in 2018.
Methods: This descriptive study was conducted for all male and female children less than 6 years old at the ministry of higher education in Kabul, which had no specific physical and mental problems in 2018. The measurements of the length and width of the head were measured by the Martin Calliper Cephalometry, and according to the protocol, the head index and the prevalence of different phenotypes was determined.
Results: Based on the present study, it was found that most of the male and female head are in the form of brachicephalic with a total percentage of 56.82%, as well as 31.81% of the heads hyper brachicephalic and 9.09% of the mesosafalic head and the lowest number of heads the were dolgossific species with a total percentage of 2.28%. Also, the study of the head index based on age showed that in less than one-year olds, the heads were most the type of hyper brachicephalic and in other age groups, the head index was lower and the brachicephalic.
Conclusions: The results of this study indicate that the dominant phenotypes in children under the age of six years in kindergartens at the ministry of higher education in Kabul are of brachicephalic in both males and females.

Keywords: Anatomical types of head, Cephalometric, Head index

INTRODUCTION

Anthropometry a Greek word means human measurement and a standard method for measuring various parts of the body. This is a world health organization (WHO) approval method that provides anthropometry the most affordable, the most comprehensive and the cheapest method for assessing body size and fitness, and a valuable tool for guiding public health policies and clinical decisions, including WHO research in this regard.

child growth standards are the 2000 centers for disease control.[1] Due to extensive medical and industrial applications from anthropometric research results, these studies are ranked first in developed countries such as the United States.[2] Anthropometric results in plastic surgery, Orthopaedics, orthodontics, and even footwear, protective caps, headphones and glasses.[3,4] Skull is one of the most important parts of the body in anthropometric studies, part of anthropometry that measures and studies the dimensions of the faces and heads. Findings of cephalometric are used in various branches of medicine and science.[2] Today in the developed countries cephalometric are used to control and prevent the dangerous consequences of many diseases and craniofacial disorders.[5] On the other hand, cephalometric measurements can help clinically diagnose pediatric growth disorders and diagnose diseases.[6,7] Research on distinct age groups shows that the dimensions of the child's body are the basis of changes in later years, and knowing their natural range is of particular importance. Head is one of the most important parts of the body that do their most growth during fatal development, and the rest of its growth is complete after birth.

Cephalometric studies are helpful in determining the type of head in terms of age, gender, race, and geographical areas in understanding the prevalence of human morphology and comparing different breeds. The most important cephalometric measurements are the length and width of the head, which is used to determine the head index, so that the skull width is divided by length and multiplied by 100.[8] This standard is different in each country because of different racial and geographical factors, so the values obtained by researchers in other countries cannot be the criterion for determining the growth disorder or the growth of normal head in other countries.[9] Given that such a study has not been done in Afghanistan, the Head index and its range of changes have not been studied and are not known and are used in other countries, since in more developed countries, more than 400 different journals are published in relation with anthropometrics.

METHODS

The study was conducted in 2017 on all children of girls and boys under 6 years old at the Ministry of Higher Education kindergartens in Kabul, where the first form of information was completed, which included the name, age and sex, and after the completion of the information on the length and width of the head was done by the Callipers cephalometric martin Sadler (Germany) and accurately 0.5 mm and according to the anthropometric method of the anatomy of the classical method.[9,10]

Measurement parameters: including maximum length and width of head were determined and the information collected in excel software was recorded and using the Hardlicka's method, the Head index was determined[11] (Figure 1).
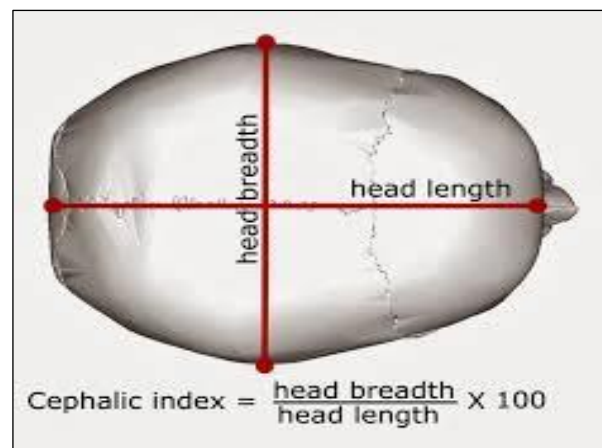

Figure 1: Measure and gain a head index.

