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Correlation between Skull width among Different Age Groups

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ABSTRACT

Introduction: Human bone increases in both size and complexity during the growth period which lasts from conception upto until maturity at about 16 to 18 years. The skull width is increased from 105 mm to around 146 mm as the age is increased from 6 months to 20 years. At the age of around 20,both the mastoid thickness and skull width reached the plateau and thereafter a very little growth occur.To evaluate the correlation between skull width among different age groups .

Materials And Methods: This study was done on 84 people in three different age groups which includes 40 people aged between 20 to 30, 23 people aged between 30 to 50 and 21 people aged above 50. sample population were selected using a convenient random sampling method to participate in the study. Bitemporal,bizygomatic, bigonial measurements were obtained with the help of spreading caliper. Bitemporal measurement is taken between the most lateral point on the temporal bone. Bizygomatic measurement is taken between the most lateral points on the external surfaces of the zygomatic arches. Bigonial measurement is taken between two points at the external angle of the mandible. The values were analyzed statistically. Kruskal-Wallis Test was done in SPSS 23.0 version.

Results: In the present study it is found that the P-value of bitemporal width between different age groups is $0.003 < 0.005$ .So, it is statistically significant. The P-value of bizygomatic width between different age groups is $0.319 > 0.005$.So,it is not statistically significant.The P-value of bigonial width between different age groups is $0.640 > 0.005$. So, it is not statistically significant.

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Conclusion: In our present study we measured the width of the skull in three different age groups and found that bitemporal width varied significantly with ages when compared to bizygomatic and bigonial width.

Keywords: *Age groups, Bitemporal width, Bizygomatic width, Bigonial Skull width. Innovative Anthropometry study*

INTRODUCTION

Anthropometry refers to the measurement of the human individual.Craniometry is measurement of the cranium, usually the human cranium. It is a subset of cephalometry, measurement of the head, which in humans is a subset of anthropometry, measurement of the human body(Willeboordse et al., 2022).Measurements of the skull based on specific anatomical reference points are used in both forensic facial reconstruction and portrait sculpture.Craniometry was also used in phrenology, which purported to determine character, personality traits, and criminality on the basis of the shape of the head and thus of the skull(Opris et al., 2022).

skull deformations with age is the major contributor in appearing older at 60's even with access to cosmetic treatments that are currently available(Ketchen, 2021).With age the skull gets thinner and longer , due to lack of density and due to gravity , the skull can literally dramatically "fall down" with years , in a phenomenon called "skull sagging".Growth takes place at the end plates of the cranial bones. Sutures allow this to occur(Ghaderi et al., 2018; Paul et al., 2021).When growth is over, the sutures fuse,The overall shape of the skull does not change Rather, the size increases.There are some medical condition, such as Paget's disease or acromegaly that will causes in the shape of the skull, but these are pathological.

Bone matrix is constantly being remodeled if strong force is applied consistently enough across time could effect a change in the shape, but probably not drastically(Almuhawas et al., 2020).Before the brain is done fully growing, the suture joints between the bones that make up the skull haven't fully ossified yet, which affords the skull a capacity to grow during the young life.

After maturity,it doesn't change much.It is typically the jaw that sees the most dramatic changes, particularly during puberty because of the anabolic effects of certain sex hormones on growth factors(Lee et al., 2019).The jaw can also change with age because of changes in dentition and calcium flux and vitamin/mineral status that occur with age-related decline. The lower mandible's bone density at least partially depends on forces exerted by the jaw through teeth. You'll see that people who have lost a lot of teeth will experience jaw bone loss(Paul et al., 2021).

Basically the skull size is fairly consistent throughout your adult and teenage years, from 15–20 years on, however aside from the posterior cranial area, the facial bones can undergo quite a significant change as according to age and medical conditions(Parciak et al., 2017; Rodríguez et al., 2022). Most appropriately the skin shows important age related changes which increase from the age of 25 concurrent with the slow down and eventual non functioning of the growth hormone center(Leem et al., 2022).

