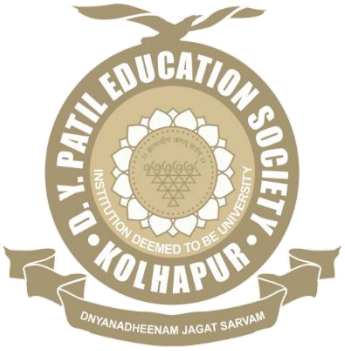
ANTHROPOMETRIC COMPARATIVE STUDY OF FACIAL PARAMETERS WITH BODY HEIGHT IN SANGLI DISTRICT POPULATION

A THESIS SUBMITTED TO



D. Y. PATIL EDUCATION SOCIETY,KOLHAPUR

(DEEMED TO BE UNIVERSITY, Declared u/s 3 of the UGC Act 1956)

FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN ANATOMY (MEDICAL)

UNDER THE FACULTY OF MEDICINE

BY

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Year 2020

DECLARATION

I hereby declare that the thesis entitled, "**ANTHROPOMETRIC COMPARATIVE STUDY OF FACIAL PARAMETERS WITH BODY HEIGHT IN SANGLI DISTRICT POPULATION**" which is being submitted here with for Degree of Doctor of Philosophy in Anatomy (medical),under the faculty of Medicine, completed and written by me has not previously formed the basis for the Degree or Diploma at any other University or examining body.

Place: Kolhapur

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Research Student

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D.Y. PATIL EDUCATION SOCIETY, KOLHAPUR

(Deemed to be University Declared u/s 3 of the UGC Act 1956)

CERTIFICATE

This is to certify that the thesis entitled "**ANTHROPOMETRIC COMPARATIVE STUDY OF FACIAL PARAMETERS WITH BODY HEIGHT IN SANGLI DISTRICT POPULATION**" which is being submitted here with for the award of The Degree of Doctor of Philosophy in Medical Anatomy from D.Y. Patil Education Society, Kolhapur(Deemed to be University, Declared u/s 3 of the UGC Act 1956), under the Faculty of Medicine, is the result of original Research work completed by **Dr.VaishaliAnnasaheb Mane** underour supervision and guidance and to the best of our knowledge and belief the work bound in this thesis has not formed earlier the basis for the award of any Degree at any other University or examining body.

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ABBREVIATIONS

1. BGW=Bigonial Width

2. BOW=Bi-orbital Width

3. BZW=Bizygomatic Width

4. CR=Calculated Range

5. DP=Demarcation Point

6. FP=Facial Parameter

7. F=Female

8. Ht=Height

9. IOW= Inter Orbital Width

10. IP= Identification Point

11. LFH=Lower Facial Height

12. Max= Maximum

13. Min= Minimum

14. M=Male

15. NH=Nasal Height

16. NW=Nasal Width

17. SEE= Standard Error Estimation

18. SD= Standard Deviation

19.TFH= Total Facial Height

20.UFH= Upper Facial Height

CHAPTER NO.1

INTRODUCTION

1. **INTRODUCTION**

Anthropologists are committed to grasping the dynamics of communities and populations. As anthropology combines the premises of a biological as well as well as socio-cultural study, it looks at the diverse sections of human beings with dual perspective, one derived from its branch called biological anthropology, and the other from social/cultural anthropology. How communities and populations continue to retain their identity, in social and cultural terms on one hand and biological on the other, and how they acquire the characteristics of the others because of cultural borrowing or interbreeding are the questions anthropologists systematically investigate.[1]

Anthropologists distinguish groups of people on the basis of common origin, living, or having lived, in certain defined regions and possessing different characteristic features in their appearance. But one should remember that there are no strict lines of demarcation between races. All these groups blend imperceptibly into one another with intermediate types possessing various combinations of physical characteristics. Modern man is biologically uniform in basic features (for example upright posture, well-developed hand and feet, prominent chin, absence of bony eye brow, an intricately structured brain encased in a big skull with a straight high forehead and 46 number of chromosomes) and polymorphous as regards many secondary features. Scientists consider all human beings as belonging to a single species, Homo sapiens. The variations found in groups living in different geographical areas reflect only a differentiation within the single species due to host of biological, social and other factors. In anthropology there are two schools of

thought on the origins of man and the major races—the polycentric and the monocentric schools. The polycentric theory (Franz Weidenreich, U.S.A.) claims that modern man evolved in several regions relatively independent of one another and that people developed at different rates. This theory claims that modern man evolved from the “oldest” and “old” people in each region and that this gave rise to the formation of the major races.[1]

Anthropometry is concerned with measurement of physical sizes and shapes of human body.[2] Anthropometry is derived from the Greek word anthropos means man, metry means to measure, thus anthropometry is a science that correlated with the measurement of size, weight and proportions of human body. It was developed by a German Anatomist, Johanne Sigismund Elsho for his doctoral thesis at the University of Padua in 1654.[3]

Anthropometry is the systemic technique for measuring and taking observations on man, his skeleton, the skull, the limbs, trunk etc.[4]

Anthropometric characteristics have direct relationship with sex, shape and form of an individual and these factors are intimately linked with each other and are manifestation of the internal structure and tissue components which in turn, are influenced by environmental and genetic factors. It is a technique used in both physical &systemic measurements of the bones of the human skull.[5-7]

There are inter-racial and inter-geographical differences in measurements & their correlations with stature. What may be true for one race or one region may not be true for other.[8] There are very few studies and references available on facial parameters in India.

Anthropometric studies play an important role in distinguishing a pure race from the local mingling of races.[9] Facial anthropometric studies involving facial height have far-reaching implications in health-related fields.[10,11] The science of comparative racial anthropometry has shown that there are consistent differences in the body proportions of various human races.[12] Each race has different gene pools and even genetically different subgroups that exhibit different behaviours, characteristics and peculiarities.[13]

In the past, facial anthropometry has been successfully utilized for forensic purposes by some scientists.[14,15] However, only a few studies have been conducted on facial height proportions in different communities.[16,17] The external physical appearance is very important in the personal identification of any individual or race. Although Nepal is a relatively small country, it is a conglomeration of different religious, linguistic and ethnic groups. Although

these groups look different in terms of their physical characteristics, there is no recorded data in the literature that provides evidence of their physical differences.

Stature is an important biological parameter in medico-legal forensic examination. It occurs many a times when highly decomposed or mutilated bodies or fragmentary remains of skull are brought for medico-legal examination. Sometime only skull is brought for examination. There is definitive biological correlation of stature with all the body parts such as extremities, head, trunk, vertebral column etc.[18]

It is proved beyond doubt that each race requires its own formula for stature estimation. The climate and dietary habits of the people of different regions of India are variable. Racial and ethnic variations also exist in population of different geographical regions. Hence opinions based on the result of studies done in one population cannot be entirely applicable to other population.[18]

Stature has a definite and proportional biological relationship with each and every part of the human body, i.e. head, face, trunk, extremities. This relationship helps a forensic scientist to calculate stature from dismembered and mutilated body parts in forensic examinations. For such a calculation, two methods, i.e. regression method and multiplication method have been extensively used by the scientists all over the world, and it has been universally concluded that the regression analysis provides best estimates for stature reconstruction.[19,20] Many studies have been conducted on the estimation of stature from various body parts like hands, trunk, intact vertebral column, upper and lower limbs, individual long and short bones, foot and footprints.[21,22]

Since all these parts of the body and bones are not always available for forensic examination, it becomes necessary to make use of other parts of the body like head and face region. But only a few studies have been conducted on cephalo-facial region with respect to estimation of stature. There are plenty of studies which focus on other aspects of the cephalo-facial identification. Determination of sex and race from cephalic region, various methods of

reconstructing the face appearance in an individual from the bones of the skull, new facial soft tissue depth data, ultrasound, computerized tomography-scansand 3D reconstruction computer programs are in full development throughout the world.[23,24]

In many cases, brought for medico legal and forensic examinations, where only the cephalo-facial region is available, it becomes difficult for the forensic scientist to identify the deceased in the absence of any detailed and in depth study on this region.[25,26]

Sometimes, the forensic scientist cannot apply the techniques of facial reconstruction may be due to lack of expertise, standardized data and equipment. In these cases, stature estimation from the cephalo-facial region can always supplement the identification of data collected by using the techniques of facial reconstruction, and consequently can help in narrowing down the process of forensic investigation. Introna et al.[27] provided the correlation between stature and cranial diameters and proposed a mathematical formula for determination of living stature in an Italian population. Chiba and Terazawa[28] successfully estimated stature from anthropometry of skull in 124 Japanese cadavers and calculated regression formulae.

Patil and Mody[29] predicted stature from measurements of radiographic lateral cephalogram in central Indian population and proposed some formulae by regression analysis. Krishan and Kumar[30] calculated regression formulae for estimation of stature from 16 cephalo-facial measurements in a sample of 252 Koli male adolescents in north India. Ryan and Bidmos[31] took several measurements on skulls taken from 99 complete skeletons of indigenous South Africans from Raymond A. Dart collection, and successfully derived regression formulae for estimation of total skeletal height from these skull measurements. They also explained the utility of these measurements in estimation of stature with certain precautions.

Thus, the present study was designed to correlate the facial parameters with body height/stature of the individual.

CHAPTER NO.2

AIM

AND

OBJECTIVES

AIM

Estimation of height/stature from facial parameters in Sangli district population.

OBJECTIVES

1. To measure the stature of an individual.

2. To measure the facial parameters (total facial height, upper facial height, lower

facial height, nasal height, nasal width, bi-orbital width, inter-orbital width,

bizygomatic width and bigonial width) of the same individual.

3. To derive regression equation for each facial parameter to determine the stature

and see its accuracy, applicability and reliability for Sangli district population.

4. To see the sex difference.

5. To compare the present study with other study.

CHAPTER NO.3

REVIEW

OF

LITERATURE

3. REVIEW OF LITERATURE

3.1 FACIAL MORPHOLOGY (HISTORICAL OVERVIEW)

The face is the body part that epitomises a human person and is required for identification of individuals. It can even be argued that the human face is a cultural construct that cannot be studied without taking into account cultural values.[32] and yet the human face is an anatomical entity that arose through biological processes during the course of human evolution and its structure is regulated by the same embryological, anatomical and physiological mechanisms that form all other parts of the body.[33]

Morphology as a system of diagnosis and therapeutics has been in existence for thousand years. A brief historical overview is useful in identifying the sources of morphology and describing its place in the development of current diagnostic approaches. The earliest depictions of morphology may be found in three sources: the Sphinx, the first book of Ezekiel, and Genesis. The study of facial morphology is believed to have originated in ancient Egypt more than 4500 years ago. The eastern morphology of India and China is different and may have a different origin. The evidence of an Egyptian origin can be seen in its Sphinxes. The Sphinxes have been categorized by type: criosphinx (lion body with ram head), hieroco sphinx (lion body with hawk head), and androsphinx (lion body with human head, like the Great Sphinx). Thus they portray the four creatures (man, lion, eagle, and ram or ox) that are used in morphology to denote the four temperamental/humoral types, these are: bilious (man), lymphatic (ox), sanguine (lion), and nervous (eagle). These humoral types are read by looking at the profile of the person.[33]

References to morphology can be found in the Bible. The river that comes out of the Garden of Eden and parts into four (Genesis 2:10) is believed to refer to the four flows of energy, which is the most succinct way of defining temperaments. The creature with four faces, those of a man, a lion, an ox, and an eagle is also described in Ezekiel 1:10. Morphology holds that these four types, in various combinations, constitute the profiles of all human beings. It also holds that each type has invariable characteristics associated with it; that is any person who displays a

predominance of one temperamental type must have certain behavioral, psychological and physiological characteristics.[33]

As for the personality types, they are defined by the front shape of the face. According to morphology, there are twelve such shapes, all of geometrical design, like the temperamental types, are invariable throughout the world no matter what race. Ancient Greece has contributed the twelve geometrical faces that describe personalities. They were originally named with the names of Greek gods and later renamed by their Roman counterparts.[33]

In modern times we don't see these "pure" facial types anymore because of admixture. In the ancient days, certain tribes and cultures shared a predominance of one facial type through inbreeding and intermarriage. The Greek sculptors carved these pure types and manifested them as the gods and goddesses of ancient Greece, later adopted by the ancient Romans. The statues were placed in public view so as to remind the members of the population of the proper proportions and measures that obtained for each particular type.[33]

The earliest recorded facial proportional analysis is in the Greek neoclassical canons (450 BC). The neoclassical canons have been used for many years to describe the facial morphological features. However, the world is made up of many heterogeneous societies comprising multiple ethnic groups, and seeking orthodontic treatment, maxillofacial surgery and facial cosmetic surgery has become very popular within these societies. Facial proportional analysis is a critical component of the pre-operative assessment procedure. For surgical procedures, these "ideal" proportions derived from the Greek neoclassical perspective are not applicable for a significant portion of the world's different ethnic groups. Several studies have found significant differences between the facial proportions described in the neoclassical canons and the mean values of these proportions in modern non-Caucasian ethnic populations.[34,35] These investigations into the applicability of the neoclassical facial canons have generated substantial amounts of data on the facial dimensions of numerous ethnic groups. Notably, Farkas and his associates [36] compiled the

single most comprehensive craniometric survey of ethnic groups from multiple regions around the world.

3.2 THE ENLIGHTENMENT PERIOD:

The age of enlightenment beginning in the 18th century brought interest in objective descriptions of the world, this included the human face. In the Netherlands, Peter Camper introduced the first system of measurements describing numerically variation of human faces. Camper[37] was known for his theory of the "facial angle" originally in connection with two lectures he gave in Amsterdam to art students on beauty and portraiture, he determined that modern humans had facial angles between 70° and 80°, with African and Asian angles closer to 70°, and European angles closer to 80°. According to Camper's new portraiture technique, the facial angle is formed by drawing two lines: one horizontally from the nostril to the ear; and the other perpendicularly from the advancing part of the upper jawbone to the most prominent part of the forehead.

Blumenbach[38] followed soon thereafter by establishing the formal system of craniometry (analysis of human skulls). On the basis of his craniometrical research, Blumenbach divided the human species into five races: Caucasian or white race, Mongolian or yellow race, Malayan or brown race, Negroid or black race, and American or red race.

Blumenbach's craniometric system has been largely used by physical anthropologists of the 19th century and was entrenched in the 20th century by Martin[39] and Howells.[40] It provides a standardised set of diameters and angles based on several craniometric points which can be measured reliably by anyone familiar with the system.

The craniometric system is now universally accepted by physical (biological) anthropologists. It is also used, with modifications dictated by clinical needs, by orthodontists and other medical specialists. This ensures strict comparability of data collected by various scientists working in various countries and in various academic systems.

The craniometric system is also applicable to the fossils providing a record of human ancestry. In this way a large, uniform, quantitative database describing the variability of human faces across geographical space and through evolutionary and historical time has been provided by numerous craniometric publications.[34,36]

However, not all characteristics of the human face can be described by simple metrics, so a series of standardized categorical scales describing shapes of the entire face and its elements has been created within the broader range of descriptive scales.[34]

ANALYSIS OF FACIAL MORPHOLOGY (CURRENT APPROACHES)

Facial morphology is the study of facial structures, form and shape. Analysis of the human face has a long tradition, as shown earlier, with different techniques applied to analyze facial morphology and assess growth of the face and jaws for the purposes of determining the aetiology, diagnosis, treatment planning and clinical outcome assessment of different kinds of malocclusion, facial asymmetry and dysmorphology.

3.3 ANTHROPOMETRY

Anthropometry is the systematic collection and correlation of various measurements of the human body. It is one of the principal techniques of physical anthropology that has gained attention in fields like forensic, socio-cultural, industrial and bio-medical applications. Anthropometry is a method recommended for quantitative analysis of craniofacial morphology using direct clinical measurements including distances, angles, ratios and proportions.[34] Anthropometry remains a simple, inexpensive, efficient and non-invasive method for describing craniofacial morphology. However, it lacks the details of more powerful technologies like 3D imaging systems, but it is better suited for population studies because of the availability of comparative, normal databases.[41,42] Anthropometric data provides a good knowledge on the distribution of various measurements across human populations. For example, a known range for human measurements can help guide the design of products to fit most people, e.g. crash helmet.[43]

A quantitative comparison of anthropometric data before and after surgery enables objective assessment of surgical outcomes. In forensic anthropology, average measures across a population may inform a likely appearance of victims from their remains; and in the recovery of missing children, by ageing their appearance taken from photographs.[34, 44]

In facial anthropometry, direct clinical measurements based on identifying specific facial landmarks allow the quantification of changes in facial morphology as a result of growth or healthcare intervention.

Facial landmarks can be divided into 3 broad categories: [45]

anatomical or anthropometric landmarks;

mathematical landmarks; and

pseudo-landmarks.

i) Anatomical or anthropometric landmarks, often used by scientists and clinicians, are biologically meaningful points defined as standard reference points on the face and head, such as: inner and outer canthi of the eyes, nasion, pronasale, subnasale, centre of the upper lip (labiale superius), centre of the lower lip (labiale inferius), outer corners of the mouth (cheilions), and a chin point (pogonion).[34,46] They tend to be somewhat more abstract than other features of the skull (such as protuberances or lines). Anatomical landmarks are considered very important because they are useful in various scientific fields including anthropology, forensics, orthodontics, cosmetic surgery, and computer vision.

Three principal types of landmarks have been recognized based on their anatomical position on the face.[47]

1) Discrete juxtaposition or intersection of tissues (e.g., subnasale and cheilion)
2) Maxima of curvature (e.g., inner and outer canthi)
3) External points (e.g., alare)

Some modifications regarding the above classification are noted below:

- Some facial landmarks can be a mixture of types (e.g. labiale superius, labiale inferius, and crista philtri can be classified as Type 1 and Type 2).
- Hard tissue Nasion is a Type 1 landmark (identified by the intersection of the bony sutures under the bridge of the nose), whereas soft tissue nasion is a Type 2 landmark (defined as the point of maximum concavity and maximum convexity on the bridge of the nose).
- Some Type 3 landmarks as defined by Farkas[34] (1994) have been redefined as Type 2 landmarks (e.g., pronasale is defined as the point of maximum total curvature on the tip of the nose; pogonion is defined as the point of maximum Gaussian curvature on the anterior aspect of the chin; and sublabiale is defined as the extreme point of Gaussian curvature under the lower lip).
- Other types include landmarks located at the center of a structure or space (e.g., the cephalometric point "Sella").

ii) Mathematical landmarks, these points are defined according to certain mathematical or geometric properties of human faces, such as: middle point between two anatomical landmarks (for example, mid-endocanthion or mid-intercanthal point "mid", this is the midpoint between left and right endocanthi); extreme point with respect to particular face region (for example, leftmost point of face contour); or centroid of a certain group of landmarks. A mathematical landmark may or may not coincide with an anatomical landmark, and it can be easily located using automated methods.

iii) Pseudo-landmarks or semi-landmarks, these points are identified based on two or more anatomical or mathematical landmarks (between landmarks), or around the outline of facial surface or hair contours. Unlike anatomical landmarks, semi-landmarks do not have specifically defined biological positions and can be approximately located using prior knowledge of anatomical or mathematical properties. Pseudo-landmarks are relatively easy to acquire using

computational methods,[48] and are generally accurate enough for appearance-based face recognition techniques applied in computer vision.

