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COMPARISON OF THE GROWTH OF BRAIN IN HEALTHY CHILDREN AND CHILDREN WITH GENETIC HEART DISEASES

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Abstract:
Background & Objective: *The genetic diseases of the heart are the main reason for the reduction of the growth of various organs of body of human beings. Among the small age children who have the diseases of heart, because of failure of heart as consequence of adverse supply of blood, there is effect on the growth of skull as well as brain which is the cause of complicate phenomenon in cephalometric field. The aim of this research work is to calculate the length, span, height, head's circumference, measurement of the volume of brain, weight of brain and cephalic index in the normal children in comparison with children suffering from the genetic diseases of heart.*
Methodology: *This research work conducted on four hundred and seventy-four patients in which two hundred and seventy-six were healthy controls and one hundred and ninety-eight were patients having the age from 1 month to 6 years.*
Results*: Brain's cephalometric indices in healthy controls and group of patients from 1 month to 6 year of age was high, followed by the reduction in the brain growth. These standard indices showed the less development in the volume of brain among the patients suffering from genetic heart diseases.*
Conclusion: *The decrease in the dimensions of head among children suffering from the genetic diseases of heart in initial stages of life might be because of deficiency of oxygen and adverse supply of blood to the cells of brain. Extensive care from parents and doctors are able to ensure the early detection of the disease which can restore the healthy growth of bran among those patients.*
KEY WORDS: *Cephalometric, Anthropology, Cephalic, Embryonic, Genetic, Reduction, Extensive, Controls.*

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INTRODUCTION:

The important branch of anthropology is Cephalometry. In this branch, the dimensions of face and head carried out. Those dimensions are in use to display the indices for determining the growth of mind and development of all types of face as well as head. The brain's dimensions as weight and volume of brain are the vital part in the life of human beings. The development of brain starts in at embryonic period, but this growth of brain will increase after birth [1, 2]. Research works on a specific age group have displayed the dimensions of the body of neonate would be basic for the growth in latter period of life. So, the awareness about the indices is very important. One of those indices in which the indicated normal calculations is the development of brain obtains it highest size after the start of live to 6 year of age. But, the growth of bones is a difficult phenomenon and in cephalometery is use for its measurement [3].

Proper growth of the brain of fetal depends upon the flow of blood in cerebral. Various congenital heart complications could happen because of the disparities in physiology & anatomy which have the ability to change the intrauterine flow of blood. So, variable growth of brain is the consequence in various congenital heart abnormalities and circumference of head at the time of birth shows its variability [4]. Children having diseases of heart and suffering from malnutrition in comparison with healthy children had an important reduction in the circumference of head [5]. The genetic diseases of heart is one of the vital factor responsible for reduction in the rate of growth of various parts of human body [3, 6]. The deficiency in the supply of blood and oxygen can affect the growth of skull and brain among the children suffering from diseases of heart which is also a complicate phenomenon. Clinically, the awareness of other impacts are helpful in the identification and prevention of these complications. This research work carried out for the measurement of length, span, impact of height and head's circumference, measurement of weight and volume of brain and various cephalic indices in healthy controls as compared with those children who are the victims of diseases of heart.

METHODOLOGY:

This research work consisted of four hundred and seventy-four patients of both genders. Two hundred and seventy six participants were healthy controls and one hundred and ninety eight participants were the members of patient group. The categorization of the participants carried out in various age groups. The selection of the patients carried out by the departments of angiography & echo cardiology in Allied Hospital Faisalabad. The duration of this research work was from January 2018 to January 2019. Children having some serious abnormality like retardation of mind, past history of surgery & twins were not the part of this research work. For the measurement of cephalometric indices suitable apparatus like anthropo-meter, calliper cephalo-meter, goni-meter & measuring tape were in use for the measurement of the head's circumference, span, length and height.

For the highest cranial length, the measurement of summit of glabella to furthest point of occipital, highest cranial breadth, highest breadth at ninety degree angles to median plane carried out. The space between tragus & vertex for the height of auricular and from anterior bone to inion for perimeter of cephalic measured. Cranial capacity has a correlation with the volume of brain calculated from calculation of cranium's length, weight and height with the use of under mentioned formula in millimeters.

Male Gender: 0.0003370 (L- 11) (B- 11) (H- 11) + 406.010cc.

Female gender: 0.0004000 (L- 11) (B- 11) (H- 11) + 206.600cc.

