

A CORRELATION BETWEEN HEAD CIRCUMFERENCE AND CHEST, WAIST AND HIP CIRCUMFERENCES IN YOUNG POPULATION OF KERALASuchitra S. Prabhu¹, Ramakrishna Avadhani², Rohan Mascarenhas³**HOW TO CITE THIS ARTICLE:**

Suchitra S. Prabhu, Ramakrishna Avadhani, Rohan Mascarenhas. "A Correlation between Head Circumference and Chest, Waist and Hip Circumferences in Young Population of Kerala". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 06, January 19; Page: 1002-1007, DOI: 10.14260/jemds/2015/140

ABSTRACT: INTRODUCTION: The head and body measurements in human body vary because of differences in anatomical features which may be influenced by environmental or geographical factors. This also brings about differences in their bony structure and fat distribution. **OBJECTIVES:** The purpose of this study was to find the correlation between the Head circumference and Chest, Waist & Hip circumferences. **METHODS:** Head, Chest, Waist, and Hip circumferences were taken for 347 subjects. Then the subjects were classified as Total sample, Males and Females. Data was tabulated and statistical analysis (unpaired t test) was carried out to find if any statistical significance between Cephalometric and Anthropometric measurements existed. The correlation co-efficient between head measurement and body measurements was determined using Karl Pearson's formula. **RESULTS:** Statistically significant difference was observed for all parameters. Statistically significant correlations were observed in Total sample, Males and Females. **CONCLUSION:** These measurements will serve as a future frame work for comparing the craniofacial dimensions for differentiation of other racial groups. These are also useful in, anthropometric studies, cosmetology, and reconstructive surgery as well as garment industries. This is also an attempt to help a forensic scientist to identify the individual from dismembered and mutilated body parts in forensic examinations.

KEYWORDS: Craniofacial dimensions, Anthropometric measurements, Correlation.

INTRODUCTION: Humans are different from each other because of size, shape, colour and phenotypic characteristics. Anthropometric characteristics have direct relationship with sex, shape and form of an individual. Genetic and environmental factors substantially influences inter individual differences in body shape, size and configuration of those who have resided in the same environment for many generations.¹ Body measurements, indices, hormones influence variations in anatomical proportions between males and females. Body shape affects body posture and gait and has a major role in physical attraction; this is because body shape is influenced by hormone levels during puberty so body shape indicates good health and fitness.²

Physical attraction could indicate a person's physical traits and health. It also reflects their ethnic, cultural and social background. The body measurements and indices of people vary because of differences in anatomical features which may be influenced by environmental or geographical factors. This brings about difference in their body shape and fat distribution. Body measurements are useful in identification of individual in medico legal cases, medical diagnosis and also in anthropological studies.

The face and body grow in different proportions in time. Body measurements were used by the Egyptians but facial measurements were first performed by the Greeks, as a part the total body measurements. Some Investigators have used measurements in human beings to imply certain groups of people to be superior where as others applied such measurements to create art of ultimate

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beauty. Although earlier researchers studied the relationship between the face and the body there is no defining or conclusive study which can determine the inter relationship of the facial skeletal pattern and body type. This study examines the role of proportions and interdependency between the head type and body types.

Anthropometric characteristics have direct relationship with sex, shape and form of an individual. These factors are intimately linked with each other and are manifestations of the internal structure and tissue components which in turn are influenced by environmental and genetic factors. These measurements vary because of differences in anatomical features which may be influenced by environmental or geographical factors. This brings about difference in shapes and forms of head and face. These are useful in Orthognathic surgeries, assessment of growth, growth modulations, anthropometric studies, cosmetology, reconstructive surgery, and forensic sciences and garment industries.

METHODOLOGY: A cross sectional study was conducted among the young population of Kerala. The sample size included 347 students (180 males and 167 females) aged 18 to 25 years.

Measurements of Head, Chest, Waist, and Hip circumferences were obtained from the selected Kerala population. All measurements were taken two times and the average was recorded.

HEAD CIRCUMFERENCE: The tape was wrapped around the Glabella, superior orbital margins, superior margins of the external acoustic meatus and Inion and back to the point above the Glabella.³

CHEST CIRCUMFERENCE: The subject standing with relaxed arms hanging at sides and the measurement is taken approximately from the armpit at the level of 4th costo sternal joint and just superior to the level of nipple.⁴

WAIST CIRCUMFERENCE: The measurement was taken horizontally at midpoint between the costal margin and iliac crest in the mid axillary line.⁵

HIP CIRCUMFERENCE: Measured at the level of greater trochanters and maximum extension of the buttock's posterior.⁵

Data was tabulated and statistical analysis (unpaired t test) was carried out to find if any statistical significance between head and body measurements existed. The correlation co-efficient between head measurement and body measurements was determined using Karl Pearson's formula.