The facial bones may undergo age-related osteoporosis reducing density to bone cellular structure and thereby becoming less resistant to external conditions as well as the impact of personal health stability, much influenced by nutrition and exercise as well as pollutants(Rodríguez et al., 2022). A variety of conditions affect the facial structure, from restricted blood flow and stroke conditions to the way we sleep and sustain our posture. Toxins can reduce the pliable texture of appearance and a multitude of syndromes can cause small to medium indentations and bumps on the head including more major diseases and illnesses

which can transform a person's appearance from bone conditions caused by pressure from internal growths, to infections and bacterial superbugs(Gopinath, Ganesh and Subramani, 2021).

The facial structure of the skull includes the mandible, Maxillary, Zygomatic, and Frontal Bones while the sides such as where your temples are include the Temporal and Sphenoid Bones. While the cartilage of the nasal passage is inside the nose, the septum can be severely distorted and literally destroyed by drug use and accidental trauma(Gopinath, Ganesh and Subramani, 2021). In saying this, natural conditions show us that bone structure and appearance have an infinite variety of beauty and uniqueness, no matter how different one is from your appearance, there is beauty sustained within and on your exterior, Both physiological balance as well as psychological health are essential indicators as well as the root cause of skull shape(Samuel et al., 2022).

A rather key area of the face that has an immense impact on the skull shape is the teeth. Good healthy teeth are one of the basics of good living. Diseases such as tooth decay and gum ailments can distort appearance and not having proper dental care can cause your jawline to appear abnormally attached from side-ward growing wisdom teeth and more(Booncharoen et al., 2022).While aging is a major contributor to facial structure, good nutrition and avoiding sugar related intake can make a positive difference in your comfort and overall health as well as slow down oxidation while maintaining healthy muscle and bone(Almuhawas et al., 2020) .

Human bone increases in both size and complexity during the growth period which lasts from conception upto until maturity at about 16 to 18 years. The skull width is increased from 105 mm to around 146 mm as the age is increased from 6 months to 20 years. At the age of around 20,both the mastoid thickness and skull width reached the plateau and thereafter a very little growth occurred(Almuhawas et al., 2020).

Our team has extensive knowledge and research experience that has translated into high quality publications (Neelakantan, Grotra and Sharma, 2013; Mohan and Jagannathan, 2014; Jayaraj et al., 2015; Sheriff, Ahmed Hilal Sheriff and Santhanam, 2018; Dua et al., 2019; Gan et al., 2019; Li et al., 2020; Paramasivam et al., 2020; Aldhuwayhi et al., 2021; Markov et al., 2021). This research is needed to know the changes in skull width with aging. The aim of the research is to evaluate the correlation between skull width among different age groups.

MATERIALS AND METHODS

Study Setting

The study was carried out from 12th june 2022 to 15th juneJuly 2022 in Kakkalur,Thiruvallur district,Tamil Nadu,India and saveetha dental college.It is convenience sampling.Study setting in this study type is population setting.Pros of this research are convenient sampling,data availability,easier access,accurate details.Cons of this research are Small group of population involved,Geographic location,trends in other locations were not assessed.Location taken here is Kakkalur and saveetha dental college.

Ethical Clearance

Prior ethical approval to conduct the study was obtained from the institutional review board.SRB at saveetha dental college.

Study Population

The study was conducted on 84 people in three different age groups which includes 40 people aged between 20 to 30, 23 people aged between 30 to 50 and 21 people aged above 50. Sample population were selected using a convenient random sampling method to participate in the study.

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Data Collection Methods

Bitemporal,bizygomatic,bigonial measurements were obtained with the help of spreading caliper. Bitemporal measurement is taken between the most lateral point on the temporal bone. Bizygomatic measurement is taken between the most lateral points on the external surfaces of the zygomatic arches. Bigonial measurement is taken between two points at the external angle of the mandible.To minimize sampling bias three measurements were taken and average was taken.All the measurements are taken by a single person.