After determining the mean of the head index, the percentage of the prevalence of the quadruple head by gender and the anthropometric international standard and the prevalence of the mean head index based on the age of the children were determined.

This research is a descriptive cross-sectional study. Which determines the head index for children below the age of 6 years in kindergartens at the ministry of higher education in Kabul. Information for each child includes name, gender, age, and cephalometric variables including head length (distance between frontal tuberosity and anion) and the head width (the greatest distance between the parietal masses) is measured by Calliper cephalometry and is divided by the length of the head to the head width and multiplied to 100. All children under 6 years old at the Ministry of Higher Education Kindergartens in Kabul include: Kabul University of Medical Sciences, Kabul University, Polytechnic University, Rabbani University, Aliabad Hospital, Maiwand Hospital, and Shahr Ara Hospital, which has 230 children. Researched and studied.

In the sampling method a list of all kindergartens from the Ministry of higher education was provided in Kabul, and then the names of all children were listed in excel software. Then for all kindergartens, the head index was calculated, and the prevalence was expressed as percentage by gender and age.

Due to the fact that no specific procedures and interventions were carried out on the subjects in this study, so no harm was done to the children. Nevertheless, the parents of the children studied were informed through the kindergarten manager and the satisfaction of the kindergarten director was obtained for this study.

RESULTS

In the present study, out of 230 children, 10 people were excluded from the study for over 6 years of age or mental disorders, and a study was conducted on 220 children

under 6 years of school education at the ministry of higher education in Kabul, which physical condition or have no specific mind. Samples consisted of 116 male and 104 female children, the mean of variations including

maximum head circumference and maximum apex width and mean head incidence were determined based on gender (Table 1).

Table 1: Mean cephalometric parameters in both genders.

Variables	Sex	Number	Minimum	Maximum	Mean	SD
Head Length	Male	116	14	19	16.8	1.2±1.0
	Female	104	14	19	16.3	
Head Width	Male	116	12	16	14.2	0.9±1.0
	Female	104	11.5	16	13.6	
Head Index	Male	116	72.9	96.4	84.1	3.6± 4.6
	Female	104	71.4	91.2	83.2	

Table 2: Head indexes in different ages.

Age	Number	Minimum head index	Maximum head index	Mean	SD	Percent
1 year	6	81.25	96.42	87.45	±5.8	2.7
2 year	27	72.98	91.2	82.27	±4.4	12.2
3 year	42	72.23	90.9	83.39	±3.6	19
4 year	64	71.42	91.2	84.14	±4.1	29
5 year	61	75.75	90.62	83.5	±3.7	27.7
6 year	20	72.72	93.75	84.47	±4.4	9

Table 3: Different type of mean head shape in both genders.

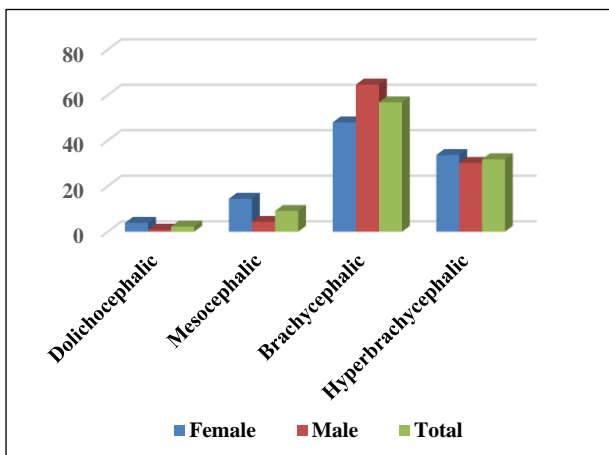| Head shapes	Sex	Number	Minimum	Maximum	Mean	SD	Percent
Dolichocephalic	Male	4	71.4	74.2	72.6	±1.04	3.8
	Female	1	72.9	72.9	72.9	±0	0.8
Mesocephalic	Male	15	75	87.2	76.4	±1.05	14.4
	Female	5	75.6	79.4	78	±1.26	4.3
Brachycephalic	Male	50	80	84.8	82.8	±1.63	48
	Female	75	80	84.8	82.5	±1.26	64.6
Hyper brachycephalic	Male	35	85.2	91.2	87.9	±2.04	33.6
	Female	35	85.2	96.4	88.6	±2.64	30.1