RESULTS: The Head circumference, Chest, Waist, Hip circumferences are measured and the measurements were statistically analysed and the mean and standard deviations were calculated as shown in table No.1 and 2 respectively

| Measurements | Group | N | Mean ± SD |
|--------------------|---------|-----|------------|
| Head circumference | Males | 180 | 54.93±1.5 |
| | Females | 167 | 52.69±4.1 |
| | Total | 347 | 53.85±3.22 |

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| | | | |
|---------------------|---------|-----|-------------|
| Chest circumference | Males | 180 | 83.92±7.5 |
| | Females | 167 | 79.31±6.8 |
| | Total | 347 | 81.7±7.56 |
| Waist circumference | Males | 180 | 74.19±8 |
| | Females | 167 | 67.09±8.7 |
| | Total | 347 | 70.77±9.09 |
| Hip circumference | Males | 180 | 88.02 ±7 |
| | Females | 167 | 84.67± 9 |
| | Total | 347 | 86.4 ± 8.16 |

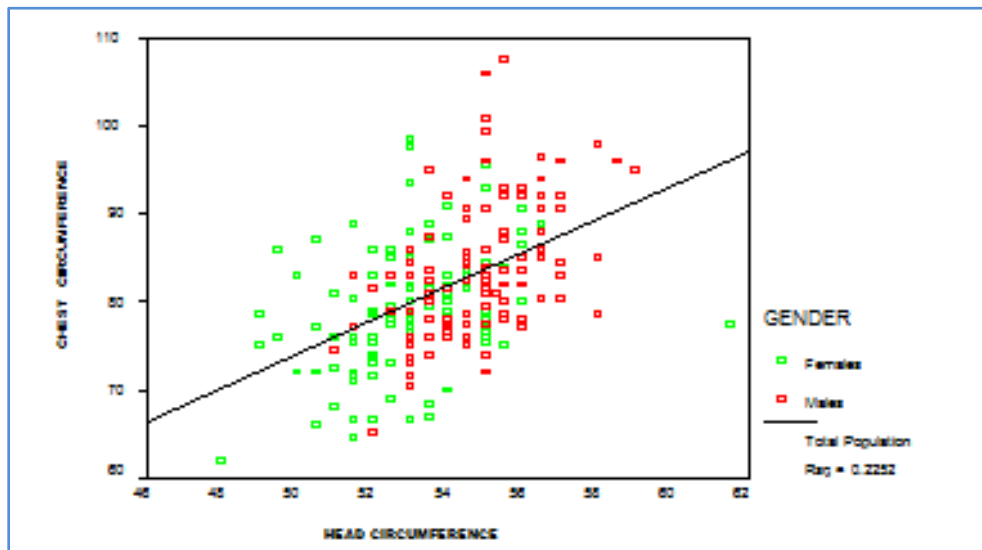
Table 1: showing mean± standard deviation values of different parameters.

From the above table it is very clear that males have maximum circumferences while females have minimum.

| Measurements | t-value | p-value |
|---------------------|---------|------------|
| Head circumference | 6.921 | p<0.001*** |
| Chest circumference | 5.958 | p<0.001*** |
| Waist circumference | 7.893 | p<0.001*** |
| Hip circumference | 3.897 | p<0.001*** |

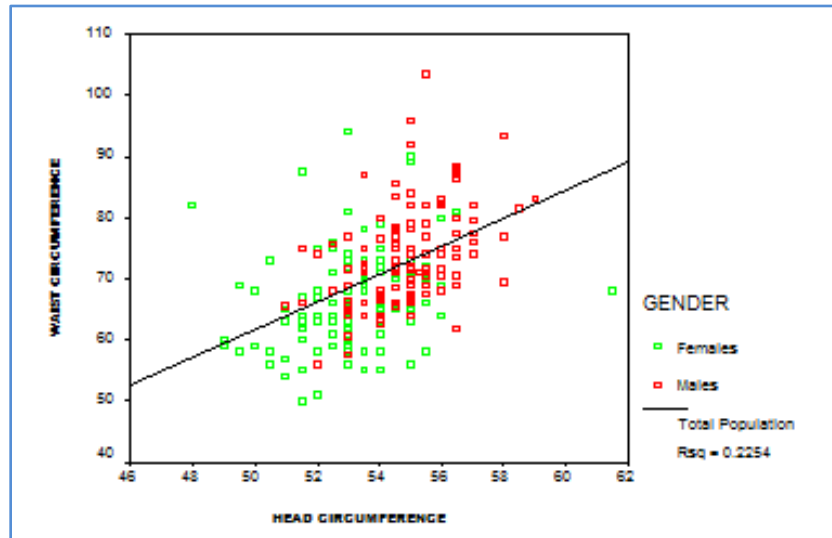
Table 2: Gender differences for different parameters.