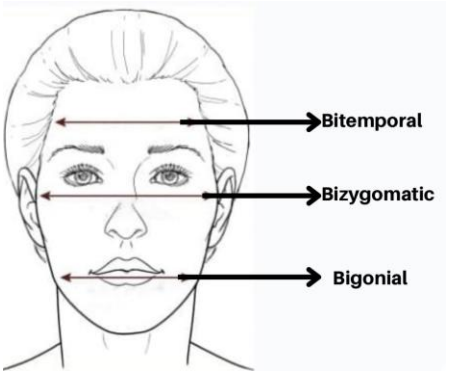

FIGURE-1: It depicts the three Measurements of the skull Namely Bitemporal width ,Bizygomatic Width and Bigonial width.

FIGURE-2: Taking the measurements of the skull using spreading caliper

Dependent And Independent Variables

Independent variables are the measurements of the skull width namely Bitemporal Measurement, Bizygomatic measurement and Bigonial measurement. Dependent variables include The different age groups namely 20-30 age group,30-50 age group and above 50 age group.

Statistical Analysis

The values were analyzed statistically. Kruskal-Wallis Test was done in SPSS 23.0 version.

RESULTS

TABLE 1: The table above depicts the Mean of the Bitemporal,Bizygomatic and Bigonial width in All three Age groups.

	AGE GROUP	N	MEAN
Bitemporal width	20-30	40	51.73
	30-50	23	36.33
	<50	21	31.69
	Total	84	
Bizygomatic width	20-30	40	38.46
	30-50	23	47.59
	<50	21	44.62
	Total	84	
Bigonial width	20-30	40	44.08
	30-50	23	43.72
	<50	21	38.17
	Total	84	

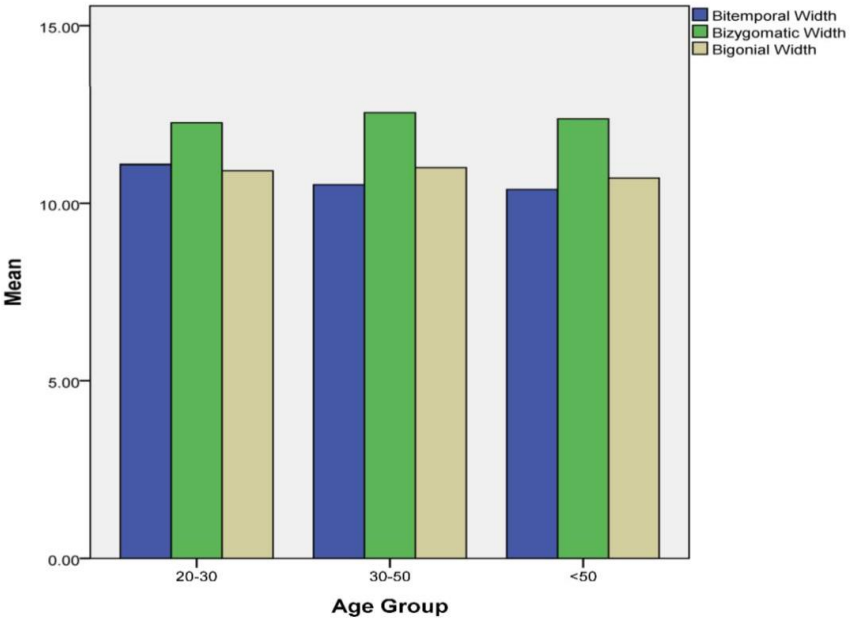

FIGURE-3: The bar graph depicts the association between different age groups and mean value of the skull widths.X-axis represents the different age groups.Y-axis represents the mean value of skull width of the different age groups.The mean of bitemporal width in 20-30 age group is around 11.The mean of bizygomatic width in 20-30 age group is around 12.The mean of bigonial width in 20-30 age group is around 10.9.The mean of bitemporal width in 30-50 age group is around 10.7.The mean of bizygomatic width in 30-50 age group is around 12.4.The mean of bigonial width in 30-50 age group is around 11.The mean of bitemporal width in age group above 50 is around 10.5.The mean of bizygomatic width in age group above 50 is around 12.The mean of bigonial width in age group above 50 is around 10.9.