The anthropometric evaluation of craniofacial morphology begins with the identification of landmarks. These landmarks, as explained above, are defined in terms of visible or palpable features (skin or bone) on the subject's head and face.[49]

A series of measurements between these landmarks is then taken using carefully specified procedures and measuring instruments (such as calipers, levels and measuring tape). As a result, repeated measurements of the same individual are very reliable, and measurements of different individuals can be successfully compared.[49]

Farkas described a widely used set of measurements to analyze the human face. Anthropometric data using this system is widely available.[34] This system uses a total of (47) landmark points to describe the face. The landmarks are typically identified by abbreviations of corresponding anatomical terms. For example, the inner canthus of the eye is 'en' for 'endocanthion', while the top of the flap of cartilage in front of the ear (tragus) is't' for 'tragion'. Two of the landmarks determine a canonical horizontal orientation for the head. The horizontal plane is determined by the two lines (on either side of the head) connecting the landmarks't' and 'or' for (orbitale), the lowest point of the eye socket on the skull. In measurements, anthropometrists actually align the head to this horizontal, in what is known as "Frankfurt Horizontal (FH)" position, [34, 50] so that measurements can be made easily and accurately. In addition to this, a vertical mid-line axis is defined by the landmarks 'n' for (nasion), a face feature roughly between the eyebrows; 'sn' for (subnasale), the centre point where the nose meets the upper lip; and 'gn' for (gnathion), the lowest point on the chin.

Five types of facial measurements have been described by Farkas, as illustrated.[34]

- The shortest distance between two landmarks. An example is en-ex, the distance between the landmarks at the corners of the eye.

- The axial distance between two landmarks, the distance measured along one of the axes of the canonical coordinate system, with the head in Frankfurt Horizontal (FH) position. An example is v-tr, the vertical distance (height difference) between the top of the head ‘v’ for (vertex) and hairline ‘tr’ for (trichion).
- The tangential (geodesic) distance between two landmarks, the distance measured along a prescribed (shortest) path on the surface of the face (curved surface). An example is ch-t, the surface distance from the corner of the mouth ‘ch’ for (cheilion) to the tragus.
- The angle of inclination between two landmarks with respect to one of the canonical axes. An example is the inclination of the ear axis with respect to the vertical.
- The angle between locations, such as mento-cervical angle at the chin.

Farkas described a total of 132 measurements on the face and head. Some measurements are paired, where there is a corresponding measurement on the left and right sides of the face. Until recently, experienced anthropometrists could only carry out the measurement process by hand. However, scientists have investigated the 3D range scanners as an alternative to manual measurement.[34,50] The systematic collection of anthropometric measurements has made possible a variety of statistical investigations of groups of subjects. Subjects have been grouped on the basis of their gender, race, age, attractiveness or the presence of a physical anomaly or syndrome. Means and variances of measurements within a group have been tabulated.[34]

Morecroft[51] conducted a study based on analysing predefined anthropometric facial landmarks to evaluate 3D shape analysis for facial identification. 3000 subjects have been recruited for the study, and each face has been recorded using a 3D digital stereo-photographic Geometrix scanner. The results showed that 27 reproducible facial landmarks are important for facial comparison and identification. Among these landmarks are: glabella, pogonion, endocanthion, exocanthion, cheilion, and stomion.

In addition to direct clinical measurements, the proportions between measurements have also been derived.[34] The description of the human form by proportions goes back to the ancient Greek neoclassical canons (450 BC). Facial proportions provide useful information about the relationships between features and serve as more reliable indicators of group membership than simple measurements. The study of facial proportions has shown statistically significant differences across several population groups.[52] Nasjletti and Kowalski[53] looked for proportional changes over time with aging in the vertical dimensions of the front of the face. They found by examining 510 whites (20-86 years of age) that all the ages exhibited increases in total facial height and that these were always in constant proportions. The upper face was always very close to the same proportion of the entire face throughout the entire aging process. Kowalski and Nasjletti[54] conducted a similar facial height study on a group of black American males, and they found that the facial proportions to be very close to constant in all ages even though there was growth occurring as with the white American group.

3.4 CEPHALIC AND FACIAL INDICES

Anthropometric methods can quantify changes in craniofacial composition that diversify human phenotypes and particular features that differentiate individuals and ethnic group. These standard data are accurately assessed which can be found useful in plastic surgery, tooth deformities, in legal medicine for identification of an individual or in medical genetics for the diagnosis of dimorphism or craniofacial abnormalities.

In India many attempts are made to build a widespread database covering different population. M Kumar et al[55] and S.K. Rathee[56] evaluated data on facial and cephalic anthropometry of Haryanvi adults. 100 healthy[57] and 93 formalin cadaver[58] South Indians were studied for their dominant head and face types. It has been seen that population of Mumbai,[59] Odisha,[60] Andhra[61] and North India[62] were studied for their mean cephalic index and were classified for their head form.

Anthropometric measurements were used to assess cephalofacial proportions for morphological studies. Studies were also conducted on different samples of Indian population for deciding race and sex of an individual whose identity is unknown.[63,64]

Many authors attempted classification of cephalic index from Brazil, Sri Lanka and Nepal people.[65-67] The type of head and face depends upon many factors such as racial difference, environmental and geographical change and genetic influence. Cephalofacial parameters together were studied by many authors in the world. A Rexhepi et al[68] studied five cephalofacial measurements of Kosova Albanian population and A K. Pandey[69] collected measurements of cephalo-facial in his work and studied Onges, one of the scheduled tribe of Andaman and Nicobar Islands.

While going through the literature on indices we came across to very few studies measuring facial index and cephalic index among people of Gujarat. The research performed so far comprises measurements of maximum head length and maximum head breadth in adults of Gujarat.[70,71] Also, very few published work has yet been reported on facial index of Gujarati population. The literature lacks the report concerning the facial index values in normal healthy Gujarati people.

3.5 STATURE DETERMINATION

Estimation of stature by the mathematical or statistical methods is a routine practice in the creation of an anthropological profile in establishing the identity of human remains. Stature evaluation is an invariably changing target for forensic anthropologists because of the secular trends in stature, allometric changes in long bones, and the migration of world population. In forensic casework, formulae or equations derived from recent samples provide the most accurate stature estimates. There are various ways to estimate stature from bones but the most easiest and the reliable method is by regression analysis.

AK Agnihotri et al[72] aimed to model stature for both male and female separately on the basis of craniofacial dimensions. 150 young and healthy students of 20-28 years of age were selected and measured for fourteen cephalofacial dimensions and stature. Further adequate gender-wise regression models were formulated for this purpose. Skull is composed of hard tissue and is the best preserved part of skeleton after death, hence, in many cases it is the only available part for forensic examination.

KR Patil et al[73] conducted study on 150 normal healthy subjects which were subjected to lateral cephalometric radiograph. The radiographic cephalometric method makes possible to describe the three-dimensional characters of skull on a roentgenogram that presents a two-dimensional image.

Krishan K[74] attempted to estimate stature from various anthropometric measurements of cephalo-facial region of 996 adult male Gujjars belonging to an endogamous group in north India. Five cephalo-facial measurements were taken on each subject following internationally recommended standard methods and techniques. Separate equations for each cephalo-facial dimension which can help in estimation of stature from individual part of head and face were calculated by regression analysis. Stature estimation is very important component in identification of human remains in forensic anthropology. D Sahni et al[75] presented a supplementary approach for the estimation of stature when extremities are not available. Seven facial measurements were

used to determine stature of 300 healthy subjects from Northwest India. The subjects were classified into six height categories according to Martin's stature classification.[76] M Kumar et al[77] adopted methodology for cephalofacial measurements from Krishan and Kumar on 800 adult healthy Haryanvi Banias and a series of five somatometric landmarks and six anthropometric measurements were taken. Stature is an important part of physical identity. There lies an interrelationship among different body dimensions which may be used to estimate one from another in case of missing body parts. Garos of Bangladesh are recognised as a tribal community with very distinctive physical appearance.

Z Akhter et al[78] were first to conduct study with the intention to establish ethnic specific anthropometric data for the Bangladeshi Garo tribal populations. One hundred adult females cranial dimension such as head circumference, head length and stature were measured using a measuring tape, spreading calliper, steel plate and steel tape. As the cranial measurements and stature assist identification of missing person and aid in diagnosis and treatment of some anomalies, so knowledge of normal value for these regions produces the best visual and efficient results.

Prophecy of stature from cranial remains is essential in establishing the identity of an unknown individual. Despite its significance, little was known concerning the cranial dimensions in Sri Lankans. In 2010 Ilayperuma[79] study was designed to investigate the relationship and to put forward a gender and age specific linear regression model between the cranial dimensions and height of an individual. Total 400 subjects of 20-23 years were included in the study. The cranial length, breadth and auricular head height of the subjects were recorded using a digital sliding calliper and Todd's head spanner capable of measuring to the nearest 0.01mm. The height of the individual was measured using a standing height measuring instrument. The regression formulae derived from the study will likely be used in clinical, medico-legal, anthropological and archaeological studies.

In Nigeria frequent ethnic and religious clashes and incessant border clashes are often witnessed in some parts of the country leading to mass casualties. The victims of these devastating casualties were highly mutilated and dismembered beyond physical recognition. Hence, EO Ewunonu et al[80] randomly choose 1000 male and female Igbo subjects whose age-range falls within 12 years to 45 years to establish a relationship between stature and head dimensions for positive identification by stature in forensic investigations concerned with unknown fragmentary human head.

Also, S Sagar et al[81] attempted to estimate stature from facial measurement viz., nasal height, nasal breath, head length, head breadth, ear length among the Jatavs of Delhi. Males and females of 17 to 40 years age range were subjected to measurements to formulate multiplication factor and regression equation for estimation of stature. Effort was made to investigate the correlation between stature and six facial measurements among the Kabuis of Imphal valley, and estimate the stature using Regression equation and Multiplication factor. The sample size of the Jibonkumar et al[82] study comprises of 199 male Kabuis of the Imphal Valley belonging to the age range of 18 to 45 years. Six facial dimensions of each subject along with their stature were measured. The study indicated that it was more reliable to use linear regression equations rather than multiplication factor. 286 healthy Turkish males[83] with a mean age of 22.71 ± 4.86 years craniofacial dimensions were measured to estimate stature in cases where only the craniofacial region are brought for forensic examination. The correlations between craniofacial dimensions and stature were also evaluated according to different head and face types. Indian population shows spectra of heterogeneous and homogenous subpopulations across various regions.

VG Naikmasur et al[84] focused on two population groups with different ethnic background i.e. South Indian and immigrant Tibetan population. The immigrant Tibetans are the people residing in Tibetan colony, Mundgod, Karnataka. The colony was established by government of India in 1966 for the Tibetan refugees. The study was an attempt to derive a discriminant function to determine sex using lateral and PA cephalogram in South Indian and immigrant Tibetan

populations. Apart from craniofacial dimensions many studies revealed that stature can also be known from various other body parts.

Various studies conducted on the estimation of stature indicate that every part of the skeleton has been used for estimation. Study has proved that sternum can be a reliable predictor of stature in the adult South Indian female population and can be used as a tool for stature estimation when better predictors of stature like the long bones of the limbs are not available. R.G. Menezes et al[85] studied 40 intact sternums of adult females of South Indian origin aged between 25 and 35 years of age obtained during medico-legal autopsies. MK Mondal et al[86] studied length of ulna for estimation of stature in 300 living adult male in Burdwan district and adjacent areas of West Bengal. Measurements were taken, tabulated and statistically analyzed. Earlier work in Eastern Indian population was done about a century ago and a more recent study is felt necessary due to various reasons. Anirban D et al[87] assessed whether the earlier works done in this population was still relevant with reformation of population by the process of migration, invasion and sometimes also by natural ways such as famines, disaster that lead to natural auto selection associated with change in time. Their study was undertaken to deduce a regression equation formulae for prediction of stature from tibial length and vice versa; the authors also made a comparison (test of significance) of stature and dry tibial length separately for males and females. Measurements of tibial length and body height of total 518 cadavers between 23 to 75 years of age were measured and studied. The conventional measurements of foot, hand and long bones for stature estimation have been already studied in different populations, while very few is available concerning bi-acromial breadth and bi-iliocristal breadth. Anthropometrical measurements were performed by A Ozaslan et al[88] on 337 Turkish volunteers; 216 males and 121 females. These measurements were studied by SPSS routines and linear regression formulas were defined for variables included in significant correlation related to stature.

Arm span is the most reliable body parameter for predicting the stature of an individual. In children, both arm span and stature increase with age but in elders arm span does not vary

significantly with age. Arm span and standing height were measured by Y Zverev et al[89] for Malawian children, 289 boys and 337 girls, aged 6–15 years while S Hossain et al[90] carried out on 100 Christian Garo adult females.

Several works have been reported on the effectiveness of stature estimation from foot dimensions for establishing the individuality of a person mostly in mutilated bodies and skeletal remains. The studies examine the relationship between stature and foot dimensions in various ethnic groups. The work was undertaken with the objective of reconstruction of stature in both sexes by various linear and multiple regression equations and multiplication factors were computed. Researchers like T Kanchan et al[91] examined 200 Gujjars of North India, Narde & Dongre[92] studied 640 subjects of Nagpur, DI Mansur et al[93] conducted work on 440 Nepali students, one thousand Maharashtrian samples were collected by Khanapurkar S et al,[94] 1120 children from birth to 5 years were measured by S R Pandhare et al[95] and M Rani et al[96] analyzed 300 sample of Delhi students.

These studies were conducted on various population group with individual belonging to diverse population groups. It can be known that foot dimensions are well correlated to stature estimation in determining partial identity of unidentified bodies and dismembered remains. A new approach was depicted with a purpose to analyze the anthropometric relationship of length of hands, phalanges and feet with stature. Authors like Habib SR[97] and J P Patel et al[98] have tried to estimate stature from hand length in Egyptian and Gujarati population respectively. In addition to hand length Habib SR[97] also use length of phalanges. Due to the paucity of the studies in the literature K Krishan[99] measured dimensions of hands and feet of 246 Rajputs of Himachal Pradesh. A Ozaslan et al[100] explained the predictive role of hand and foot dimensions in stature estimation by studying 356 Turkish volunteers.

Kayastha community of Bundelkhand region of India were measured for the stature, hand and foot measurements by following the standard technique. Srivastava A et al[101] studied 223 Kayastha (100 males and 123 females) ranging in age 20 to 40 years for stature estimation. 200

young and healthy male students aged between 18 to 25 years having no disease or deformity were examined anthropometrically by K Sushil et al[102] in respect to their height and length of right forearm and hand.

Jadav and Shah[103] found out correlation and derived a regression formula between head length and body height in Gujarat region. The study was conducted on 727 (468 male & 259 female) medical students belonging to various regions of Gujarat.

Reconstruction of stature from different parts of body and craniofacial, plays an important role in identifying the unknown. All the above obtained formulas are specific to that study populations and therefore, application of these by the other populations might cause incorrect results. An in depth study of different population was done on stature estimation and it was known that not much reported work has been performed on stature estimation through craniofacial dimensions and other body parts among Gujarati inhabitants. Thus necessity for creation of specific equations peculiar to populations was taken into account in the study.

3.6 SEX DETERMINATION

Anthropometry is being used more often in sexing the skeletal or human remains. Sex is primarily being determined from pelvis and secondly from skull. Sex is usually assigned predominantly on basis of various characteristics of bones or different parts of body. Larger size and shape of the body represents males while smaller size and shape represents females. In a population there are no precise size and shape standards available universally for sexual dimorphism within that population. Hence different authors worked globally on different population to provide metrical standard charts meant to be applied to that particular group.

Worldwide, various studies have been conducted on the determination of sex from variety of human bones i.e. skull, pelvis, long bones, scapula, clavicle, and the bones like metatarsals, metacarpals, phalanges, patella, vertebrae, ribs etc. The most popular statistical model in sex determination is recently developed discriminant function analysis which encouraged many forensic scientists to assess their anthropometric data accordingly.

An attempt was made by R Singla et al[104] to find out the co-relation of foot measurements with the sex in Haryanvi Jats and North Indian mixed population. 600 subjects of either sex in male and female of age 18-50 years were taken as 150 males and 150 females from Haryanvi jats,150 males and 150 females from north Indian mixed population taken at random. This estimation of sex is of immense value in forensic identification especially in cases of mass disasters and criminal mutilation.

Mandibular canines offer best result for sexual dimorphism among all teeth. Teeth are great substance in living and non-living population for anthropological, genetic, odontological and forensic investigations. Their extreme durability in the face of fire and bacterial decomposition makes them invaluable for identification. Being the hardest and chemically the most stable tissues in the body, they are selectively preserved. The study was per-formed on 400 healthy volunteers (200 males, 200 females) of 17 - 21 years with the aim to investigate whether

any correlation existed between odontometric measures including mandibular canine index, and sex determination.[105]

Standardized radiographic imaging techniques are used by many authors for advantage of being more precise and correct methods. Naikmasur, V. G et al[106] studied a total of eleven cranio-mandibular parameters in South Indian and Indian immigrant of Tibetan population using lateral and postero–anterior (PA) cephalograms. They preferred using discriminant function analysis for sexual dimorphism. Similar study was performed by Patil, K. R et al[73] using lateral cephalograms for skull examination. Their effort was to determine sex by discriminant function analysis of 150 normal healthy adults of Central India using ten cephalometric linear variables. They used X-ray lateral cephalometric radiograph of a dried skull and the outline was traced and compared with the actual measurement of dried skull which was measured using venire calliper. 18th and 19th century documented skeletal collection of British sample were studied by Gapert, R et al[107] and manually recorded morphometric variables of the foramen magnum using univariate and multivariate discriminant function analysis and linear regression. Earlier reported work of Luo, Y. C.[108] in 1995 studied adult human pubis using discriminant function analysis for determining sex. It was quite a remarkable observation from the literature survey that sex can be determined using various long bones. 80 male and 47 female corpse of Turkey were studied by Celbis O et al[109] for length measurements from radius and ulna to determine sex and estimate stature. Important work performed by Gonzalez-Reimers, E et al[110] in 2000 to define standards which can be used to determine sex of individual from Canary Island situated in Africa. Osteometric study was performed at right tibia on 59 complete skeletons. All the parameters of tibia were measured to obtain functions usable when bone fragments are recovered. Slaus, M. et al[111] published similar work using measurements of tibial bone in Croatian population. Femora of German and South African population were studied by G Mall et al[112] and İşcan, M. Y[113] for determining sex. The constant temporal changes need to be standardized constantly and hence the authors continuously strive to find accurate results which can be used as sex indicators.

Height and sex from different parts of the body help in solving crime mysteries related to human identity. Similarly, foot dimensions[114] long bones of arm [115] and shoe prints[116] if present at the scene of crime may provide clue regarding the height and the sex of the person that helps in establishing partial identity of the suspect.

CHAPTER NO.4

MATERIALS AND METHOD

4. MATERIALS AND METHOD

4.1 STUDY INFORMATION

TYPE OF STUDY:
Cross sectional, comparative study.