Figure 2: Frequency of head shapes in different genders.

According to Table 1 in both males and females, there was a slight difference between the mean length of the head, about 5mm in the width of the head, about 5.6mm, and the difference between the mean head index in both males and females was 8.3mm, and of the type Brachi. In this study, children were divided into six groups of up to 1 year, 2 years, 3 years, 4 years, 5 years and 6 years, and the minimum, maximum and average head index was determined based on age, after which the percentage of children by age was determined that the results It shows that the highest average head index in child was 87.45mm in one year and were hyperbrachicephal, accounting for approximately 2.7% of the children in the present study, and in other age groups, the head index was Brachi. (Table 2). Based on the present study, the prevalence of head's mean incidence in different classes of head was determined based on gender. Most of the head were male and female in brachicephalic or smooth, with a mean

head mean of 82mm, and a slight difference between the two sexes Male and female, with an incidence of 48% female and 64.65% male, with a prevalence of 56.82% for both sexes, and the lowest number of head was dolgossific or long with a mean head index of 72mm, and a slight difference between The mean of Head index in both genders was 3.88% in female and 0.87% in males with a prevalence of 2.28% in both genders (Table 3). Also, the prevalence of head index was described and was determined by determining the percentage of the prevalence of head indexes based on sex in both male and female sexes and the total amount in each sex in the form of a columnar graph (Figure 2).

DISCUSSION

In this study, in order to evaluate the average head index of children under the age of 6 years old at Ministry of Higher Education, which is based on the fact that most of the heads are of both sexes were brachicephalic or broad-walled type with a percentage of 65.82% and the lowest number of head The type of doligocephalic was 2.28%. Also, in both males and females, the dominant vertices were brachicephalic in gender, with a percentage of 64.65% and 48% respectively, and the lowest number of heads in both males and females were doligocephalic type with 0.87% and 3.88%, respectively. This head index-based of age study also showed that in one-year-old children most of heads were hyperbrachi or very smooth. This is due to the decrease in the velocity of lateral growth relative to longitudinal growth after the first year of life of the child, the child's life is high due to the formation of paranasal sinuses and the growth of the upper and lower jaw growth, and after the first year it decreases.[12]

The study of Golalipour and colleagues on infants in the north of Iran showed that 38% of the head are mesocephalic, which is not consistent with the results of the present study.[13] A study by Safikhani et al, on determining the type of head and face in children younger than 6 years of age in Ahwaz, Iran shows that most of the children have brachicephali and the least number of heads is dolgossific, which is perfectly consistent with the results of this study.[14] The study of cephalometry by Ebrahim N et al and his colleagues in order to compare the head index in infants and children with congenital heart disease in Rasht, Iran, showed that the predominant head type in healthy children is brachicephalic, which is in accordance with our research results.[15] The study of Kumari in the Visakhapatnam and Pradesh cities of India on adult male and female sexes ranging from 26 to 49 showed that most of the heads were mesocephalic, not in accordance with our results.[16]

According to the results of various studies in different countries, the results of this study in some cases are similar and, in some cases, due to different reasons, such as race, geographic region, living conditions and inheritance. Can be due to the difference in head form in races and people in different geographical areas, it can be said that inheritance is the head cause of changes in the shape of the head and the environmental factors after that have the greatest impact.[17] It should be noted that the reaction to a specific environment indicates the response of the genotype of that population to the environment.[18] This study shows that the head are more common in children of Kabul city is broad, but unfortunately, for such a study to determine the head index has not been made in Afghanistan and there is no further information on the head index of different ages and ethnicities. It cannot be said with certainty that in the Afghans the head is brachicephalic or broad, it changes its nutritional status and economic situation. It is precise, and this requires more extensive studies.