As shown in Table -2 highly significant gender difference were observed for all parameters (p<0.001***).

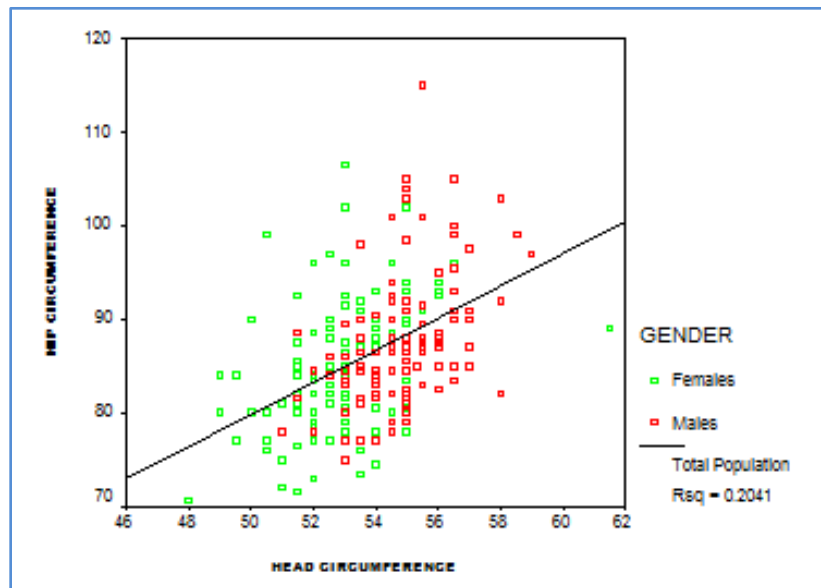


Graph 1: Correlation of Head Circumference with Chest Circumferences in both genders

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Graph 2: Correlation of Head Circumference with Waist Circumferences in both genders



Graph 3: Correlation of Head Circumference with Hip Circumferences in both genders

Graph-1,2 and 3 depicts correlation of head circumference with chest, waist and hip circumferences.

DISCUSSION: The human face shows difference among age, race, and genders. The anthropometric analysis of the face is an important step for approaching the patient who is subjected for craniofacial plastic reconstructive surgery ⁶. Head circumference is one of the most significant findings in physical examinations, especially in the evolution of the development and early diagnosis of neurological

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disorders.⁷ In the present study comparison between the male and female of the whole sample ($p < 0.001^{***}$) showed statistically significant difference. Whereas a study by Karmegam et al., showed slightly lesser mean value in Malay, Chinese and Indian people.⁸ Total males were showing same circumference as that of males of India. Head Circumference shows moderate positive correlation with Waist Circumference, Hip Circumference and Chest Circumference, The result of the correlation indicates that the Head Circumference increases as the body parameters like Chest Circumference, Waist Circumference and Hip circumference increases.

Chest Circumference is a transverse measurement which, together with height and BMI is a basis for estimating physical status of an individual⁹. Pavlica et al., revealed that males of all groups showed highest mean value than other groups as well as than that of females⁹. The statistical significant difference is recorded in Males and Females of Total sample ($p < 0.001^{***}$). On comparing the obtained data with previous investigations on Southern Thai population an increased trend of this characteristic feature has been observed.¹⁰

Waist Circumference is influenced by body weight, body composition and fat distributions and their associations with gender and age.¹¹ The results of this investigation revealed that the Total sample showed 70.77 ± 9.09 cm, Total males showed 74.19 cm and Females showed 67.09cm. When comparison was done between all groups, Males were showing highest mean value than Females. Males and Females of Total sample showed statistically significant difference ($p < 0.001^{***}$).

Hip Circumference dimension has been used for detecting the fat tissue distribution. Hip Circumference also indicates the health risk. In the present study, Hip Circumference of Total males was showing 88.02cm. When comparison was done between Males and Females of Total sample ($p < 0.001^{***}$) showed statistical significant difference ($p < 0.001^{***}$).

The gender differences observed for all parameters. All values were high in males compared to females. This variation may be because of before puberty both males and females have a similar ratio. When they attain puberty the hormonal changes bring variation in the ratios between the sexes. Women with 0.7 WHR are invariably rated more attractive by men, regardless of their culture.²

CONCLUSION: The gender difference and established correlation between head measurement and body measurements which would help us to establish the population norms. These measurements will also serve as a future frame work for estimating the craniofacial dimensions of other ethnic groups and help these are also useful in, anthropometric studies, cosmetology, and reconstructive surgery as well as garment industries. This is also an attempt to help a forensic scientist to identify the individual from dismembered and mutilated body parts in forensic examinations.

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Date of Submission: 15/12/2014.
Date of Peer Review: 16/12/2014.
Date of Acceptance: 09/01/2015.
Date of Publishing: 17/01/2015.