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DURATION OF STUDY:
This study was conducted during the period from May 2017 to November 2018.

STUDY POPULATION:
All subjects were taken from Sangli District population, 10 Talukas;Miraj,Vita-khanapur,Tasgav,Jat,Walwa,Shrale,Kadegav,Palus,Kawtemahakal and Atpadi.

SAMPLE SIZE:
A total of 1000 subjects included for the study.

INCLUSION CRITERIA:

Adult individuals both male and female belonging to the age group above 18 years in Sangli district from Hindu, Muslim and Christian religions , native of Sangli district.

EXCLUSION CRITERIA:

Individuals having congenital facial deformity/stature anomaly/undergone any facial surgery, deformed face.

ETHICAL APPROVAL:

Prior approval was obtained from the Institutional Research Committee and IEC approval no.DYP/PhD/601 Date 19.04.2017.

4.2 METHODOLOGY:

- After IEC approval and written informed consent was taken from participants included in the study.
- A total of 1000 subjects belonged to study group.506 males and 494 females for Sangli District participated in the study. Religion wise 542 Hindu (Maratha, Brahmin, and other backward class), 257 Muslim and 201 Christian-converted.

  The procedure was explained to the subjects.

- Following anthropometric measurements were taken with reference to following anthropometric landmarks.

  1. Stature/Body height
  2. Total Facial Height -TFH
  3. Upper Facial Height-UFH
  4. Lower Facial Height-LFH
  5. Nasal Height-NH
  6. Nasal Width-NW
  7. Total facial /Bizygomatic Width-BZW
  8. Lower facial/Bigonial Width-BGW
  9. Bi-orbital Width-BOW
  10. Inter-orbital Width-IOW

4.3 VARIOUS ANTHROPOMETRIC LANDMARKS:

1. Zygion (zy): most lateral point of the zygomatic arch
2. Gonion (go): most lateral point on the angle of mandible
3. Nasion (n): meeting point of nasal root and the nasofrontal suture.
4. Subnasale (sn): midpoint of the columella where philtrum of upper lip meet.
5. Gnathion (gn): midpoint of mandible protuberance.
6. Prosthion: A point on upper alveolar arch midway between the median upper incisor teeth.

4.4 ANTHROPOMETRIC MEASUREMENTS

1. **Height:** The height of individual was measured in standing position, from heel to the highest point of scalp by standard flexible steel tape in cm. Fig no 4.5.2.
2. For facial measurements subjects were asked to sit in an upright relaxed position and made to look at a distant object. Following facial measurements were taken with digital vernier calliper.
3. **Total facial height**: It is from nasion to gnathion in mm.Fig no 4.5.3
4. **Upper facial height**- It is from nasion to prosthion in mm.Fig no 4.5.4
5. **Lower facial height-** It is from prosthion to gnathion in mm**.** Fig no 4.5.5
6. **Nasal aperture height**- It is from nasion to the subnasale in mm.Fig no 4.5.10
7. **Nasal aperture width**- It is maximum transverse distance between right &left margins of the nasal aperture in mm.Fig no 4.5.11
8. **Total facial breadth/Bizygomatic width-** It is transverse width between the right &left zygomatic arches in mm.Fig no 4.5.9
9. **Lower facial/bigonial width**- It is maximum transverse width between the right &left mandibular angles in mm.Fig no 4.5.6
10. **Bi-orbital width**- It is transverse width between the lateral orbital margins of right and left orbit in mm.Fig no 4.5.8
11. **Inter-orbital width**- It is transverse width between the medial orbital margins of right and left orbit in mm.Fig no 4.5.7

4.5 PHOTOGRAPHIC ILLUSTATION

Fig 4.5.1 Digital vernier calliper and measuring tape

4.5.2 Stature/Height

Fig4.5.2 Stature/Height-in standing position, heel to highest point of scalp

4.5.3 Total Facial Height

Fig4.5.3 Total Facial Height-from nasion to gnathion

4.5.4 Upper Facial Height

Fig4.5.4 Upper Facial Height-from nasion to prosthion

4.5.5 Lower facial height

Fig 4.5.5 Lower facial height-from prosthion to gnathion

4.5.6 Bigonial width

Fig 4.5.6 Bigonial width-width between right and left mandibular angles

4.5.7 Inter-orbital Width

Fig4.5.7 Inter-orbital Width-between medial orbital margins of rt. & lt. orbit

4.5.8 Biorbital Width

Fig4.5.8 Biorbital Width-between lateral orbital margins of rt. & lt.orbit

4.5.9 Bizygomatic Width

Fig 4.5.9 Bizygomatic Width- between the rt. and lt. zygomatic arches

4.5.10 Nasal Height

Fig 4.5.10 Nasal Height-from nasion to subnasale

4.5.11 Nasal Width

Fig 4.5.11 Nasal Width-distance between rt. and lt. margins of nasal aperture

4.6 STATISTICAL ANALYSIS OF DATA

All facial parameters were converted mm to cm.Data were coded and entered into excel sheet which was later analyzed using Statistical Package for the Social Sciences version 22.0 (SPSS; SPSS Inc. IBM, Delaware). SPSS is software package used for statistical analysis. Descriptive statistics, i.e., mean, SD, and range, were calculated for all the variables. Pearson correlation was used to find correlation. Student's pair *t*-test was used to compare and correlate the parameters on the same population. $P < 0.05$ was considered statistically significant and $P < 0.01$ or <0.001 was considered highly significant at 95% of confidence interval. Non parametric data was analysed using Mann Whitney test.

CHAPTER NO.5

OBSERVATIONS AND RESULTS

5. OBSERVATIONS AND RESULTS

In the present study, data on facial anthropometry and stature of participants (1000) was collected. The data was analysed separately for males and females of Sangli District population and religion wise Hindu, Muslim, Christian and comparison were done. All Facial parameters were converted mm to cm. For statistical analysis SPSS software is used. Statistical analysis was presented in tabular form as mean, standard deviations, minimum and maximum value of stature and facial parameters.

Table 5.1: Distribution according to age and sex.

Age Group	Male	Female	Total
18-30	**434**	**419**	**853**
31-40	**57**	**55**	**112**
41-50	**15**	**20**	**35**
Total	**506**	**494**	**1000**

Majority of male population 434 is in the age group of 18-30 years and female population 419 is in age group of 18-30 years.

Table 5.2: Descriptive statistics of Height and Facial parameters amongst Sangli District population: (n=1000, M=506, F=494).

FP	Sex	Mean	SD	SEE	Min	Max	P value	IP	% of IP	CR	DP	% D.P.
TFH	M	11.05	0.71	0.031	8.95	12.96	<0.001	>13.13	0	8.92 - 13.18	> 12.13	1.1
	F	10.03	0.70	0.031	7.67	13.13		<8.95	1.3	7.93 - 12.13	< 8.92	1.3
UFH	**M**	**5.70**	**0.44**	**0.020**	**4.16**	**7.12**	**<0.001**	**> 6.73**	**1.5**	**4.38 – 7.02**	**> 6.6**	**2.1**
	F	**5.22**	**0.46**	**0.021**	**3.63**	**6.73**		**< 4.16**	**1.1**	**3.84 – 6.6**	**< 4.38**	**3.1**
LFH	**M**	**5.35**	**0.59**	**0.026**	**3.48**	**7.37**	**<0.001**	**> 7.97**	**0**	**3.58 – 7.12**	**> 6.62**	**2.1**
	F	**4.79**	**0.61**	**0.027**	**2.20**	**7.97**		**< 3.48**	**1.2**	**2.96 – 6.62**	**< 3.58**	**3.3**
NH	M	4.76	0.41	0.018	1.58	5.77	<0.001	> 4.96	1.6	3.53 – 5.99	> 5.87	0.9
	F	4.49	0.46	0.021	1.55	4.96		< 1.58	0.5	3.11 – 5.87	< 3.53	1.3
NW	M	3.63	0.34	0.015	2.38	4.54	<0.001	> 4.96	0	2.61 – 4.65	> 4.43	1.8
	F	3.32	0.37	0.016	1.33	4.96		< 2.38	1.9	2.21 – 4.43	< 2.61	1.7
BOW	M	10.11	0.54	0.024	7.70	11.73	<0.001	> 11.34	0.7	8.49 – 11.73	> 11.31	0.9
	F	9.72	0.53	0.024	7.23	11.34		< 7.70	0.9	8.13 – 11.31	< 8.13	1.3
IOW	M	3.40	0.35	0.016	2.39	4.88	<0.001	> 4.75	1.2	2.35 – 4.45	> 4.27	1.1
	F	3.25	0.34	0.015	1.90	4.75		< 2.39	2.1	2.23 – 4.27	< 2.35	0.8
BZW	M	11.84	0.73	0.033	9.59	13.90	<0.001	> 13.89	0.3	9.65 – 14.03	> 13.62	1.9
	F	11.49	0.71	0.032	9.21	13.89		< 9.59	1.4	9.36 – 13.62	< 9.65	1.2
BGW	**M**	**10.87**	**0.83**	**0.037**	**9.38**	**13.44**	**<0.001**	**> 12.89**	**2.2**	**8.38 – 13.36**	**> 12.91**	**2.3**
	F	10.42	0.83	0.037	8.32	12.89		< 9.38	3.1	7.93 - 12.91	< 8.38	1.3
Ht	**M**	**167.54**	**6.89**	**0.305**	**144**	**185**	**<0.001**	**> 173**	**2.2**	**146.87-188.21**	**> 172.24**	**3.1**
	F	**153.01**	**6.41**	**0.289**	**133**	**173**		**< 144**	**3.2**	**133.78 – 172.24**	**<146.87**	**2.3**

(*P<0.001; highly statistically significant)

Table 5.2 outlines that height and all facial parameters are greater in males than in females of Sangli district population.

A statistically significant difference is seen in all the parameters. For sexual dimorphism, identification point for each parameter was calculated from the range of each measurement. From this percentage of identified persons was calculated. The calculated range is obtained by (mean±3S.D) to check the accuracy of data collected. Demarking points were worked out from calculated range. By applying demarking point for each parameter, percentage of identified males and females was recorded.

Amongst all above parameters studied, height > 172.2cm, Bi Gonial Width (BGW) >12.91cm, Lower Facial Height (LFH) > 6.62 cm and Upper Facial Height (UFH) > 6.6 cm observed to be the best parameters for identification of males of Sangli district population.

For identification of females of Sangli district population, LFH < 3.58 cm, UFH < 4.38 cm and Height < 146.87 cm found to be the best parameters.

Table 5.3: Descriptive statistics of height and facial parameters amongst Hindu Population of Sangli District :(M=278, F=264).

FP	Sex	Mean	SD	SEE	Min	Max	P value
TFH	M	11.01	0.71	0.041	9.30	12.97	<0.001
	F	10.10	0.64	0.039	8.53	11.96	
UFH	M	5.62	0.42	0.025	4.16	6.84	<0.001
	F	5.21	0.43	0.026	3.91	6.67	
LFH	M	5.38	0.58	0.033	3.70	7.37	<0.001
	F	4.89	0.49	0.031	3.73	7.59	
NH	M	4.76	0.43	0.024	1.58	5.77	<0.001
	F	4.49	0.41	0.025	1.55	6.06	
NW	M	3.65	0.31	0.018	2.38	4.33	<0.001
	F	3.33	0.37	0.022	1.33	4.96	
BOW	M	10.15	0.49	0.028	8.45	11.73	<0.001
	F	9.79	0.53	0.033	7.23	11.34	
IOW	M	3.44	0.33	0.019	2.46	4.88	<0.001
	F	3.28	0.33	0.021	2.07	4.75	
BZW	M	11.84	0.61	0.035	9.83	13.90	<0.001
	F	11.55	0.66	0.041	9.87	13.68	
BGW	M	10.74	0.75	0.043	9.38	13.45	<0.001
	F	10.52	0.76	0.047	8.51	12.89	
Ht	M	167.68	7.79	0.39	144	185	<0.001
	F	152.99	6.69	0.41	133	173	

(*P<0.001; highly statistically significant)

Table 5.3 compares the data about height and various facial parameters in males and females of Hindu religion of Sangli district. It shows that height and all facial parameters are greater in Hindu males than in Hindu females.

A statistically significant difference is seen in all the parameters. .

Table 5.4: Descriptive statistics of Height and facial parameters amongst Muslim Population of Sangli District; (M=131, F=126).

FP	Sex	Mean	SD	SEE	Min	Max	P value
TFH	M	11.12	0.73	0.064	8.95	12.75	<0.001
	F	10.07	0.72	0.064	8.39	13.13	
UFH	M	5.87	0.44	0.038	4.60	7.12	<0.001
	F	5.36	045	0.041	4.35	6.73	
LFH	M	5.27	0.59	0.052	3.48	6.84	<0.001
	F	4.67	0.84	0.076	2.20	7.97	
NH	M	4.80	0.37	0.033	3.50	5.52	<0.001
	F	4.62	0.46	0.041	3.18	5.56	
NW	M	3.54	0.35	0.031	2.52	4.31	<0.001
	F	3.31	0.31	0.028	2.46	4.30	
BOW	M	9.93	0.63	0.055	7.70	11.74	<0.001
	F	9.64	0.49	0.044	8.45	10.77	
IOW	M	3.30	0.38	0.033	2.44	4.88	<0.001
	F	3.23	0.35	0.031	2.03	4.01	
BZW	M	11.73	0.92	0.081	9.59	13.78	<0.001
	F	11.43	0.71	0.064	9.75	13.89	
BGW	M	10.99	0.91	0.080	9.42	13.44	<0.001
	F	10.22	0.88	0.079	8.31	12.53	
Ht	M	167.90	6.94	0.61	146	185	<0.001
	F	152.64	6.01	0.54	136	166	

(*P<0.001; highly statistically significant)

Table 5.4 compares the data about height and various facial parameters in males and females of Muslim religion of Sangli district. It shows that height and all facial parameters are greater in Muslim males than in Muslim females.

A statistically significant difference is seen in all the parameters.

Table 5.5: Descriptive statistics of Height and facial parameters amongst Christian population of Sangli District; (M=97,F=104).

FP	Sex	Mean	SD	SEE	Min	Max	P value
TFH	M	11.10	0.64	0.071	9.86	12.84	<0.001
	F	9.81	0.78	0.077	7.67	12.23	
UFH	M	5.74	0.44	0.049	4.90	6.71	<0.001
	F	5.09	0.51	0.051	3.63	6.29	
LFH	M	5.39	0.59	0.065	3.90	6.99	<0.001
	F	4.67	0.45	0.045	3.41	5.88	
NH	M	4.72	0.38	0.043	3.98	5.68	<0.001
	F	4.34	0.54	0.053	2.67	5.31	
NW	M	3.73	0.37	0.041	2.93	4.53	<0.001
	F	3.32	0.43	0.041	1.82	4.11	
BOW	M	10.27	0.49	0.055	9.07	11.74	<0.001
	F	9.65	0.55	0.054	8.27	10.79	
IOW	M	3.39	0.37	0.041	2.39	4.88	<0.001
	F	3.12	0.38	0.038	1.90	3.88	
BZW	M	12.01	0.80	0.089	10.01	13.65	<0.001
	F	11.41	0.82	0.081	9.21	13.67	
BGW	M	11.12	0.85	0.095	9.41	12.85	<0.001
	F	10.39	0.92	0.091	8.42	12.48	
Ht	M	166.44	7.18	0.79	144	179	<0.001
	F	153.51	6.20	0.61	135	172	

(*P<0.001; highly statistically significant)

Table 5.5 compares the data about height and various facial parameters in males and females of Christian religion of Sangli district. It shows that height and all facial parameters are greater in Christian males than in Christian females.

A statistically significant difference is seen in all the parameters.

The regression formulae were derived separately by using regression analysis of the facial parameters with stature.

Regression equation (y=a+bx)

Y=stature,

x=independent variable,

a=regression coefficient of dependent variable,

b=regression coefficient of independent variable.

Standard error of estimate (SEE) was calculated for each regression equation.

Table 5.6 : Correlation Coefficient (r) and regression analysis of height with facial parameters for Sangli District population.

FP	Sex	r value	Regression equation y=a+bx	SEE	P value
TFH	M	**0.462**	**Y=117.43 + 4.5TFH**	**6.11**	**<0.001**
	F	**0.411**	**Y=115.72 + 3.7TFH**	**5.87**	**<0.001**
UFH	M	**0.224**	**Y=147.78 + 3.4UFH**	**6.73**	**<0.001**
	F	**0.267**	**Y=133.69 + 3.7UFH**	**6.19**	**<0.001**
LFH	M	**0.381**	**Y=143.29 + 4.5LFH**	**6.36**	**<0.001**
	F	**0.228**	**Y=142.13 + 2.3LFH**	**6.27**	**<0.001**
NH	M	**0.224**	**Y=149.71 + 3.7NH**	**6.73**	**<0.001**
	F	**0.239**	**Y=138.58 + 3.2NH**	**6.25**	**<0.001**
NW	M	0.087	Y=161.67 + 1.6NW	6.88	0.07
	F	0.136	Y=145.30 + 2.3NW	6.36	0.003
BOW	M	**0.271**	**Y=132.27 +3.4BOW**	**6.64**	**<0.001**
	F	**0.283**	**Y=119.18 + 3.4BOW**	**6.15**	**<0.001**
IOW	M	**0.192**	**Y=155.07 + 3.6IOW**	**6.77**	**<0.001**
	F	0.094	Y=147.48 + 1.7IOW	6.39	0.038
BZW	M	**0.212**	**Y=144.31 + 1.9BZW**	**6.75**	**<0.001**
	F	**0.183**	**Y=134.21 + 1.6BZW**	**6.31**	**<0.001**
BGW	M	0.011	Y=167.23 + 0.1BGW	6.91	0.93
	F	0.102	Y=144.86 + 0.8BGW	6.39	0.02

(*P<0.05; statistically significant by linear regression)

Table 5.6 summarizes that all facial parameters except NW and BGW showed positive correlation with stature significantly (P <0.001)in males of Sangli district population. SEE for males is ranging between 6.11 to 6.91.Total Facial Height (TFH) with higher "r" value of 0.462 and lesser SEE −6.11 and Lower Facial Height (LFH) with "r" value of 0.381 and SEE – 6.36 showed better correlation with height than remaining facial parameters. TFH is the best facial parameter to correlate with height for males of Sangli district population.

For females in Sangli district population, all facial parameters except NW, IOW and BGW showed positive correlation with stature significantly ($p < 0.001$). Total Facial Height (TFH) with "r" value of 0.411 and least SEE – 5.87 found to be the best facial parameter to correlate height for females.

Comparing "r" value of TFH in males and females of Sangli district, it is seen that "r" value is more in males (0.462) as compared to females (0.411). We can say that TFH is the best facial parameter to correlate with stature in both sexes for Sangli district population.

Table 5.7: Correlation Coefficient(r) and linear Regression Analysis of height with facial parameters in Hindu population.