Kruskal - Wallis test was done and it was found P-value of bitemporal width between different age groups is 0.003 < 0.005 .So, it is statistically significant. The P-value of bizygomatic width between different age groups is 0.319 > 0.005.So,it is not statistically significant. The P-value of bigonial width between different age groups is 0.640 > 0.005 So, it is not statistically significant.

DISCUSSION

Human beings increase in both size and complexity during the growth period which lasts from conception until maturity at about 16 to 18 years of age(Trenouth, 1991).most of the increase in size occurs during the pre- embryonic and embryonic phases of prenatal development although changes still occur in organs and tissues well into postnatal life(Draghici et al., 2021). Size increase is also rapid prenatally and continues throughout the remainder of the growth period although the growth rate changes(Takata et al., 2021). Changes in overall size may occur in mature individuals due to other pathological conditions but this is not growth.Growth and Alterations in craniofacial Morphology attracts interest in fields like genetics,physical anthropology and forensic sciences(Nováková et al., 2022).

The size and shape of the pediatric skull change significantly with age and head circumference,The skull thickness and suture width also changes with aging. Skull width increases with age in a logarithmic manner.The skull width changes from Birth to 18 years old for women as they reach full maturity. For men it's 21 years old(Aljuboori and Andaluz, 2021).Then it will change as people get older, especially when people become a senior citizen(Erasmie, Lundberg and Ringertz, 1982).hardening and closure of the sutures, coupled with changes of the facial bones and dentures there is quite a marked change from infancy to adulthood.According to the author of the book “The Anatomy of Facial Expressions” our human skulls change shape in specific ways as we age.

General effects which influence the overall shape and growth rate of skull bone includes Hormonal influences, particularly from growth and sex hormones;Nutritional influences; well-nourished people are usually have stronger skull bone than malnourished individuals;Genetic influences(Arora et al., 2021); children tend to have similar body build to one of their parents, but these characteristics are multifactorial with several genes involved;Socio-economic influences(Erasmie, Lundberg and Ringertz, 1982).

A few degenerative changes exist that can be used in aging including biparietal thinning, alveolar resorption, and arthritis of the mandibular fossa(Zhang et al., 2022). Biparietal thinning begins on the posterior aspects of the parietals. The parietal will appear flattened in nature.This is generally seen in individuals of advanced age, likely 50 years or older

In the present study it is found that the mean rank of the bitemporal width of 40 people in the age group of 20-30 is 51.73.The mean rank of the bitemporal width of 23 people in the age group of 30-50 is 36.33.The mean rank of the bitemporal width of 21 people in the age group above 50 is 31.69.The mean rank of the bizygomatic width of 40 people in the age group of 20-30 is 38.46.The mean rank of the bizygomatic width of 23 people in the age group of 30-50 is 47.59.The mean rank of the bizygomatic width of 21 people in the age group above 50 is 44.62.The mean rank of the bigonial width of 40 people in the age group of 20-30 is 44.08.The mean rank of the bigonial width of 23 people in the age group of 30-50 is 43.72.The mean rank of the bigonial width of 21 people in the age group above 50 is 38.17.P-value of bitemporal width between different age groups is 0.003 < 0.005 .So, it is statistically significant. The P-value of bizygomatic width between different age groups is 0.319 > 0.005.So,it is not statistically significant. The P-value of bigonial width between different age groups is 0.640 > 0.005 . So, it is not statistically significant.

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CONCLUSION

In our the present study we measured width of skull in three different age groups and found that bitemporal width varied significantly with ages when compared to bizygomatic and bigonial width.This study was done among a small population,further research can be done among a larger population,gender and ethnicity.

AUTHOR CONTRIBUTIONS

Preethi:Study Design, Data collection, Data Analysis, manuscript writing

Yuvaraj Babu K: Study Concept, Data verification, Data Analysis, manuscript drafting and correction

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CONFLICT OF INTEREST

The author reported the conflict of interest while performing this study to be nil.

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