CONCLUSION

The results of this study indicate that dominant phenotypes in children less than 6 years of age in kindergartens in Kabul city are both kind of brachicephalic and rare phenotypes of dolgossific. Of course, the definitive point in this regard and the process of changes in the Afghan leadership need further study, which has not been studied before.

REFERENCES

1. Jaiswal P, Rathore KB, Masih WF. Cephalic Index and head shape in various castes of hadoti region. Int J Scientific Study. 2016;4(2):242-6.
2. Eivazi S, Mastery Farahani R. The cephalometric neurocranial index of one-day-old male newborns in Kermanshah by anthropometry. Anatomic Sci J. 2013;10(1):51-6.
3. Proffit, WR, eds. Contemporary orthodontics. 3rd ed. Mosby, St Louis. 2000;276-277.
4. Alavi S, Safari AT. An investigation on facial and cranial anthropometric parameters among Isfahan Young adults. J Dent Med. 2003;16(1):19-28.
5. Fok TF, Hon KL, Wong E, Ng PC, So HK, Lau J, et al. Trunk anthropometry of Hong Kong Chinese infants. Early Hum Dev. 2005;81(9):781-90.
6. Farkas LG, eds. Anthropometry of the head and Face. Raven Pr; 1994.
7. Saksena SS, Bixler D. Facial morphometrics in the identification of gene carriers of X-linked hypohidrotic ectodermal dysplasia. Am J Med Genet. 1990;35(1):105-14.
8. Shah GV, Jadhav HR. The study of cephalic index in students of Gujarat. J Anat Soc India. 2004;53(1):25-6.

9.   Golalipour MJ, JMHK. The variation of head and face in female newborns in the south-east of the Caspian Sea (Iran-Gorgan). Eur J Anat. 2005;9(2):95-98.
10. Williams PL, Bannister LH, Berry MM, Collins P, Dyson M, Dussek JE, eds. Gray's anatomy: The anatomical basis of medicine and surgery. 39th ed. London: Churchill Livingston, Philadelphia; 2005.
11. Stewart. Hrdlika, eds. Practical Anthropometry. 4th ed. Philadelphia, PA: The Wistar Institute of Anatomy and Biology; 1952:87-89.
12. Sadler, eds. Longman's medical embryology. 9th ed. Philadelphia: Lippincott Williams & Wilkin; 2004:361-399.
13. Golalipour MJ, HK, Jahanshahi M, Farahani RM. The shapes of head and face in normal male newborns in south-east of Caspian sea (Iran-Gorgan). J Anat Soc India. 2003;52(1):28-31.
14. Safikhani Z, Bordbar NA. Determination of anatomical type of head and face in children under 6 years in Ahwaz. Acta Medica Iranica. 2007:43-5.
15. Ebrahim. Cephalometric measurement in infant with congenital heart diseases compared to healthy infant. Ana Sci J. 2013;10(2):93-8.
16. Kumari KL, Babu PV, Kumari PK, Nagamani M. A study of cephalic index and facial index in Visakhapatnam, Andhra Pradesh, India. Int J Res Med Sci. 2015;3(3):658.
17. Bayat PD, Ghanbari A, Sohouli P, Amiri S, Sari-Aslani P. Correlation of skull size and brain volume, with age, weight, height and body mass index of Arak Medical Sciences students. Int J Morphol. 2012;30(1):157-61.
18. Heidari Z, Mohammadi M, MSH NM, Arab A. Cephalic and prosopic indices: comparison in one-day newborn boys in Zahedan. Teh Uni Med J. 2004;62(2):156-65.