FP	Sex	r value	Regression equation y=a+bx	SEE	P value
TFH	M	**0.470**	**Y=118.16 + 4.5TFH**	**6.01**	**<0.001**
	F	**0.448**	**Y=105.39 + 4.7TFH**	**5.99**	**<0.001**
UFH	M	**0.237**	**Y=146.34 + 3.8UFH**	**6.61**	**<0.001**
	F	**0.251**	**Y=132.46 + 3.9UFH**	**6.48**	**<0.001**
LFH	M	**0.412**	**Y=141.88 + 4.8LFH**	**5.33**	**<0.001**
	F	**0.324**	**Y=131.49 + 4.4LFH**	**6.34**	**<0.001**
NH	M	**0.278**	**Y=146.85 + 4.4NH**	**6.53**	**<0.001**
	F	**0.243**	**Y=135.16 + 4.0NH**	**6.50**	**<0.001**
NW	M	0.084	Y=161.03 + 1.8NW	6.78	0.14
	F	0.142	Y=144.42 + 2.6NW	6.63	0.02
BOW	M	**0.216**	**Y=137.17 + 3.0BOW**	**6.64**	**<0.001**
	F	**0.329**	**Y=112.76 + 4.1BOW**	**6.32**	**<0.001**
IOW	M	**0.217**	**Y=152.52 + 4.4IOW**	**6.65**	**<0.001**
	F	0.132	Y=145.46 + 2.2IOW	6.65	0.04
BZW	M	**0.295**	**Y=128.82 + 3.2BZW**	**6.51**	**<0.001**
	F	**0.269**	**Y=121.71 + 2.7BZW**	**6.45**	**<0.001**
BGW	M	0.078	Y=160.03 + 0.7BGW	7.51	0.17
	F	0.144	Y=139.65 + 1.2BGW	6.63	0.02

(*P<0.05; statistically significant by linear regression)

Table 5.7 summarizes that all facial parameters except NW and BGW showed positive correlation with stature significantly (P < 0.001) in Hindu males of Sangli district population. Total Facial Height (TFH) with higher "r" value of 0.470 and lesser SEE −6.01 and Lower Facial Height (LFH) with "r" value of 0.412 and SEE –

5.33 showed better correlation with height than remaining facial parameters. TFH is the best facial parameter to correlate with height for Hindu males of Sangli district population.

For Hindu females in Sangli district population, all facial parameters except NW, IOW and BGW showed positive correlation with stature significantly ($p < 0.001$). Total Facial Height (TFH) with "r" value of 0.448 and least SEE – 5.99 found to be the best facial parameter to correlate height for females.

Comparing "r" value of TFH in Hindu males and females, it is seen that "r" value is more in males (0.470) as compared to females (0.448). Hence, we can say that TFH is the best facial parameter to correlate with stature for Hindu population of Sangli district

Table 5.8: Correlation Coefficient(r) and linear Regression Analysis of height with facial parameters in Muslim population.

FP	Sex	r value	Regression equation y=a+bx	SEE	P value
TFH	M	**0.421**	**Y=123.31 + 4.0TFH**	**6.31**	**<0.001**
	F	0.211	Y=135.01 + 1.8TFH	5.89	0.01
UFH	M	0.185	Y=150.72 + 2.9UFH	6.84	0.03
	F	0.204	Y=138.06 + 2.7UFH	5.91	0.02
LFH	M	**0.367**	**Y=145.50 + 4.3LFH**	**6.47**	**<0.001**
	F	0.034	Y=151.49 + 0.2LFH	6.03	0.70
NH	M	0.167	Y=153.09 + 3.1NH	6.86	0.05
	F	0.124	Y=145.07 + 1.6NH	5.98	0.17
NW	M	0.016	Y=166.72 + 0.3NW	6.96	0.84
	F	0.218	Y=138.75 + 4.2NW	5.88	0.21
BOW	M	**0.461**	**Y=117.77 + 5.0BOW**	**6.18**	**<0.001**
	F	0.109	Y=139.73 + 1.3BOW	5.99	0.22
IOW	M	0.187	Y=156.59 + 3.4IOW	6.84	0.03
	F	0.068	Y=156.55 – 1.2IOW	6.01	0.44
BZW	M	0.089	Y=159.89 + 0.7BZW	6.93	0.31
	F	0.060	Y=146.84 + 0.5BZW	6.02	0.06
BGW	M	0.002	Y=168.11 - 0.02BGW	6.97	0.97
	F	0.052	Y=148.99 + 0.4BGW	6.02	0.56

(*P<0.05; statistically significant by linear regression)

Table 5.8 summarize that only TFH, LFH and BOW showed positive correlation with stature significantly ($P < 0.000$) in Muslim males of Sangli district population. Of all these facial parameters, Bi-Orbital Width (BOW) with "r" value of 0.461 and SEE – 6.18 and Total Facial Height (TFH) with higher "r" value of 0.421 and lesser SEE −6.31 showed better correlation with height than remaining facial parameters. BOW is the best facial parameter to correlate with height for Muslim males of Sangli district population.

For Muslim females in Sangli district population TFH and UFH showed positive correlation with stature significantly. However no single facial parameter found to correlate with stature for Muslim females of Sangli district.

Table 5.9: Correlation Coefficient(r) and linear Regression Analysis of height with facial parameters in Christian population.

FP	SEX	r value	Regression equation y=a+bx	SEE	P value
TFH	**M**	**0.543**	**Y=98.79 + 6.1TFH**	**6.06**	**<0.001**
	F	**0.588**	**Y=107.74 + 4.6TFH**	**5.04**	**<0.001**
UFH	M	0.268	Y=141.51 + 4.3UFH	6.96	0.01
	F	**0.432**	**Y=127.29 + 5.1UFH**	**5.62**	**<0.001**
LFH	M	**0.366**	**Y=142.47 + 4.4LFH**	**6.71**	**<0.001**
	F	**0.370**	**Y=129.99 + 5.0LFH**	**5.78**	**<0.001**
NH	M	0.081	Y=159.45 + 1.4NH	7.20	0.47
	F	**0.379**	**Y=134.67 + 4.3NH**	**5.76**	**<0.001**
NW	M	0.225	Y=150.01 + 4.4NW	7.04	0.04
	F	0.039	Y=151.62 + 0.5NW	6.22	0.69
BOW	M	0.229	Y=132.25 + 3.33BOW	7.03	0.03
	F	**0.378**	**Y=112.30 + 4.2BOW**	**5.77**	**<0.001**
IOW	M	0.138	Y=157.46 + 2.6IOW	7.15	0.21
	F	0.258	Y=140.55 + 4.1IOW	6.02	0.001
BZW	M	0.261	Y=138.44 + 2.3BZW	6.97	0.01
	F	0.121	Y=143.11 + 0.9BZW	6.18	0.22
BGW	M	0.169	Y=182.18 – 1.4BGW	7.12	0.13
	F	0.056	Y=149.59 + 0.3BGW	6.22	0.57

(*P<0.05; statistically significant by linear regression)

Table 5.9 shows correlation of facial parameters with height in Christian population of Sangli district. All facial parameters except NH, IOW and BGW showed significant positive correlation with stature in Christian males of Sangli district. Of all significant facial parameters, Total Facial Height (TFH) with "r" value of 0.543 and SEE – 6.06 found to be the best parameter to correlate with stature for Christian males of Sangli district.

In Christian females of Sangli district, TFH, UFH, LFH, NH, BOW and IOW showed significant positive correlation with stature. Of these significant facial parameters, Total Facial Height (TFH) with "r" value of 0.588 and SEE – 5.04 showed the best correlation with stature.

Comparing "r" value of TFH in Christian males and females, it is seen that "r" value is more in females (0.588) as compared to males (0.543). Hence we conclude that TFH is the best parameter to correlate with stature for Christian population of Sangli district.

Table 5.10: Comparison of actual height and estimated height from facial measurements in Sangli population using regression analysis.

FP	SEX	Minimum estimated height	Maximum estimated height	Mean estimated height
TFH	M	157.70	175.75	167.15
	F	144.09	164.3	152.83
UFH	M	161.92	171.98	167.16
	F	147.12	158.59	153
LFH	M	158.9	176.45	167.36
	F	147.19	160.46	153.14
NH	M	155.55	171.05	167.32
	F	143.54	154.45	152.94
NW	M	165.47	168.93	167.47
	F	148.35	156.7	152.93
BOW	M	158.45	172.15	166.64
	F	114.76	157.73	152.22
IOW	M	163.67	172.63	167.31
	F	150.71	155.55	153
BZW	M	162.53	170.72	166.8
	F	148.94	156.43	152.59
BGW	M	168.16	168.57	168.26
	F	151.51	155.17	153.19
Actual stature	M	146	185	167.16
	F	136	166	153.01

Table 5.10 depicts comparison of actual stature and evaluated stature from facial measurements in Sangli district population using regression analysis. The minimum, maximum and mean values of measurements were replaced in their particular regression equations and evaluated stature was calculated. It is noted that in every facial parameter, minimum evaluated stature is higher than actual minimum stature whereas maximum evaluated stature is less than the actual maximum stature and Mean evaluated stature values are nearly equal to the actual stature in both males and females of Sangli district because regression equations are evaluated from measures of central location or tendency.

Table 5.11: Comparison of actual height and estimated height from facial measurements in Hindu population using regression analysis.

FP	Sex	Minimum estimated height	Maximum estimated height	Mean estimated height
TFH	M	160.01	176.51	167.69
	F	145.47	161.63	152.85
UFH	M	162.15	172.31	167.70
	F	147.70	158.48	152.77
LFH	M	159.65	177.25	167.69
	F	147.91	164.90	153.02
NH	M	153.82	172.23	167.78
	F	141.34	159.42	153.13
NW	M	165.31	168.82	167.60
	F	147.88	157.33	153.06
BOW	M	162.53	172.38	167.61
	F	142.41	159.23	152.89
IOW	M	163.35	173.99	167.64
	F	150.02	155.91	152.69
BZW	M	160.26	173.28	166.69
	F	148.36	158.64	152.88
BGW	M	166.59	169.44	167.55
	F	149.87	155.12	152.28
Actual stature	M	144	185	167.67
	F	133	173	152.98

Table 5.11 depicts comparison of actual stature and evaluated stature from facial measurements in Hindu population of Sangli district using regression analysis. The minimum, maximum and mean values of measurements were replaced in their particular regression equations and evaluated stature was calculated. It is noted that in every facial parameter, minimum evaluated stature is higher than actual minimum stature whereas maximum evaluated stature is less than the actual maximum stature and Mean evaluated stature values are nearly equal to the actual stature in both Hindu males and females of Sangli district because regression equations are evaluated from measures of central location or tendency.

Table 5.12: Comparison of actual height and estimated height from facial measurements in Muslim population using regression analysis.

FP	Sex	Minimum estimated height	Maximum estimated height	Mean estimated height
TFH	M	159.13	174.30	167.80
	F	150.11	158.65	153.14
UFH	M	164.04	171.37	167.73
	F	149.79	156.24	152.52
LFH	M	160.46	174.91	168.14
	F	151.93	153.04	152.43
NH	M	163.94	170.21	167.96
	F	150.17	153.96	152.46
NW	M	167.47	168.01	167.78
	F	149.09	156.81	152.64
BOW	M	156.27	176.45	167.44
	F	150.71	153.73	152.27
IOW	M	164.87	173.18	167.81
	F	151.73	154.12	152.61
BZW	M	166.61	169.54	168.10
	F	151.72	153.73	152.56
BGW	M	167.84	167.92	167.89
	F	152.32	154.01	153.08
Actual stature	M	146	185	167.90
	F	136	166	152.64

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Table 5.12 depicts comparison of actual stature and evaluated stature from facial measurements in Muslim population of Sangli district using regression analysis. The minimum, maximum and mean values of measurements were replaced in their particular regression equations and evaluated stature was calculated. It is noted that in every facial parameter, minimum evaluated stature is higher than actual minimum stature whereas maximum evaluated stature is less than the actual maximum stature and Mean evaluated stature values are nearly equal to the actual stature in both Muslim males and females of Sangli district because regression equations are evaluated from measures of central location or tendency.

Table 5.13: Comparison of actual height and estimated height from facial measurements in Christian population using regression analysis.

FP	Sex	Minimum estimated height	Maximum estimated height	Mean estimated height
TFH	M	158.92	177.13	166.54
	F	143.01	164.01	152.85
UFH	M	162.57	170.35	166.20
	F	145.82	159.38	153.27
LFH	M	159.63	173.20	166.17
	F	147.02	159.40	153.34
NH	M	165.03	167.41	166.07
	F	146.13	157.49	153.35
NW	M	162.88	169.96	166.43
	F	152.52	153.67	153.27
BOW	M	162.20	170.98	166.12
	F	147.06	157.61	152.87
IOW	M	163.67	170.14	166.28
	F	148.35	156.46	153.36
BZW	M	161.46	169.84	166.07
	F	151.40	155.42	153.38
BGW	M	164.19	169	166.61
	F	152.11	153.34	152.71
Actual stature	M	144	179	166.44
	F	135	172	153.51

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Table 5.13 depicts comparison of actual stature and evaluated stature from facial measurements in Christian population of Sangli district using regression analysis. The minimum, maximum and mean values of measurements were replaced in their particular regression equations and evaluated stature was calculated. It is noted that in every facial parameter, minimum evaluated stature is higher than actual minimum stature whereas maximum evaluated stature is less than the actual maximum stature and Mean evaluated stature values are nearly equal to the actual stature in both Christian males and females of Sangli district because regression equations are evaluated from measures of central location or tendency.

Table 5.14: Comparison of Mean actual stature and Mean estimated stature in Sangli district population.

FP	Male			Female		
	Mean actual stature	**Mean estimated stature**	**Difference**	**Mean actual stature**	**Mean estimated stature**	**Difference**
TFH	167.16	167.15	0.01	153.01	152.83	0.18
UFH	167.16	167.16	0.00	153.01	153.00	0.01
LFH	167.16	167.36	0.20	153.01	153.14	0.13
NH	167.16	167.32	0.16	153.01	152.94	0.07
NW	167.16	167.47	0.31	153.01	152.93	0.08
BOW	167.16	166.64	0.52	153.01	152.22	0.79
IOW	167.16	167.31	0.13	153.01	153.00	0.01
BZW	167.16	166.81	0.35	153.01	152.59	0.42
BGW	167.16	168.16	1.0	153.01	153.19	0.18

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Table 5.14 shows difference between actual stature and evaluated stature from various facial parameters using regression equation in Sangli district population. It is observed that in males difference ranges from 0.00 to 1.0 cm. Evaluation of stature from UFH (167.16 cm) is exactly same with actual stature (167.16 cm), next to that is TFH with a difference of 0.01 (167.15 cm).

In females of Sangli district population, difference between actual stature and estimated stature from various facial parameters ranges from 0.01 to 0.79 cm. Estimation of stature from UFH (153.00 cm) and IOW (153.00 cm) correlated with actual stature (153.01 cm) and showed least difference is 0.01cm.

We conclude that stature can be evaluated from all above facial parameters studied and derived regression formulae can be used for evaluation of stature from facial parameters for Sangli district population.UFH is the best facial parameter to evaluate stature for males while UFH and IOW are the best facial parameter to evaluate stature for females of Sangli district.

Table 5.15: Comparison of Mean actual stature and Mean estimated stature in Hindu population.

FP	Male			Female		
	Mean actual stature	**Mean estimate stature**	**Difference**	**Mean actual stature**	**Mean estimated stature**	**Difference**
TFH	167.67	167.69	0.02	152.98	152.85	0.13
UFH	167.67	167.70	0.03	152.98	152.77	0.21
LFH	167.67	167.69	0.02	152.98	153.02	0.04
NH	167.67	167.78	0.11	152.98	153.13	0.15
NW	167.67	167.60	0.07	152.98	153.06	0.08
BOW	167.67	167.61	0.06	152.98	152.89	0.09
IOW	167.67	167.64	0.03	152.98	152.69	0.29
BZW	167.67	166.69	0.98	152.98	152.88	0.10
BGW	167.67	167.55	0.12	152.98	152.28	0.70

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Table 5.15 shows difference between actual stature and evaluated stature from various facial parameters using regression equation in Hindu population of Sangli district. It is observed that in males difference ranges from 0.02 to 0.9 cm. Of all facial parameters studied, evaluation of stature from LFH (167.69 cm) and TFH (167.69 cm) showed least difference of 0.02 with actual stature (167.67 cm).

In females of Sangli district population, difference between actual stature and evaluated stature from various facial parameters ranges from 0.04 to 0.70 cm. Evaluation of stature from LFH (153.02 cm) showed the least difference of 0.04 cm with actual stature (152.98 cm).

We conclude that stature can be evaluated from all above facial parameters studied and derived regression formulae can be used for estimation of stature from facial parameters for Hindu population of Sangli district.LFH and TFH are the best facial parameter to evaluate stature for Hindu males while LFH is the best facial parameter to evaluate stature for Hindu females of Sangli district.

Table 5.16: Comparison of Mean actual stature and Mean estimated stature in Muslim population.

FP	Male			Female		
	Mean actual stature	**Mean estimate stature**	**Difference**	**Mean actual stature**	**Mean estimated stature**	**Difference**
TFH	167.90	167.80	0.10	152.64	153.14	0.50
UFH	167.90	167.73	0.17	152.64	152.52	0.12
LFH	167.90	168.14	0.24	152.64	152.43	0.21
NH	167.90	167.96	0.06	152.64	152.46	0.18
NW	167.90	167.78	0.12	152.64	152.64	0.00
BOW	167.90	167.44	0.46	152.64	152.27	0.37
IOW	167.90	167.81	0.09	152.64	152.61	0.03
BZW	167.90	168.10	0.20	152.64	152.56	0.08
BGW	167.90	167.89	0.01	152.64	153.08	0.44

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Table 5.16 shows difference between actual stature and evaluated stature from various facial parameters using regression equation in Muslim population of Sangli district. It is observed that in Muslim male's difference ranges from 0.01 to 0.4 cm. Of all facial parameters studied, evaluation of stature from BGW (167.89 cm) showed least difference of 0.01 with actual stature (167.90 cm).

In Muslim females of Sangli district population, difference between actual stature and evaluated stature from various facial parameters ranges from 0.00 to 0.50 cm. Evaluation of stature from NW (152.64 cm) is exactly same with actual stature (152.64 cm).

We conclude that stature can be evaluated from all above facial parameters studied and derived regression formulae can be used for estimation of stature from facial parameters for Muslim population of Sangli district. BGW is the best facial parameter to evaluate stature for Muslim males while NW is the best facial parameter to evaluate stature for Muslim females of Sangli district.

Table 5.17: Comparison of Mean actual stature and Mean estimated stature in Christian population.

FP	Male			Female		
	Mean actual stature	**Mean estimate stature**	**Difference**	**Mean actual stature**	**Mean estimated stature**	**Difference**
TFH	166.44	166.54	0.10	153.51	152.85	0.66
UFH	166.44	166.20	0.24	153.51	153.27	0.24
LFH	166.44	166.17	0.27	153.51	153.34	0.17
NH	166.44	166.07	0.37	153.51	153.35	0.16
NW	166.44	166.43	0.01	153.51	153.27	0.24
BOW	166.44	166.12	0.32	153.51	152.87	0.64
IOW	166.44	166.28	0.16	153.51	153.36	0.15
BZW	166.44	166.07	0.37	153.51	153.38	0.13
BGW	166.44	166.61	0.17	153.51	152.71	0.80

Table 5.17 shows difference between actual stature and evaluated stature from various facial parameters using regression equation in Christian population of Sangli district. It is observed that in Christian male's difference ranges from 0.01 to 0.37 cm. Of all facial parameters studied, evaluation of stature from NW (166.43 cm) showed least difference of 0.01 with actual stature (166.44cm).