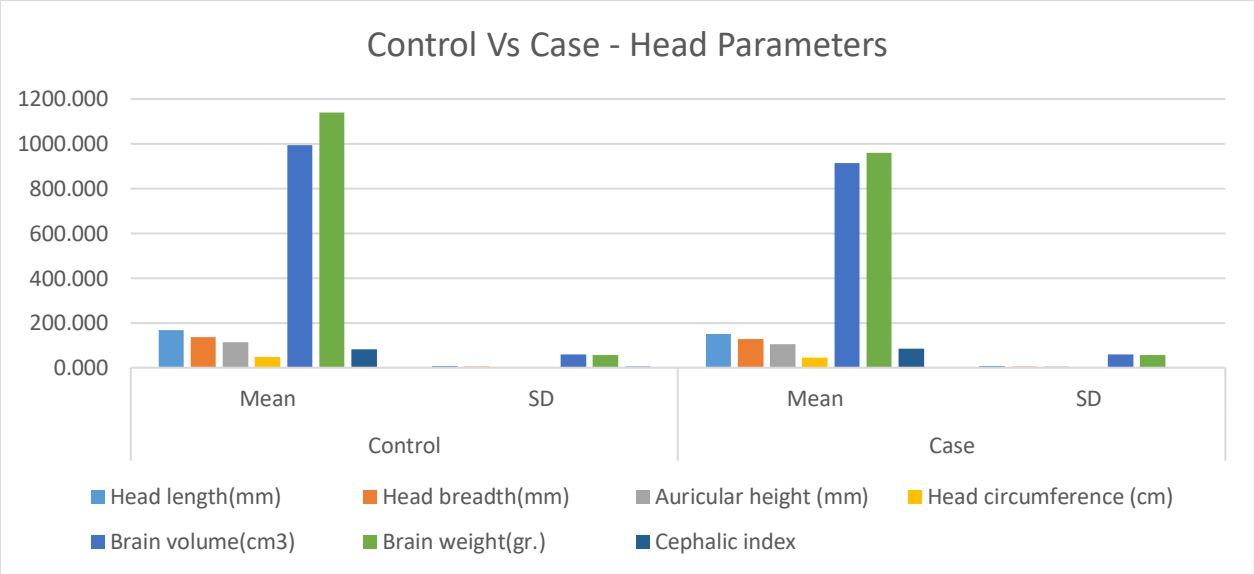
L is height and B is breadth in this formula and H in the formula is height of the auricular [3]. The calculation of the weight of brain carried out as M=PV. P is brain's special gravity which is 1.035 and V is the volume of brain in this formula. To calculate the cephalic index, highest cranial breadth divided by highest cranial length were have multiplication with one hundred. A special designed form was in use for record of this information and T test & SPSS were in use for the statistical analysis of this research work.

RESULTS:

The average and SD value of various features are available in Table-1. The analysis of the collected information showed the highest growth rate on the dimensions of head in the members of both groups catch the highest limit at the time of first to 6 months after the reduction in the rate of growth. The calculated samples in anthropologic indices like length of brain, brain span, height, and head's circumference & volume and weight of brain from 1st to 6th months was high, followed by reduction in the rate of growth. These features in the group of healthy controls when compared with the group of patients, displayed development in the dimensions of head and brain.

Table-I: Various Parameters of Head

Different Parameters	Control		Case		P.value
	Mean	SD	Mean	SD	
Head length(mm)	166.720	8.090	150.260	8.140	0
Head breadth(mm)	136.610	3.430	127.200	4.920	0
Auricular height (mm)	114.050	3.140	105.850	4.020	0
Head circumference (cm)	48.070	2.590	44.670	2.750	0.0040
Brain volume(cm3)	993.000	58.270	913.800	57.930	0
Brain weight(gr.)	1140.100	56.230	959.330	55.800	0
Cephalic index	82.020	4.330	84.600	3.370	0



Majority of alterations in height happened between five to eighteen months of the age of children. The average and standard deviation of the cephalic indices in the group of patients and healthy controls were 82.02 ± 4.33 and 84.6 ± 3.37 correspondingly. We found an important disparity between the members of both groups. The classification of head carried out with the help of cephalic indices as brachycephalic type was most dominant with 39.70% and dolichocephalic type was the least frequent among the participants of both groups with 3.30%.

DISCUSSION:

The findings of this research work showed that decrease in the dimensions of head in various groups of age who have the diseases of heart shows the decrease in the brain growth which is the result of the deficiency of oxygen and adverse supply of blood to the cells of brain [7]. Yung & his colleagues researched on three hundred and five autopsies of neonates for association between the circumferences of head and length of crown-rump [8]. They discovered that when the circumference of head was much less than the length of crown rump, there was very high prevalence of genetic heart diseases. Manzar in 2005 [9] discovered that patients suffering from the defects of heart found with small size of head at birth time. Findings of this research work are similar to the outcomes of research works of Yung & Manzar [10].

A research work conducted in Kenya [11] also described the circumference of head in the patients suffering from diseases of heart was much smaller in comparison with the healthy persons from their population, this finding is also similar with our results. Donofrio in 2003 [12] concluded that fetus with disease of heart have abnormalities of circulatory system that comprised the delivery of cerebral oxygen [13]. Our current research work showed the impact of malformation of heart in the development of the volume and weigh of brain and circumference of head in the children suffering from genetic diseases of heart.

CONCLUSION:

The results of this research work conclude that there should be a start in the identification and treatment of children suffering from the diseases of the heart just after the birth or in early age. These precautions can ensure the accurate growth of all children.

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