In Christian females of Sangli district population, difference between actual stature and evaluated stature from various facial parameters ranges from 0.13 to 0.80 cm.

Evaluation of stature from BZW (153.38cm) is showed least difference with actual stature (153.51 cm).

We conclude that stature can be evaluated from all above facial parameters studied and derived regression formulae can be used for estimation of stature from facial parameters for Christian population of Sangli district. NW is the best facial parameter to evaluate stature for Christian males while BZW is the best facial parameter to evaluate stature for Christian females of Sangli district

Table 5.18: Comparison of Correlation coefficient (r) in males and females of Hindu, Muslim and Christian population.

FP	Male			Female		
	Hindu	Muslim	Christian	Hindu	Muslim	Christian
TFH	**0.470**	**0.421**	**0.543**	**0.448**	0.211	**0.588**
UFH	0.237	0.185	0.268	0.251	0.204	**0.432**
LFH	**0.412**	0.367	0.366	0.324	0.034	0.370
NH	0.278	0.167	0.081	0.243	0.124	**0.379**
NW	0.084	0.016	0.225	0.142	0.218	0.039
BOW	0.216	**0.461**	0.229	**0.329**	0.109	0.378
IOW	0.217	0.187	0.138	0.132	0.068	0.258
BZW	0.295	0.089	0.261	0.269	0.060	0.121
BGW	0.078	0.002	0.169	0.144	0.052	0.056

Table 5.18 Compares correlation co efficient (r) among Hindu, Muslim and Christian males of Sangli district population as well as among females of all three religions. In Hindu and Christian males, highest “r” value is seen for TFH. Christian males have the highest “r” value of TFH (0.543) than Hindu males (0.470). In Muslim male’s highest “r” value is for BOW (0.461). Hence, we can say that TFH is the best criteria to identify Hindu and Christian males while BOW is the best criteria to identify Muslim males of Sangli district population.

In Hindu and Christian females, highest "r" value is seen for TFH. Christian females have the highest "r" value of TFH (0.588) than Hindu females (0.448). In Muslim female's highest "r" value is for NW (0.218). Hence, we can say that TFH is the best criteria to identify Hindu and Christian females but there is no strong facial parameter to correlate with stature for Muslim females.

Table 5.19: Comparison of mean Actual Stature of Males (165.92) and mean estimated stature in the subjects (n=25) from Sangli district population.

No	FP	Mean	Std Deviation	Mean Estimated stature	Difference between means=mean actual stature-mean estimated stature
1	**TFH**	11.12	0.57625	167.47	1.55
2	**UFH**	5.80	0.50608	167.5	1.58
3	**LFH**	5.35	0.45294	167.36	1.44
4	**NH**	4.68	0.41710	167.02	1.10
5	**NW**	3.62	0.35374	167.46	1.54
6	**BGW**	11.25	0.86940	168.35	2.43
7	**BZW**	11.63	0.76565	166.40	0.48
8	**BOW**	9.88	0.59346	165.86	0.05
9	**IOW**	3.30	0.30899	166.95	1.03

Table 5.20: Comparison of mean Actual Stature of Females (152.96) and mean estimated stature in the subjects (n=25) from Sangli district population.

No	FP	Mean	Std Deviation	Mean Estimated stature	Difference between means=mean actual stature-mean estimated stature
1	**TFH**	10.25	0.78001	153.64	0.68
2	**UFH**	5.27	0.44309	153.18	0.22
3	**LFH**	4.97	0.80747	154.56	1.6
4	**NH**	4.61	0.41461	153.33	0.37
5	**NW**	3.44	0.27330	153.21	0.25
6	**BGW**	10.51	1.16897	153.26	0.3
7	**BZW**	11.49	0.72980	154.14	1.18
8	**BOW**	9.70	0.52363	152.16	0.8
9	**IOW**	3.28	0.28362	153.05	0.09

In order to test the accuracy of the obtained regression formula on Sangli district population, a sample of 50 individuals (m=25,f=25) within the same age group was taken using the same parameters in the main study. The stature was estimated using the regression formulae for facial parameters of Sangli district population. The mean estimated stature was calculated and compared with the mean actual stature of these subjects. The difference between the mean actual stature of males (165.92cm) and mean estimated stature ranges from 0.05 to 2.43cm.The difference between the mean actual stature of females(152.96cm) and mean estimated stature ranges from 0.22 to 1.18 cm. In

other words, the calculated regression formulae also hold true for the Sangli district male and female population.

CHAPTER NO.6

DISCUSSION

6. DISCUSSION

The present cross sectional study was **conducted** to correlate the facial parameters with body height/stature of the individual of Sangli district (Maharashtra) population with Nagpur population, South Indian population, Haryanvi population, Jat population, Kattunaykan population, Gujarati population, Nepali population, Srilankan population, Nigerians population, Ijaw ethnic group, Central Serbia population.

The study was conducted in department of Anatomy from May 2017 to November 2018. A total sample size of 1000 adult individuals both male and female belonging to the age group 18 to 50 years were included as study population. Subjects with facial deformity facial surgery, stature deformity, stature anomalies and facial congenital anomalies were excluded from the study.

The study was conducted after taking ethics clearance from the institute and informed written consent from the individuals. The data was collected from individuals regarding demographic profile, height and nine facial parameters.

Statistical analyses of the results were performed separately for males and females for gender variations. Even religion wise differences were studied. Regression equations were derived.

In the present study, most subjects were in age group 18-30 years. The mean age of male and female was 23.66 ±7.16 and 23.72 ±7.12 years respectively and there were51% of males and 49% of females.

In a study done by Baral P[120] et al among four endogamous communities in the Sunsari district of Nepal also found slight more male population (51%) compared to females (49%) as study subjects.

Similar findings were also seen in study done by Wankhede KP[131] et al in central India with males (55.31%) and females (44.69%) as study population with mean age of 19.42 years.

STATURE/HEIGHT

Table 6.1: Comparison of mean value of Stature with previous studies

Author	Population	Stature cm	
		Males	**Females**
Sahni (2010)	Northwest	165.90	163.24
Ilayperuma (2010)	Srilankan	162.95	152.48
Agnihotri., (2011)	Indo-Mauritius	173.40	157.36
Asha and Prabha (2011)	South India	169.62	156.82
Wankhede (2012)	Nagpur	170.97	156.89
Sheetal sagar (2014)	Jat	152.53	152.44
Ajeet Jaiswal (2014)	Kattunayakan	165.66	151.04
Twisha (2015)	Gujarati	164.3	150.56
Swami (2015)	Haryanvi	168.71	155.18
Pokharel (2018)	Nepali	167.42	155.99
Present study	**Sangli district population**	**167.54**	**153.01**
	Hindu population	**167.68**	**152.99**
	Muslim population	**167.90**	**152.64**
	Christian population	**166.44**	**153.51**

Table 6.1 shows that mean value of stature of males is more than mean stature of females in all previous studies done by various researchers. Our study also confirms the same. The mean stature of males of the present study Sangli district population (167.54cm), Hindu population and Muslim population is comparable with studies done by Pokharel[128] on

Nepalese population. Mean stature of males in the present study is lower than the Indo-Mauritian population[72] and higher than Srilankan population[66]

When compared with Indian studies, stature of males of Sangli district population, Hindu population and Muslim population is lesser than Nagpur population,[131] South Indian population[135] and Haryanvi population[126] and higher than Jat population,[81] Kattunaykan[129] and Gujarati population.[130]

The mean value of stature of males of Christian population (166.44 cm) is more than Northwest population,[75] Srilankan population,[66] Jat population,[81] Kattunaykan[129] and Gujarati population.[130] And less than Indo-Mauritian population,[72] Nagpur population,[131] South Indian population[135] and Haryanvi population.[126]

The mean value of stature of females of Sangli district, Christian population in the present study (153.01 cm)is lower than Nepali population,[128] Indo Mauritius population[72] Nagpur population,[131] Northwest population,[75] Haryanvi population[126] and South Indian population[135] and is higher than Srilankan population,[66] Jat population,[81] Kattunaykan population[129] and Gujarati population.[130] The mean stature of females of Hindu & Muslim population confirms Srilankan population,[66] Jat population.[81] The difference may be due to geographic, ethnic, genetic or environmental variations.

TOTAL FACIAL HEIGHT:

Table 6.2: Comparison of mean value of Total Facial Height with previous studies:

Author	Population	Mean Total Facial Height (cm)	
		Males	**Females**
O Ebeye(2009)	Nigerian	12.61	11.91
EseAnibor(2013)	Ijaw ethnic group	11.58	10.86
D.Jeremic(2013)	Central Serbia	12.14	11.08
Ajeet Jaiswal (2014)	Tamilnadu	5.72	5.54
Twisha et al(2015)	Gujarati	9.85	8.54
Swami et al (2015)	Haryanvi	11.07	10.21
Sinchal Datta (2017)	Mumbai (Maharashtra)	11.19	10.34
Pokhrel(2018)	Nepali	12.14	11.53
Present study	**Sangli district population**	**11.05**	**10.03**
	Hindu Population	**11.01**	**10.10**
	Muslim Population	**11.12**	**10.07**
	Christian Population	**11.10**	**9.81**

The mean value of total facial height of males of Sangli District population is 11.05 ±0.71 cm compared to 10.03 ±0.70 cm in females with highly statistically significant difference. (P<0.000).The mean total facial height of males and females of Sangli district is comparable with studies done by Sinchal Datta[124] on males and females of Mumbai, Swami[126] et al on males and females of Haryanvi. The values are more than Gujarati[130] and Tamilnadu[129] males and females and lower as compared to males and females of the other countries.

The mean value of total facial height of Hindu males (11.01cm), Muslim males (11.12cm) and Christian males (11.10cm) of Sangli District population is comparable with studies done by Sinchal Datta[124] on males of Mumbai, Swami[126] et al on males of Haryanvi. The values are more than Gujarati[130] and Tamilnadu[129] males and lower as compared to males of the other countries.

The mean value of total facial height of Hindu females (10.10cm), and Muslim females (10.07cm) of Sangli District population is comparable with studies done by SinchalDatta[124] on females of Mumbai, Swami[126] on females of Haryanvi. The values are more than Gujarati[130] and Tamilndu[129] females and lower as compared to females of the other countries. The mean total facial height of Christian females (9.81cm) is more than Tamilnadu[129] population and Gujarati[130] population and less than Nigerians population[125], Ijaw ethnic group,[122] Central Serbia population,[118] Haryanvi population,[126] Mumbai population[124] and Nepali population.[128] The difference may be due to geographic, ethnic, genetic or environmental variations.

UPPER FACIAL HEIGHT

Table 6.3: Comparison of mean value of Upper Facial Height with previous studies:

Author	Population	Upper Facial Height (cm)	
		Males	**Females**
Baral P et al(2010)	Brahmin	4.44	4.42
	Chhetri	4.46	4.44
	Rai	4.32	4.31
	Limbu	4.33	4.32
Prasanna et al(2014)	North Indian	7.21	6.56
	South Indian	6.79	6.19
Present study	**Sangli district population**	**5.70**	**5.22**
	Hindu Population	**5.62**	**5.21**
	Muslim Population	**5.87**	**5.36**
	Christian Population	**5.74**	**5.09**

The present study confirms that mean value of Upper Facial Height in males (5.70cm) and females (5.22cm) of Sangli district population is less than North Indian and South Indian population.[117] The values are more than the study done by Baral P[120] et al. The same confirms with males and females of Hindu, Muslim and Christian population of Sangli district.

LOWER FACIAL HEIGHT

Table 6.4: Comparison of mean value of Lower Facial Height with previous studies:

Author	Population	Lower Facial Height (cm)	
		Males	**Females**
Hatwal et al(2009)	Gadwall	5.73	5.48
Baral P et al(2010)	Brahmin	5.56	5.58
	Chhetri	5.54	5.56
	Rai	5.68	5.69
	Limbu	5.67	5.68
O Ebeye(2015)	Nigerian	6.75	6.36
Present study	**Sangli district population**	**5.35**	**4.79**
	Hindu Population	**5.38**	**4.89**
	Muslim Population	**5.27**	**4.67**
	Christian Population	**5.39**	**4.67**

The mean value of lower facial height in males (5.35cm) of Sangli District is comparable with studies done by Baral P[120] and Hatwal[123] et al but lower than Nigerian population.[125]This also holds true for Hindu, Muslim and Christian males of Sangli district.

The mean value of lower facial height in females (4.79cm) of Sangli District is less as compared with studies done by Baral P,[120] Hatwal[123] and O Ebeye.[125] This also holds true for Hindu, Muslim and Christian females of Sangli district.

BIZYGOMATIC WIDTH

Table 6.5: Comparison of mean value of Bi-zygomatic Width with previous studies:

Author	Population	Bi-zygomatic Width (cm)	
		Male	Female
Rashmi(2012)	Pune	11.69	11.18
D Jeremic(2013)	Central Serbia	12.91	11.99
Prasanna LC (2014)	North India	12.22	10.88
Prasanna LC (2014)	South India	11.93	11.85
Twisha(2015)	Gujarati	13.07	11.47
Sinchal Datta(2017)	Maharashtra	12.90	12.09
Pokhrel **(2018)**	Nepali	12.04	11.36
Present study	**Sangli district population**	**11.84**	**11.49**
	Hindu Population	**11.84**	**11.55**
	Muslim Population	**11.73**	**11.43**
	Christian Population	**12.01**	**11.41**

The mean value of Bizygomatic width (BZW) in males (11.84cm) of Sangli district is comparable with the studies done by Rashmi[119] (11.69cm) on Pune population and Prasanna L C[117] (11.93cm) on South India population. It is lower than the studies done by Prasanna L C[117]on North Indian population, Twisha[130] on Gujarati population, Sinchal Datta[124] on Maharashtrian population, C Pokharel[128] on Nepali population and D Jeremic[118] on Central Serbia population.

The mean value of Bizygomatic width in females (11.49cm) of Sangli district population is comparable with the studies done by Rashmi[119] (11.18cm) on Pune population and Prasanna L C[117] (11.85cm) on South India population, Twisha[130] on Gujarati population (11.47cm), C Pokharel[128] on Nepali population (11.36cm) and D Jeremic[118] on Central Serbia population (11.99cm). It is more than the studies done by Prasanna L C[117]on North Indian population, (10.88cm) and lower than Sinchal Datta[124] on Maharashtrian population (12.09cm).

Mounika and Babuin[132] their study in 30 South Indians subjects entitled, "Estimation of stature from the facial width" found out that the mean values of bizygomatic width were 9.432 cm, which was smaller than the present study.

NASAL HEIGHT;

Table 6.6: Comparison of mean value of Nasal Height with other studies:

Author	Population	Nasal Height(cm)	
		Males	**Females**
O Ebeye(2009)	Nigerian	4.56	4.27
Ese Anibor(2013)	Ijaw ethnic group	4.51	4.21
Ajeet Jaiswal(2014)	Kattunayakan	4.68	4.48
Sheetal Sagar(2014)	Jat	4.77	4.88
Sudhakar Ray(2016)	Western Uttar Pradesh	3.87	3.47
Present study	**Sangli district population**	**4.76**	**4.49**
	Hindu Population	**4.76**	**4.49**
	Muslim Population	**4.80**	**4.62**
	Christian Population	**4.72**	**4.34**

The above table shows that mean value of nasal height in males were more than females in all study population except Jat population.[81] The present study also confirms the same for Sangli district population as a whole as well as religion wise also. The nasal height of both males and females population in the present study is higher than males and females of Nigerians population,[125] Ijaw ethnic group,[122] Kattunayakan population[129] Western Uttar Pradesh population[133]and less than Jat[81]population.

NASAL WIDTH;

Table 6.7: Comparison of mean value of Nasal Width with other studies:

Author	Population	Nasal Width(cm)	
		Males	Females
Sheetal Sagar(2014)	Jat	3.9	3.75
Sudhakar Ray(2016)	Western Uttar Pradesh	2.87	2.49
Present study	**Sangli district population**	**3.63**	**3.32**
	Hindu Population	**3.65**	**3.33**
	Muslim Population	**3.54**	**3.31**
	Christian Population	**3.73**	**3.32**

The above table shows that mean value of nasal width in males is more than females in all study population. Our study also confirms same. The nasal width of both males and females of Sangli district population of the present study is higher than Western Uttar Pradesh population[133] and less than Jat population.[81] The difference may be due to geographic, ethnic, genetic or environmental variations.

BI-ORBITAL WIDTH

Table 6.8: Comparison of mean value of Bi-orbital Width with previous studies:

Author	Population	Bi-orbital width(cm)	
		Males	**Females**
Gosavi SN	Maharashtra	9.56	9.56
Munguti J	Kenya	9.95	9.63
Rashmi	Pune	9.44	9.23
Present study	**Sangli district population**	**10.11**	**9.72**
	Hindu Population	**10.15**	**9.79**
	Muslim Population	**9.93**	**9.64**
	Christian Population	**10.27**	**9.65**

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The mean value of bi-orbital width in the present study was more in males than females. Mean bi-orbital width of males and females in the present study is higher than Maharashtra population,[134] Pune population[119] and Kenya population.[136]The mean value of Bi-orbital width in males and females of Hindu population and Christian population also confirms same. The mean value of Bi-orbital width in males of Muslim population is less than Kenya population[136] and more than Maharashtra population,[134] Pune population.[119] The mean value of Bi-orbital width in females of Muslim population is confirms with Kenya population[136] and more than Maharashtra population,[134] Pune population.[119]

INTER-ORBITAL WIDTH

Table 6.9: Comparison of mean value of Inter-orbital Width with previous studies:

Author	Population	Inter-orbital width(cm)	
		Males	**Females**
Asma	Bangladeshi Buddhist	-	3.12
Rashmi	Pune	3.05	3.02
Present study	**Sangli district population**	**3.40**	**3.25**
	Hindu Population	**3.44**	**3.28**
	Muslim Population	**3.30**	**3.23**
	Christian Population	**3.39**	**3.12**

In the present study, the mean value of Inter-orbital width in males is higher than females. The value of mean inter-orbital width of males and females of Sangli population, Hindu population, Muslim population and males of Christian population in present study is comparable with males and females of Pune population.[119] The mean value of Christian females (3.12cm) of present study is same with Bangladeshi Buddhist females.[127]

BIGONIAL WIDTH

Table 6.10: Comparison of mean value of Bigonial Width with previous studies:

Author	Population	Bigonial width(cm)	
		Males	Females
Rashmi(2012)	Pune	10.63	9.92
Swami (2015)	Haryanvi	11.45	10.33
Twisha(2015)	Gujarati	10.38	8.79
Present study	**Sangli district population**	**10.87**	**10.42**
	Hindu Population	**10.74**	**10.52**
	Muslim Population	**10.99**	**10.22**
	Christian Population	**11.12**	**10.39**

In the present study the Bigonial width in males was higher than females. Christian males have maximum Bigonial width compared to Hindu and Muslim males of Sangli district population and their width is comparable with Haryanvi population.[126] Hindu and Muslim males of Sangli district population have Bigonial width comparable with Pune[119] and Gujarati population.[130]

Hindu females of Sangli district population have maximum Bigonial width as compared with Muslim and Christian females.Bigonial width in all females of Sangli district population is comparable with Haryanvi females[126] and more than Pune[119] and Gujarati population.[130]

In table 6.11, shows correlation coefficient(r) of stature with other facial parameters in Sangli district population. And also derived regression equation for each parameter separately. In Sangli district male population, total facial height was (r=0.46, SEE=6.11) correlated with stature. In females, the total facial height(r=0.41, SEE=5.87) was better correlated with stature.

Table 6.11: Comparison of correlation coefficient (r) of STATURE with TOTAL FACIAL HEIGHT of previous studies

Author	Population	Sex	Total Facial Height	
			r	P
Patil&Mody (2005)	Central India	M	0.925	<0.001
Jibon et al (2006)	Imphal Valley	M	0.213	<0.001
K Krishna et al (2008)	North India	M	0.455	<0.001
Kharyal et al (2008)	Himachal Pradesh	M	0.390	<0.001
		F	0.350	<0.001
Sahni et al (2010)	North west India	M	0.219	<0.002
		F	0.181	0.021
Pelin et al (2010)	Turkish	M	0.199	<0.001
Sinchal Dutta (2017)	Maharashtra	M	0.166	<0.01
		F	0.272	<0.001
Agnihotri (2011)	Indo-Mauritian	M	0.320	<0.001
		F	0.190	<0.01
K P Wankhede et al (2012)	Maharashtra	M	0.197	<0.001
		F	0.144	<0.002
Present study	**Sangli district population**	**M**	**O.460**	**<0.001**
		F	**0.410**	**<0.001**
	Hindu Population	**M**	**0.470**	**<0.001**
		F	**0.448**	**<0.001**
	Muslim Population	**M**	**0.421**	**<0.001**
		F	**0.211**	**0.01**
	Christian Population	**M**	**0.543**	**<0.001**
		F	**0.588**	**<0.001**

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Table 6.11 shows comparison of correlation coefficient(r) of stature with total facial height with previous studies. In the present study of Sangli district population, total facial height is a good facial parameter for prediction of height in Sangli district Sangli district population males and females, Hindu males and females, Muslim males and Christian males and females. Total facial height is the best parameter for prediction of height for Christian males and females with 'r' value of 0.543 and 0.588, respectively.

Compared with the previous studies, it is found that Patil and Mody[29] found best correlation between stature and total facial height in males of central India with highest 'r' value of 0.925.

Majority of the above researchers found correlation of stature with total facial height predominantly in males with higher 'r' value.

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Table 6.12: Comparison of correlation coefficient (r) of STATURE with BIZYGOMATIC WIDTH of previous studies:

Author	Population	Sex	Bizygomatic Width	
			r	P
Jibon et al (2006)	Imphal Valley	M	0.185	<0.001
K Krishna et al (2008)	North India	M	0.461	<0.001
Twisha Shah (2015)	Guajarati	M	0.032	0.18
		F	0.048	0.21
Sinchal Dutta et al (2017)	Maharashtra	M	0.250	<0.01
		F	0.249	<0.001
C. Pokhrel **et al (2018)**	Nepali	M	0.175	0.029
		F	0.255	<0.001
Present study	**Sangli district population**	**M**	**0.21**	**<0.001**
		F	**0.18**	**<0.001**
	Hindu Population	**M**	**0.295**	**<0.001**
		F	**0.269**	**<0.001**
	Muslim Population	**M**	**0.089**	**0.31**
		F	**0.060**	**0.06**
	Christian Population	**M**	**0.261**	**0.02**
		F	**0.121**	**0.22**

In the present study, Bizygomatic width in Sangli district population males(r=0.21), Hindu males (r=0.295) and females (r=0.269) of Sangli district population showed a positive correlation with stature and is statistically significant.

Studies by K Krishna[99] on North Indian males showed a strong positive correlation between stature and Bizygomatic width with higher r value of 0.461.Sinchal Dutta[124] in their studies on Maharashtra population showed positive correlation of stature with Bizygomatic width in both males and females with r values of 0.250 and 0.249, respectively and are comparable with r values for Hindu males and females in the present study.

Table 6.13: Comparison of correlation coefficient (r) of STATURE with NASAL HEIGHT of previous studies:

Author	Population	Sex	Nasal Height	
			r	P
Wankhede KP (2012)	Maharashtra	M	0.186	<0.001
		F	0.196	<0.001
Kharyal (2008)	Himachal Pradesh	M	0.36	<0.001
		F	0.22	<0.001
Agnihotri (2011)	Indo Mauritian	M	0.19	<0.01
		F	0.15	<0.01
Jaiswal A (2014)	Madurai	M	0.17	<0.01
		F	0.10	<0.01
Present study	**Sangli district population**	**M**	**0.22**	**<0.001**
		F	**0.23**	**<0.001**
	Hindu Population	**M**	**0.278**	**<0.001**
		F	**0.243**	**<0.001**
	Muslim Population	**M**	**0.167**	**0.05**
		F	**0.124**	**0.17**
	Christian Population	**M**	**0.081**	**0.47**
		F	**0.379**	**<0.001**

In the present study, Nasal height in Sangli district population males and female, Hindu males and females and Christian females showed a positive correlation with stature with higher r value and is statistically significant.

Studies by Wankhede KP[131] et al, Kharyal et al, Agnihotri[72] et al and Jaiswal A[129] et al found statistically significant positive correlation with nasal height, Kharyal with maximum r value of 0.36 and 0.22 for males and females, respectively. In the present study, better correlation between stature and nasal height is seen in Christian females

Table 6.14: Comparison of correlation coefficient (r) of STATURE with BIGONIAL WIDTH of previous studies:

Author	Population	Sex	Bigonial Width	
			r	P
K Krishan(2008)	North Indian	M	0.462	<0.001
Shah T et al (2015)	Gujarati	M	0.096	<0.05
		F	0.193	<0.05
Jibon Kumar et al (2017)	Imphal Valley	M	0.365	<0.001
Present study	**Sangli district population**	**M**	**0.01**	**0.93**
		F	**0.10**	**0.02**
	Hindu Population	**M**	**0.078**	**0.17**
		F	**0.144**	**0.02**
	Muslim Population	**M**	**0.002**	**0.97**
		F	**0.052**	**0.56**
	Christian Population	**M**	**0.169**	**0.13**
		F	**0.056**	**0.57**

In the present study bigonial width showed no correlation with stature amongst all population of Sangli district. However, previous studies by K Krishan[74]and Jibon Kumar[82] showed positive correlation between stature and Bigonial Width in North Indian and Imphal males, respectively.

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CHAPTER NO.7

SUMMARY AND CONCLUSIONS

7. SUMMARY AND CONCLUSIONS

SUMMARY

The present cross-sectional study was conducted to correlate the facial parameters with body height/stature of the individual of Sangli district population. A total sample size of 1000 adult individuals including both male and female belonging to the age group 18 to 50 years were included as study population. The data was collected from Sangli district. Subjects with facial deformity/ facial surgery/facial trauma were excluded from the study. The study was conducted after obtaining ethical clearance from the institute and informed consent from the patients. The data was collected from individuals regarding demographic profile, height and anthropometric measurements of nine facial parameters viz Total face height, Upper face height, Lower face height, Nasal aperture height, Nasal aperture width, Lower facial/bigonial width, Total face width/Bizygomatic width, Bi-orbital width and Inter-orbital width. The collected data was separated according to sex as well as religion wise to study gender variations as well as religion wise differences. The data of all facial parameters converted mm to cm.The data thus collected was subjected to statistics like mean, standard deviation, Karl Pearson's correlation coefficient, regression analysis, standard error of estimate etc. and were analyzed using SPSS (Statistical Package for Social Sciences) on windows XP professional. Statistical analyses of the results were performed to correlate facial parameters with stature separately for male and female for different facial parameters and compared. Demarking points for gender difference were worked out for Sangli district population using a formula Mean ± 3SD and this will be useful in deciding sex of unknown sample in future in medico legal cases. Regression equations for evaluation of stature were determined. Even their reliability was tested by using them on another sample of 25 males and 25females of Sangli district.

For identification of males of Sangli district population, amongst all stature and facial parameters studied, height, Bi Gonial Width (BGW), Lower Facial Height (LFH) and Upper Facial Height (UFH) observed to be the best parameters.

For identification of females of Sangli district population, LFH, UFH and Height found to be the best parameters.

Comparing the values of Karl Pearson's correlation coefficients and the standard error of estimate of each facial parameter studied, we summarize that-

1. TFH is the best facial parameter to correlate with stature in both sexes for Sangli district population.

2. TFH is the best facial parameter to correlate with stature in both sexes for Hindu population of Sangli district.

3. BOW is the best facial parameter to correlate with height for Muslim males of Sangli district population. No single facial parameter found to be correlate with stature for Muslim females of Sangli district.

4. TFH found to be the best parameter to correlate with stature for Christian males of Sangli district. TFH showed the best correlation with stature in Christian females.

Mean evaluated stature values are nearly equal to the actual stature in both males and females of Sangli district population as well as Hindu, Muslim and Christian population of Sangli district.

Regression equations derived for stature estimation from facial parameters for Sangli district population proved to accurate and reliable by seeing very much less difference between mean actual stature and evaluated stature from regression equation.

CONCLUSIONS

The present study concludes that facial parameters are useful for evaluation of stature. The values of facial parameters and stature in the present study can serve as standards for Sangli district population. They can be used as local standards for diagnostic and anthropometric evaluation in anthropology, genetics and forensic medicine. And they will support the other personal identification data like estimation of height, sex; race etc where only face is available for examination. The present study has provided regression equations for evaluation of stature from facial parameters for Sangli district population, Hindu population, Muslim population and Christian population. They are tested for their accuracy and reliability and can be used when only facial remains are presented for forensic examination. Of all facial parameters studied, Total Facial Height (TFH) found to be the best parameter to correlate with stature for males and females of Sangli district population.

CHAPTER NO.8

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8. BIBLIOGRAPHY

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ANNEXURE

D. Y. PATIL MEDICAL COLLEGE, KOLHAPUR

Constituent College of D.Y.Patil Education Society Deemed University, Kolhapur

NAAC Accrediated 'A' Grade

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Dr. Sanjay D. Patil
President

Outward No. DMCK/89/2017

Date : 14 MAR 2017

INSTITUTIONAL ETHICS COMMITTEE, D. Y. PATIL MEDICAL COLLEGE, KOLHAPUR.

This is to certify that the research project titled,

"Anthropometric Comparative Study of Facial Parameters with Body Height in Sangli District Population."

Submitted by : **Dr. Vaishali A. Mane**

Under the supervision of appointed Guide (if any): **Dr. Ashalata D. Patil**

Has been studied by the Institutional Ethics Committee (IEC) at its meeting held on **14/03/2017** and granted approval for the study with due effect with the following caveats:

1. If you desire any change in the protocol or standard recording document at any time, please submit the same to the IEC for information and approval before the change is implemented.
2. All serious and/or unexpected adverse events due to the drug/procedures tested in the study must be informed to the IEC within 24 hours and steps for appropriate treatment must be immediately instituted.
3. In case of injury/disability/death of any participant attributable to the drug/procedure under study, all compensation is to be made by the sponsor of the study.
4. The Chief investigator/Researcher must inform the IEC immediately if the study is terminated earlier than planned with the reasons for the same.
5. The final results of the study must be communicated to the IEC within 3 months of the completion of data collection.
6. The researcher must take all precautions to safeguard the rights, safety, dignity and wellbeing of the participants in the study.
7. The researcher must be up to date about all information regarding the risk/benefit ratio of any drug/procedure being used and any new information must be conveyed to the IEC immediately. The IEC reserves the right to change a decision on the project in the light of any new knowledge.
8. Before publishing the results of the study, the researcher must take permission from the Dean of the Institution.
9. Annual progress report should be submitted for all sponsored projects to the committee.
10. Unethical conduct of research in non-sponsored projects will result in withdrawal of the ethics approval and negation of all data collected till that date.

Shimpa.

Dr. Mrs. Shimpa R. Sharma
(Member Secretary, IEC)

Dr. (Mrs) Shimpa Sharma
Member Secretary,
Institutional Ethics Committee
D. Y. Patil Medical College,
Kolhapur - 416 006

869, 'E' Kasaba Bavada, Kolhapur-416 006 (MS) INDIA. Phone No. : (0231) 2601235-36, Fax : (0231) 2601238,
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रुग्ण संमती पत्र

मी श्री./सौ./कु. ..... लिंग- .....

वय-.....

राहणार:.....

या पत्राद्वारे खात्री देतो की

१) मला डी. वाय. पाटील मेडीकल कॉलेजच्या "द मेडीकल कॉलेज" वैद्यकीय डॉक्टर संशोधक यांच्याकडून विचारले गेले आहे की, संशोधन अभ्यासात माझी भाग घ्यायची इच्छा आहे का?

२) वैद्यकीय डॉक्टर संशोधक यांच्याकडून केल्या जाणाऱ्या संशोधन अभ्यासाचे स्वरुप व त्यामध्ये माझ्या सहभागाचा कालावधी याविषयी व्यवस्थितपणे मला समजणाऱ्या भाषेत सांगितले आहे.

३) संशोधन अभ्यासा दरम्यान उद्भवणारे धोके आणि परिणाम व्यवस्थितपणे मला समजणाऱ्या भाषेत समजावून सांगितले आहेत.

४) मला हे सुध्दा माहिती आहे की, माझा अभ्यासातील सहभाग फक्त वैद्यकीय संशोधन क्षेत्राच्या प्रगती करिता फायदा होण्यासाठी आहे, ना की, मेडीकल कॉलेज किंवा संशोधन कर्त्याकडून पैशाच्या फायद्याकरिता.

५) मला याची पण कल्पना दिली आहे की, मी कोणत्याही स्थितीत सहभागासाठी बांधील नाही आणि एकदा मी अभ्यासात सहभागासाठी सहमती दिली तरी मी माझा अभ्यासातील सहभाग कोणत्याही वेळी विहीत नमुन्यात मेडीकल कॉलेजला लेखी अर्ज करुन कोणतेही कारण नमूद न देता रद्द करु शकतो.

६) माझ्यामध्ये आणि संशोधनकर्ते यांच्यात अभ्यासात सहभागासाठी कोणताही आर्थिक व्यवहार असणार नाही.

७) मला याची पण कल्पना दिली आहे,की माझ्या अभ्यासातील सहभागातून जी काही माहिती गोळा गेली जाईल त्याचा वापर फक्त शैक्षणिक हेतू करिता आणि किंवा पुढील वैद्यकीय संशोधनाकरिताच होईल

८) मला याची पण खात्री दिली आहे की, अभ्यासाच्या काळात गोळा केलेल्या माहितीचे सार्वजनिक प्रसारण किंवा त्यांचा परिणामांचे सार्वजनिक प्रसारण नाव न जाहीर करता केले जाईल आणि कोणत्याही परिस्थितीत माझी स्वत:ची ओळख दाखवली जाणार नाही. कोणत्याही वैयक्तिक माहिती माझी वैयक्तिक ओळख दाखविण्याची शक्यता असेल तर नेहमीच गुप्त राखली जाईल.

९) या संमती पत्रातील मजकूर आणि त्याचा परिणाम मला समजणाऱ्या भाषेत व्यवस्थित समजावून सांगितला आहे.

सही

ANNEXURES

PUBLICATION DONE-2

1.RELIABILITY OF STATURE ESTIMATION FROM FACIAL PARAMETERS AMONGST SANGLI DISTRICT POPULATION.Dr.Vaishali A.Mane, Dr.Ashalata D.Patil, Dr.A.Y.Mane.International journal of Scientific Research and Review.ISSN No.2279-543X.2018;7(8)99-104.

2.ANTHROPOMETRIC STUDY OF FACIAL INDEX IN THE SANGLI DISTRICT POPULATION. Dr.Vaishali A.Mane, Dr.Ashalata D.Patil, Dr.A.Y.Mane.International journal of Research.ISSN NO:2236-6124;January 20198(1),992-1000.

RELIABILITY OF STATURE ESTIMATION FROM FACIAL PARAMETERS AMONGST SANGLI DISTRICT POPULATION

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ABSTRACT :

INTRODUCTION:Stature is an important parameter of identity of an individual. It is proved that each race requires its own findings for stature estimation because of ethnic, dietary and climatic variations.

***AIM and OBJECTIVES**-The aim is to correlate the stature with facial height and bizygomatic width in males and femalesof Sangli district.*

***Material and Methods**: 259 males and 259 females of Sangli district population ,within age group 18-60 yrs were analysed. Height of the subject was measured in erect posture by measuring tape. Facial height and Bizygomatic facial width were measured using a Vernier caliper. Data was subjected to statistical analysis , regression equations was formulated using regression coefficient.*

***Observation & Results**: In males,mean stature was 166.80 ± 9.19cms, facial height 11.02±0.65 cms and mean Bizygomatic width 11.81±0.69cms. In females. mean stature was 152.91±6.84 cms, mean Facial height 10.05±0.67 cms and mean Bizygomatic width 11.50 ±0.89 cms.*

***Conclusion:** All the parameters i.e. stature, facial height and bizygomatic width were found to be more in males as compared to females.There is positive correlation between facial parameters and stature.*

The facial height is the most reliable facial parameter than bizygomatic width for estimation of stature using regression equation in both males and females.

***Keywords:** stature, facial height, Bizygomatic width, correlation*

INTRODUCTION:

Anthropometry is the methodical technique of measuring and recording of human parts by the most predictive method for scientific purpose.[1]. Anatomists and Forensic experts use it for identification of sex, race and stature from skeletal remains. Stature is an important parameter of identity of an individual. It is proved that each race requires its own findings for stature estimation because of ethnic, dietary and climatic variations[2].Through anthropometric dimensions, it is possible to study body proportions, size and shape of man in formulating standards, useful in defence forces. Formula derived from the relevant sample provide most accurate and precise inference[3]. Many studies have been conducted on the estimation of stature from various body parts like hands, trunk, intact vertebral column, upper and lower limbs, individual long and short bones, foot and foot prints. Since all these parts of body and bones are not always available for forensic examination, it becomes necessary to make use of other parts of the body like head and face region[4]. Only a few studies have been conducted on cephalo-facial region with respect to estimation of stature (Bhatnagar et al 1984, Kamel et al 1990, Duyar et al 2006, Nagesh and Kumar 2006, Krishnan and Sharma 2007, Smith 2007, Restogi et al 2008, Swami S et al 2015, Kanchankumar Wankhede 2012, SinchalDatta , Vishnu Sawant 2017 Twisha Shah et al 2015, ThoudamBedita Devi et al 2017)

ANTHROPOMETRIC STUDY OF FACIAL INDEX IN THE SANGLI DISTRICT POPULATION

Dr Vaishali A. Mane[1], Dr AshalataD.Patil[2]. .Dr.A.Y.Mane[3].

1. Ph D Student. 2. Professor, Department of Anatomy,
1.2 D. Y. Patil Medical College, Kolhapur, D Y Patil Education Society, Kolhapur, Deemed to be University. 3 Professor, Dept. of Biochemistry. PIMSR Urun Islampur
vaish.mane1974@gmail.com,

ABSTRACT

INTRODUCTION- Facial index is effective in anthropometry to specify the facial proportion. Facial archetype is a guiding tool to the direction of growth of craniofacial complex. The Indian population relates to Mesoprosopic facial index which diverges from Hypereuroprosopic to Hyperleptoprosopic index. Facial index and facial types are important predictable factors in obstructive sleep apnea as Euryprosopic facial type favors the nasal breathing mode. The present study reports about the variations in facial parameters in Hindu, Muslim and Christian population of Sangli district.

AIM AND OBJECTIVE –To measure and compare gender variations in facial index amongst Hindu, Muslim and Christian religion of Sangli district population. Based on facial index, to determine dominance of facial types in Hindu, Muslim and Christian religion of Sangli district population.

MATERIAL AND METHOD – After ethical clearance from Institutional Ethical Committee, the present study was done on Hindu Muslim and Christian religion population (240 people)from 10 talukas of Sangli district in the age group of 18 to 40years. Informed written consent was obtained from each participant in the study. Facial height and breadth were measured in millimeters with reference to anatomical landmarks keeping head in Frankfurt horizontal plane. Facial Index was calculated as (Facial height ÷ facial breadth) x100. Depending on Facial Index, facial forms were classified according to Martin and Saller. Data was statistically analyzed to see religion difference and gender difference.

OBSERVATION – Measurement of facial height, facial breadth and facial index amongst Hindu, Muslim and Christian population of Sangli district showed statistically significant difference.
The mean value of facial height in Muslim (106.99 ± 8.43) is more than Hindu (103.73± 8.67) and Christian (102.58 ± 9.60,).
The mean value of facial breadth in Christian (116.70 ± 7.89) is more than Hindu (115.47 ± 7.57)and Muslim (113.42 ± 7.80.

The mean value of facial index in Muslim (94.63 ± 8.41) is more than Hindu (90.19 ± 9.26) and Christian (88.02 ± 7.34).
We observed Hyperleptoprosopic (Very Long Face)as the dominant facial form, followed by Mesoprosopic (Broad face) in all above three religions of Sangli district. Least common facial form in Hindus was Leptoprosopic (Long Face), in Muslim and Christians – Hypereuroprosopic (Very Broad Face).

CONFERENCES ATTAINDED -05

GADAG INSTITUTE OF MEDICAL SCIENCES
Gadag, Karnataka, INDIA

WORLD CONGRESS OF ANATOMISTS
Host : Karnataka Chapter of Anatomists

Certificate

Dr./Mr/Mrs/Miss VAISHALI MANE bearing Reg.No. 28155

Registered with _____ Medical Council. Address _____

has been a Delegate/Speaker/Chairperson/ Organizing Committee Member in World Congress of Anatomists, 19th KCA Conference & Post Conference CME held from 22nd to 24th Sept. 2017 & presented a Guest Lecture/Paper/Poster tilted _____

Karnataka Medical Council has granted 6 Credit hours for delegates/faculty vide letter No. K.M.C./C.M.E./ 363/2017 Dated : 29-07-2017

Dr. Uma B. R.	Dr. Sanjeev Kolagi	Dr. (Smt) S. Kantha	Dr. Bernard Moxham	Dr. P. S. Bhusaraddi
Zonal Chairman K.M.C. C.M.E. Accreditation Committee	Secretary Karnataka Chapter of Anatomists	Founder President Karnataka Chapter of Anatomists	Past President International Federation of Anatomists	President, World Congress of Anatomists Director, GIMS Gadag

D. Y. Patil University, Kolhapur
and
Anatomical Society of India
3rd State Conference of Regional Chapter of Anatomy (Maharashtra)

MAHACON-III 2016

SCOPOTOMY 16 - ENDOSCOPIC ANATOMY
CME Code - MMC/MAC/2016/A-005873 Type of CME - Pre Clinical

Certificate

Department of Anatomy

This is Certify that, Dr. Mane Vaishali Amasaheb has participated as Delegate / ~~Chairperson~~ in the **"MAHACON - III 2016"** held on 22nd & 23rd September, 2016 at D. Y. Patil Medical College, Kolhapur - 416 006. Maharashtra Medical Council has granted Two credit hours for Delegates. He/She has presented ~~oral~~ / ~~poster~~ presentation entitled _____

Dr. Mrs. V. R. Nikam	Dr. Mrs. A. D. Patil	Dr. J. K. Watve
Organizing Secretary	Joint Organizing Secretary	MMC Observer No. MMC/MAO-00001/2013

Certificate

D.Y. Patil Medical College, Kolhapur, Maharashtra
Department of Physiology

CME Code- MMC/MAC/F- 0117892018/F-011789
Type of CME – Multispeciality

National Conference On
"Cardioprotective Role of Progesterone - A New Perspective"

CAPROP - 2019

CERTIFICATION OF PARTICIPATION

This is to Certify that Dr. Vaishali Annasaheb Mane Ph.D. Student (Dept. of Anatomy)
from D.Y. Patil Medical College, Kolhapur has participated in the National Conference on

"Cardioprotective Role of Progesterone – A New Perspective" CAPROP – 2019 held on 18th January 2019

Organized by Department of Physiology at **D.Y. Patil Medical College, Kolhapur, Maharashtra.**

Maharashtra Medical Council has granted 2 credit hours for Delegates

Dr. Padmaja R Desai	Dr. Sunita M Tiwale	Dr. Rakesh K. Sharma	Dr.Rajendra W. Abhyankar
Convener CAPROP 2019 Prof & Head, Dept. of Physiology D.Y. Patil Medical College, Kolhapur	Organizing Secretary, CAPROP 2019 Dept. of Physiology D.Y. Patil Medical College, Kolhapur	Dean D.Y. Patil Medical College, Kolhapur.	MMC Observer MMC/MAO-00111/2013

D Y Patil University Kolhapur
Department Of Pathology

National Seminar on Andrology Updates 2016

MMC/Accre.Cert/MED-0207/2014

CME Code -MMC/MAC /2016/F-004621
Type of CME- Multispecialty

Sunday, 20th March 2016

Certificate of Participation

This is to certify that

Dr. Vaishali Mane

has participated as delegate in the National Seminar on Andrology Updates 2016

Organized by the department of Pathology & Sperm 360 Labs - Disha Diagnostic Centere

Maharashtra Medical Council has granted 2 Credit hours for delegates

Dr. Mahadeo Mane	Dr. (Mrs.) S.S. More	Dr. Jayant Watve
Organizing Secretary Dr. D.Y.Patil Medical Collage, Kolhapur	Convener Dr. D.Y.Patil Medical Collage, Kolhapur	Observer Maharashtra Medical Council

INTERNATIONAL CONFERENCE ON
NANOTECHNOLOGY ADDRESSING THE CONVERGENCE OF MATERIALS SCIENCE, BIOTECHNOLOGY AND MEDICAL SCIENCE

IC-NACMBM-2017
November 9-11, 2017

CERTIFICATE

This Certificate is Presented to Prof./Dr./Mr./Ms./Mrs. ....Vaishali Mane.... has Participated/ Presented (Oral/Poster) in IC-NACMBM-2017.

He/ She presented a paper /poster entitled .....

.....

Convenor	Co-convenor	Organizing Secretary
Prof. C.D. Lokhande	Prof. R.K. Sharma	Dr. Arvind Gulbake

Organised by

Centre for Interdisciplinary Research
D.Y. Patil Education Society (Deemed to be University) Kolhapur
(Reaccredited by NAAC with 'A' Grade)

PAPERS PRESENTATION-2

D.Y.PATIL EDUCATION SOCIETY, KOLHAPUR
(INSTITUTION DEEMED TO BE UNIVERSITY) RE-ACCREDITED BY NAAC WITH 'A' GRADE
D.Y.PATIL MEDICAL COLLEGE, KOLHAPUR.
DEPARTMENT OF MICROBIOLOGY
NATIONAL CONFERENCE ON RECENT UPDATES ON NIPAH AND ARBOVIRUSES - INDIAN SCENARIO
NCRUNA-2018
CERTIFICATE

NO:MMC/Accre.Cert/MED-0207/2013/ CME CODE NO: MMC/MAC/2018/F-010872

This is to certify that
Dr./Mr./Mrs./Miss Ms. Vaishali A Mane has participated as Delegate / presented a Poster / Oral presentation in the National Conference on **"Recent Updates on Nipah and Arboviruses - Indian Scenario"** held on 18th August, 2018.

The Maharashtra Medical Council (MMC) has granted 2 (TWO) Credit points for the delegates.

Dr. Mrs. R. A. Chougale, Convener, NCRUNA-2018
Dr. Mrs. V. S. Vatkar, Organising Secretary, NCRUNA-2018
Dr. D. W. Deshkar, Organising Secretary, NCRUNA-2018
Dr. S. O. Kavthekar, MMC Observer, Code-MMC/MAO-01302/2017, NCRUNA-2018

Certificate of Presentation

5th INTERNATIONAL CONFERENCE

"ANGIOGENESIS RESEARCH: TARGETED ANTI-ANGIOGENIC THERAPY"

This certificate is presented to

Mr./Mrs./Dr. Vaishali A. Mane

has presented a poster/ oral presentation on To correlate the stature with facial parameters amongst Sangli district population

in 5th **International Conference** on

"Angiogenesis Research: Targeted Anti-Angiogenic Therapy"

held on 26th-27th October, 2018 at **D. Y. Patil Education Society (Deemed to be University), Kolhapur, India.**

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Prof. C. D. Lokhande, Director
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1	Name of Research Scholar	DR VAISHALI ANNASAHEB MANE
2	Faculty and Subject	MEDICINE, ANATOMY
3	Title of Thesis	ANTHROPOMETRIC COMPERATIVE STUDY OF FACIAL PARAMETERS WITH BODY HEIGHT IN SANGLI DISTRICT POPULATION
4	Name of Research Guide	DR ASHALATA D. PATIL, PROFESSOR, DEPARTMENT OF ANATOMY
5	Name of Co-Guide	
6	Department/Institution/College	DEPARTMENT OF ANATOMY, D Y Patil EDUCATIONAL SOCIETY, KOLHAPUR (Deemed to be University, Declared u/s 3 of the UGC Act 1956)
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MASTER CHART

MASTER CHART OF ANTHROPOMETRIC COMPARATIVE STUDY OF FACIAL PARAMETERS WITH BODY HEIGHT IN SANGLI DISTRICT POPULATION.

HINDU MALES

Height=cm, All facial parameters=mm

NO	Ht	TFH	UFH	LFH	NH	NW	BGW	BZW	BOW	IOW
1	164	95.9	53.48	42.42	47.11	38.37	125.16	127.99	95.12	31
2	176.2	107.42	49.63	57.79	42.96	35.1	130.03	132.42	99.42	33.2
3	156.2	99.72	52.53	47.19	44.03	42.37	128.5	120.93	95.57	25.64
4	154.7	94.83	48.65	46.18	42.61	37.63	116.74	115.26	86.73	32.39
5	158	116.21	62.32	53.89	54.56	35.29	113.63	120.01	95.18	29.17
6	170.2	111.2	52.36	54.1	44.5	43.25	123.83	120.22	101.6	32.87
7	166	102.32	51.8	50.52	40.76	41.37	109.18	108.37	96.57	33.88
8	164.7	110.32	54.56	55.29	41.98	34.45	105.93	119.98	101.25	30.97
9	176	111.41	58.04	53.36	42.62	41.76	134.46	128.78	106.23	35.78
10	155.5	116.29	68.35	47.95	51.84	33.68	112.18	113.68	94.26	28.57
11	164	115.59	61.01	54.58	50.82	41.9	119.76	124.42	100.39	35.93
12	162	109.17	62.84	46.33	45.37	38.89	115.36	116.07	101.88	34.67
13	170	114.88	57.19	57.69	49.47	33.55	111.99	113.06	99.35	35.54
14	161	119.33	60.73	58.6	50.01	37.51	104.8	113.11	99.3	34.77
15	161.5	112.4	50.57	61.83	43.79	36.3	117.81	114.79	103.68	32.49
16	168	115.26	58.9	56.36	47.03	41.76	107.57	114.83	93.48	32.12
17	165	104.25	54.93	49.32	42.27	40.39	127.8	119.83	104.36	38.4
18	169	109.16	54.75	54.42	49.37	34.3	113.26	116.64	104.92	36.3
19	155	107.04	59.22	47.82	47.4	43.17	117.47	111.97	97.96	33.81
20	147	111.21	55.2	48.22	43.22	37.36	102.8	110.32	96.44	30.81
21	169	106.11	60.02	40.09	43.22	34.31	111.91	110.43	99.2	32.08
22	163	106.46	53.13	53.33	46.3	36.3	102.98	108.84	99.88	35.15
23	167	105.2	54.04	51.16	45.31	36.22	99.54	106.09	98.78	32.99
24	159	111.05	52.49	48.09	41.45	42.23	105.48	104.78	105.83	37.7
25	169	111.09	58.9	47.01	34.98	31.33	114.77	107.89	97.44	26.03
26	165	99.7	51	48.7	35.03	23.8	99.7	106.83	90.12	25.44
27	172	117.63	63.95	53.68	53.77	34.21	111.18	110.55	103.21	34.18
28	167	129.66	56.07	73.69	43.44	35.87	119.95	116.95	109.51	34.83
29	147	102.38	61.99	40.39	47.69	33.7	107.42	120.96	99.58	35.46
30	160	113.52	55.75	67.77	46.92	35.74	104.71	113.25	102.65	36.12
31	149	109.91	60.65	38.26	49.56	42.01	116.31	114.88	98.77	35.65
32	166.5	117.48	59.78	57.7	49.46	37.71	103.78	106.05	97	35.77
33	173	116.91	59.07	57.84	48.01	37.18	130.82	110.89	102.44	33.55
34	157.5	110.05	55.75	54.03	46.05	36.11	108.35	117.47	98.21	34.28
35	165	119.63	61.37	58.26	44.85	38.55	107.44	119.52	105.52	32.9
36	144	94.21	57.22	37.01	38.9	38.15	108.68	119.57	98.58	38.67
37	165	110.57	65.49	45.08	15.84	42.7	95.66	110.86	84.52	28.81
38	161.5	107.24	52.1	55.14	41.46	35.09	118.92	124.75	103.51	37.94
39	172	113.46	61.88	51.58	52.13	35.74	113.08	121.81	98.99	37.8
40	163	107.28	56.15	51.13	51.25	30.92	101.45	115.53	98.89	31.58

41	162	103.92	52.88	51.04	41.91	34.62	116.35	124.39	104.4	37.77
42	165	104.99	57.48	47.51	50.4	41.93	111.84	122.63	104.92	34.54
43	164	104.44	53.92	50.52	46.4	36.88	109.43	112.35	107.95	36.34
44	173	110.42	53.93	56.49	44.14	38.43	108.91	119.26	96.07	33.75
45	158	98.57	49.07	49.5	42.95	32.37	112.74	120.27	100.97	29.17
46	175	111.43	49.11	57.32	45.18	25.95	109.96	120.82	96.9	27.07
47	164	106.72	58.47	48.25	48.43	33.5	108.25	121.67	96.72	31.96
48	172	111.25	57.55	50.5	50.65	35.67	107.47	121.4	95.42	29.31
49	165	107.32	57.43	49.89	47.27	40.4	119.1	119.97	101.85	33
50	159	106.27	53.63	52.64	49.33	37.58	118.52	126.71	103.32	36.51
51	161	106.24	53.24	52.99	45.45	39.51	122.94	116.53	105.1	35.45
52	166.5	112.64	56.22	56.42	48.64	37.86	122.93	115.97	105.98	33.05
53	159.5	101.7	48.87	52.83	38.03	38.71	110.87	112.41	99.83	31.89
54	165	124.18	55.96	68.22	51.96	31.98	112.62	116.81	103.74	32.04
55	155	113.5	65.83	47.67	50.74	34.84	116.39	116.65	102.01	33.56
56	163	101.23	54.37	46.86	45.4	37.5	107.04	120.51	105.49	33.91
57	165	110.95	56.36	54.59	46.76	31.85	99.95	109.51	95.35	30.04
58	163	105.86	56.76	49.1	51.15	33.36	107.04	121.34	102.16	32.96
59	154	99.65	52.12	47.53	42.11	32.3	99.98	111.43	96.23	27.14
60	173	117.06	58.76	58.3	51.79	36.14	101.32	114.15	102.07	32.58
61	173	116.27	60.63	55.64	49.72	40.59	126.22	136.5	117.37	48.8
62	175	118.51	60.48	58.03	52.32	36.1	109.56	126.48	106.22	33.88
63	171	119.3	58.65	60.65	47.2	36.65	103.76	122.83	110.79	32.83
64	185	112.16	57.31	54.85	46.79	38.44	127.01	137.86	113.01	40.12
65	173	107.4	54.95	52.45	47.5	32.17	115.15	125.46	105.13	41.43
66	159	108.02	59.1	48.92	46.09	36.29	110.27	118.72	103.21	34.28
67	165	106.4	52.22	54.18	47.16	38.24	112.48	124.01	105.75	37.26
68	168	104.99	54.46	50.53	47.68	35.59	117.37	125.23	108.56	37.43
69	175	115.3	55.3	60	47.4	37.28	114.72	115.93	106.07	37.51
70	166	105.37	57.34	48.03	49.86	36.81	109.8	124.71	102.22	32.19
71	168	110.72	50.93	59.79	45.03	32.04	104.49	119.98	108.9	33.04
72	173	107.36	52.02	55.34	43.82	31.63	111.66	115.7	103.27	33.39
73	168	113.78	55.02	58.76	44.83	37.17	103.13	123.09	115.32	35.1
74	175	110.69	54.47	56.22	48.55	32.25	117.35	123.67	109.54	36.27
75	174	109.33	55.86	53.47	47.52	34.25	102.89	115.35	114.82	41.13
76	160	102.12	52.16	49.96	45.3	37.05	110.32	114.31	102.66	31.61
77	160	109.11	54.74	54.37	47.53	43.13	111.99	118.72	100.5	36.57
78	171	109.53	56.34	53.19	53.61	37.46	116.37	120.39	110.94	34.47
79	169	102.58	55.1	47.48	46.01	32.33	115.61	121.28	104.27	34.52
80	171	115.76	63.1	52.66	55.95	38.79	107.49	110.34	101.39	36.39

81	159	109.23	55.56	44.67	47.7	34.5	101.23	108.56	105.89	35.24
82	161	93	41.63	51.37	37.05	28.02	101.77	112.32	93.29	28.34
83	162	114.19	56.28	57.91	47.14	40.29	119.88	123.68	95.55	37.7
84	162	105.63	48.52	57.13	42.72	34.36	105.66	122.61	105.29	36.92
85	184	116.17	58.37	57.8	51.16	36.42	102.36	117.76	104.75	35.23
86	167	103.59	53.57	50.02	46.54	34.03	108.02	121.98	102.36	34.78
87	174	101.77	48.16	53.61	44.7	23.83	104.5	106.22	99.33	31.11
88	170	93.98	44.63	49.35	41.63	33.85	111.22	114.81	109.58	32.86
89	172	110.87	50.95	59.92	46.98	37.15	120.84	122.29	98.71	33
90	179	111.33	51.96	59.37	47.69	38.73	118.99	124.07	105.48	34.2
91	164	102.93	48.79	54.14	41.92	33.52	109.44	119.2	97.27	30.45
92	170	105.68	52.37	53.31	46.69	37.92	117.12	128.92	109.25	34.11
93	173	113.92	54.88	59.04	48.52	39.56	127.28	138.95	107.41	30.46
94	171	116.72	58.98	57.74	49.92	34.78	116.32	125.27	101.74	32.67
95	162	105.37	51.18	54.19	39.41	35.91	104.88	113.77	106.46	36.38
96	168	102.26	50.1	52.16	43.36	36.38	116.88	122.92	104.76	39.61
97	173	100.88	53.07	47.81	44.13	40.25	105.93	118.36	105.06	32.86
98	163	113.53	55.17	58.36	49.17	32.75	109.17	113.89	102.2	36.29
99	166	107.75	51.21	56.54	46.16	36.73	106.93	112.6	98.42	30.17
100	162	110.61	56.92	53.69	49.2	37.24	106.03	119.23	102.16	38.13
101	168	117.04	55.06	61.98	47.66	36.38	106.65	115.95	104.56	35.01
102	170	105.9	53.09	52.81	45.26	38.4	120.2	121.96	105.17	36.87
103	159	107.53	51.92	55.61	45.5	37.13	108.37	122.95	101.31	34.05
104	178	106.91	53.91	53	43.12	38.71	118.92	117.85	100.48	35.03
105	178	109.69	47.68	62.01	42.06	37.2	117.35	125.72	103.89	37.48
106	173	118.15	52.06	66.09	46.6	30.19	100.81	105.94	101.34	32.61
107	159	96.58	52.78	43.8	46.64	37.03	121.93	123.47	101.17	40.42
108	163	108.24	53.62	54.62	49.08	37.14	111.79	126.37	102.38	37.32
109	170	111.81	53.02	58.79	46.72	37.04	121.08	123.68	110.2	36.28
110	158	109.71	51.29	58.42	43.12	38.08	117.18	116.71	105.73	43.38
111	175	112.9	60.8	52.1	53.29	31.8	109.31	112.43	98.61	29.74
112	167	117.8	62.75	55.05	57.37	41.06	110.31	119.55	101.82	37.89
113	157	109.24	56.9	52.34	48.67	34.44	112.09	117.5	97.15	35.28
114	168	109.73	62.46	47.27	53.13	42.42	112.39	122.43	101.32	36.37
115	162	114.15	59.07	55.08	52.4	41.5	107.42	126.94	100.62	39.19
116	160	110.4	60.38	50.02	50.63	34.13	114.58	125.52	93.55	32.61
117	167	107.34	52.88	54.46	42.22	32.71	93.76	114.54	98.23	32.68
118	177	123.04	59.25	63.78	51.56	37.4	103.14	129.13	108.46	40.96
119	162	115.28	58.52	56.76	45.63	38.7	118.19	125.37	98.61	34.52
120	158	102.69	60.62	42.07	51.4	37.92	102.3	118.61	101.8	33.28

121	174	115.85	56.06	59.78	42.09	39.54	117.09	115.83	95.08	37.43
122	165	101.34	58.94	42	48.94	41.62	110.81	115.07	100.37	30.82
123	168	107.26	56.36	50.9	50.79	38.68	110.18	122.11	101.37	35.24
124	158	100.41	55.91	44.5	51.44	38.7	125.67	135.8	109.16	33.2
125	168	102.5	49.05	53.45	44.59	36.55	109.32	113.44	101.96	31.39
126	169	117.2	51.33	65.85	46.93	38.42	109.11	120.04	102.36	36.56
127	166	105.84	52.61	53.23	44.73	38.87	98.17	111.58	96.88	32.51
128	169	115.2	62.38	52.82	53.17	36.71	94.13	119.88	108.84	38.13
129	175	117.13	61.53	55.6	51.54	41.23	107.07	114.8	112.18	32.73
130	183	106.11	49.83	56.28	41.75	39.07	104.14	121.53	109.65	39.41
131	178	111.52	55.59	55.93	46.75	39.29	98.98	120	111.56	34.82
132	160	107.46	58.19	49.27	50	36.99	105.41	117.59	97.38	35.29
133	167	105.72	53.61	52.11	43.99	29.79	101.53	114.25	100.27	33.77
134	163	103.73	52.02	51.7	48.2	37.42	109.58	117.09	101.82	32.17
135	158	97.2	51.09	46.11	45.69	38.08	110.23	131.48	103.73	32.79
136	163	108.2	58.06	50.14	50.98	35.03	103.86	112.36	90.99	33.17
137	171	102.19	53.55	48.64	45.13	37.98	99.2	120.95	100.21	31.62
138	167	96.65	56.52	40.13	51.08	36.15	99.72	117.81	99.39	32.9
139	173	118.57	63.31	55.26	49.7	40.26	97.4	115.12	98.57	31.24
140	166	111.08	53.39	57.69	47.44	31.23	95.99	114.35	104.99	35.13
141	161	104.48	54.37	50.11	42.78	34.18	95.74	120.4	99.73	32.96
142	170	107.79	54.76	53.03	48.59	36.91	98.7	118.93	102.59	33.04
143	182	116.38	56.83	59	46.09	36.78	107.86	124.16	99.24	34.79
144	159	101.07	54.11	46.96	45.96	37.08	101.75	114.01	96.04	31.26
145	167	111.78	54.73	57.05	48.29	39.06	106.61	122.48	104.32	30.52
146	164	106.02	53.35	52.67	46.41	38.53	105.84	119.73	99.61	35.64
147	173	117.28	61.08	56.2	51.63	39.94	108.2	127.3	111.52	37.89
148	173	101.58	52.22	49.36	45.32	34.31	108.34	120	97.77	31.09
149	165	108.62	51.93	56.69	44.06	32.65	107.22	122.5	105.43	36.98
150	178	110.12	62.67	47.45	52.63	41.03	109.14	122.18	100.48	36.98
151	167	106.16	54.38	51.78	47.05	33.67	100.96	119.02	102.66	32.01
152	172	116.77	59.94	56.83	55.8	38.82	100.77	108.23	99.26	35.48
153	161	97.41	46.64	50.77	40.36	31.05	101.01	112.35	93.99	24.62
154	174	116.29	63.67	52.62	51.14	33.35	105.58	122.16	96.37	36.47
155	174	117.17	58.23	58.94	48.48	33.05	103.97	116.4	95.12	31.77
156	171	116.57	65.47	51.1	55.19	37.01	110	120.88	103.55	34.54
157	177	128.7	58.25	70.45	49.45	39.5	118.63	134.04	107.39	41.89
158	170	114.69	59.9	54.79	51.01	37.95	103.88	114.05	106.63	36.05
159	171	118.75	58.78	59.97	45.47	35.87	100.89	112.91	102.87	39.75
160	158	114.48	55.51	58.91	46	39.3	102.99	114.34	104.69	38.24

161	178	122.08	57.7	64.38	52.18	35.47	107.77	121.61	96.98	37.8
162	164	111.28	55.8	55.48	50.69	34.92	96.51	112.7	99.35	33.34
163	174	105.95	55.78	50.08	48.12	38.02	107.74	123.6	100.34	33.38
164	174	123.16	62.55	60.61	53.62	34.92	104.56	114.62	100.14	34.21
165	166	113.11	55.92	57.19	41.97	38.6	103.88	114.42	105.14	40.62
166	167	106.5	57.9	48.7	41.63	39.41	103.32	107.24	96.09	34.3
167	166	116.84	55.17	61.67	47.49	36.55	112.6	120.05	104.12	34.77
168	166	118.59	57.58	61.01	47.4	35.56	104.67	118.63	111.46	40.61
169	155	103.75	51.7	52.05	36.43	32.75	102.06	112.78	104.45	34.04
170	174	107.98	53.13	54.85	47.32	36.7	102.9	121.5	103.64	37.39
171	168	115.01	53.09	61.92	47.83	35.03	97.21	109.63	98.68	33.33
172	169	107.42	49.72	57.7	45.32	37.42	113.37	113.15	107.12	39.93
173	172	112.65	61.26	51.39	54.12	39.32	103.18	115.99	104.72	34.52
174	168	104.17	57.29	46.88	49.5	39.19	107.67	118.45	98.7	35.33
175	160	104.77	57.24	47.53	48.04	36.86	107.64	114.51	95.14	36.48
176	173	115.45	56.62	58.83	48.43	36.96	101.11	111.17	103.24	34.9
177	171	112.83	55.84	56.92	47.59	33.1	104.84	113.54	95.09	34.37
178	167	104.15	56.04	48.11	48.24	34.98	113.31	122.69	101.01	32.95
179	175	113.62	61.09	52.53	57.68	36.06	114.17	119.04	110.52	34.94
180	170	120.28	54.94	65.34	45.67	37.26	102.18	109.63	103.29	36.35
181	146	104.97	55.51	49.46	50.94	31.14	102.34	111.68	102.28	33.68
182	168	112.69	54.09	58.6	45.23	38.28	115.64	124.44	103.52	32.85
183	163	110.53	52.09	58.44	48.99	34.59	96.57	98.25	100.15	31.18
184	162	106.76	56.6	50.16	48.41	32.89	96.12	102.45	99.35	33.8
185	168	107.22	55.21	52.02	47.66	38.27	111.57	118.79	107.31	35.6
186	170	101.74	51.62	50.12	46.9	42.14	109.79	116.18	101.24	31.31
187	165	114.31	59.92	54.46	50.8	40.34	112.3	122.15	107.02	34.83
188	168	103.81	57.75	46.06	49.93	37.45	111.37	119.21	92.84	33.96
189	163	108.2	58.06	50.14	50.98	35.03	103.86	112.36	90.99	33.17
190	171	102.19	53.55	48.64	45.13	37.98	99.2	120.95	100.21	31.62
191	167	96.65	56.52	40.13	51.08	36.15	99.72	117.81	99.39	32.9
192	173	118.57	63.31	55.26	49.7	40.26	97.4	115.12	98.57	31.24
193	166	111.08	53.39	57.69	47.44	31.23	95.99	114.35	104.99	35.13
194	161	104.48	54.37	50.11	42.78	34.18	95.74	120.4	99.73	32.96
195	170	107.79	54.76	53.03	48.59	36.91	98.7	118.93	102.59	33.04
196	182	116.38	56.83	59	46.09	36.78	107.86	124.16	99.24	34.79
197	159	101.07	54.11	46.96	45.96	37.08	101.75	114.01	96.04	31.26
198	167	111.78	54.73	57.05	48.29	39.06	106.61	122.48	104.32	30.52
199	164	106.02	53.35	52.67	46.41	38.53	105.84	119.73	99.61	35.64
200	173	117.28	61.08	56.2	51.63	39.94	108.2	127.3	111.52	37.89
201	173	101.58	52.22	49.36	45.32	34.31	108.34	120	97.77	31.09

202	165	108.62	51.93	56.69	44.06	32.65	107.22	122.5	105.43	36.98
203	178	110.12	62.67	47.45	52.63	41.03	109.14	122.18	100.48	36.98
204	167	106.16	54.38	51.78	47.05	33.67	100.96	119.02	102.66	32.01
205	172	116.77	59.94	56.83	55.8	38.82	100.77	108.23	99.26	35.48
206	161	97.41	46.64	50.77	40.36	31.05	101.01	112.35	93.99	24.62
207	174	116.29	63.67	52.62	51.14	33.35	105.58	122.16	96.37	36.47
208	174	117.17	58.23	58.94	48.48	33.05	103.97	116.4	95.12	31.77
209	171	116.57	65.47	51.1	55.19	37.01	110	120.88	103.55	34.54
210	177	128.7	58.25	70.45	49.45	39.5	118.63	134.04	107.39	41.89
211	170	114.69	59.9	54.79	51.01	37.95	103.88	114.05	106.63	36.05
212	171	118.75	58.78	59.97	45.47	35.87	100.89	112.91	102.87	39.75
213	158	114.48	55.51	58.91	46	39.3	102.99	114.34	104.69	38.24
214	178	122.08	57.7	64.38	52.18	35.47	107.77	121.61	96.98	37.8
215	164	111.28	55.8	55.48	50.69	34.92	96.51	112.7	99.35	33.34
216	174	105.95	55.78	50.08	48.12	38.02	107.74	123.6	100.34	33.38
217	174	123.16	62.55	60.61	53.62	34.92	104.56	114.62	100.14	34.21
218	163	108.2	58.06	50.14	50.98	35.03	103.86	112.36	90.99	33.17
219	171	102.19	53.55	48.64	45.13	37.98	99.2	120.95	100.21	31.62
220	167	96.65	56.52	40.13	51.08	36.15	99.72	117.81	99.39	32.9
221	173	118.57	63.31	55.26	49.7	40.26	97.4	115.12	98.57	31.24
222	166	111.08	53.39	57.69	47.44	31.23	95.99	114.35	104.99	35.13
223	161	104.48	54.37	50.11	42.78	34.18	95.74	120.4	99.73	32.96
224	170	107.79	54.76	53.03	48.59	36.91	98.7	118.93	102.59	33.04
225	182	116.38	56.83	59	46.09	36.78	107.86	124.16	99.24	34.79
226	159	101.07	54.11	46.96	45.96	37.08	101.75	114.01	96.04	31.26
227	167	111.78	54.73	57.05	48.29	39.06	106.61	122.48	104.32	30.52
228	164	106.02	53.35	52.67	46.41	38.53	105.84	119.73	99.61	35.64
229	173	117.28	61.08	56.2	51.63	39.94	108.2	127.3	111.52	37.89
230	173	101.58	52.22	49.36	45.32	34.31	108.34	120	97.77	31.09
231	165	108.62	51.93	56.69	44.06	32.65	107.22	122.5	105.43	36.98
232	178	110.12	62.67	47.45	52.63	41.03	109.14	122.18	100.48	36.98
233	167	106.16	54.38	51.78	47.05	33.67	100.96	119.02	102.66	32.01
234	172	116.77	59.94	56.83	55.8	38.82	100.77	108.23	99.26	35.48
235	161	97.41	46.64	50.77	40.36	31.05	101.01	112.35	93.99	24.62
236	174	116.29	63.67	52.62	51.14	33.35	105.58	122.16	96.37	36.47
237	174	117.17	58.23	58.94	48.48	33.05	103.97	116.4	95.12	31.77
238	171	116.57	65.47	51.1	55.19	37.01	110	120.88	103.55	34.54
239	177	128.7	58.25	70.45	49.45	39.5	118.63	134.04	107.39	41.89
240	170	114.69	59.9	54.79	51.01	37.95	103.88	114.05	106.63	36.05

241	158	114.48	55.51	58.91	46	39.3	102.99	114.34	104.69	38.24
242	178	122.08	57.7	64.38	52.18	35.47	107.77	121.61	96.98	37.8
243	164	111.28	55.8	55.48	50.69	34.92	96.51	112.7	99.35	33.34
244	174	105.95	55.78	50.08	48.12	38.02	107.74	123.6	100.34	33.38
245	174	123.16	62.55	60.61	53.62	34.92	104.56	114.62	100.14	34.21
246	163	108.2	58.06	50.14	50.98	35.03	103.86	112.36	90.99	33.17
247	171	102.19	53.55	48.64	45.13	37.98	99.2	120.95	100.21	31.62
248	167	96.65	56.52	40.13	51.08	36.15	99.72	117.81	99.39	32.9
249	173	118.57	63.31	55.26	49.7	40.26	97.4	115.12	98.57	31.24
250	166	111.08	53.39	57.69	47.44	31.23	95.99	114.35	104.99	35.13
251	161	104.48	54.37	50.11	42.78	34.18	95.74	120.4	99.73	32.96
252	170	111.06	54.76	53.03	48.59	36.91	98.7	118.93	102.59	33.04
253	182	116.38	56.83	59	46.09	36.78	107.86	124.16	99.24	34.79
254	159	101.07	54.11	46.96	45.96	37.08	101.75	114.01	96.04	31.26
255	167	111.78	54.73	57.05	48.29	39.06	106.61	122.48	104.32	30.52
256	164	106.02	53.35	52.67	46.41	38.53	105.84	119.73	99.61	35.64
257	173	117.28	61.08	56.2	51.63	39.94	108.2	127.3	111.52	37.89
258	173	101.58	52.22	49.36	45.32	34.31	108.34	120	97.77	31.09
259	165	108.62	51.93	56.69	44.06	32.65	107.22	122.5	105.43	36.98
260	178	110.12	62.67	47.45	52.63	41.03	109.14	122.18	100.48	36.98
261	167	106.16	54.38	51.78	47.05	33.67	100.96	119.02	102.66	32.01
262	172	116.77	59.94	56.83	55.8	38.82	100.77	108.23	99.26	35.48
263	161	97.41	46.64	50.77	40.36	31.05	101.01	112.35	93.99	24.62
264	174	116.29	63.67	52.62	51.14	33.35	105.58	122.16	96.37	36.47
265	174	117.17	58.23	58.94	48.48	33.05	103.97	116.4	95.12	31.77
266	171	116.57	65.47	51.1	55.19	37.01	110	120.88	103.55	34.54
267	177	128.7	58.25	70.45	49.45	39.5	118.63	134.04	107.39	41.89
268	170	114.69	59.9	54.79	51.01	37.95	103.88	114.05	106.63	36.05
269	171	118.75	58.78	59.97	45.47	35.87	100.89	112.91	102.87	39.75
270	158	114.48	55.51	58.91	46	39.3	102.99	114.34	104.69	38.24
271	178	122.08	57.7	64.38	52.18	35.47	107.77	121.61	96.98	37.8
272	164	111.28	55.8	55.48	50.69	34.92	96.51	112.7	99.35	33.34
273	174	111.07	55.78	50.08	48.12	38.02	107.74	123.6	100.34	33.38
274	174	123.16	62.55	60.61	53.62	34.92	104.56	114.62	100.14	34.21
275	163	108.2	58.06	50.14	50.98	35.03	103.86	112.36	90.99	33.17
276	171	111.2	53.55	48.64	45.13	37.98	99.2	120.95	100.21	31.62
277	167	96.65	56.52	40.13	51.08	36.15	99.72	117.81	99.39	32.9
278	159	101.07	54.11	46.96	45.96	37.08	101.75	114.01	96.04	31.26

HINDU FEMALES

1	152	95.88	51.56	45.32	45.32	28.17	111.57	113.33	94.61	28.42
2	154.7	99.55	50.11	45.39	40.65	34.19	118.75	136.78	91.99	32.1
3	161.9	94.8	43.88	50.84	43.53	37.68	125.29	131.54	97.63	36.08
4	148.6	93.55	49.46	44.09	40.49	34.94	120.73	123.62	96.9	32.27
5	156.2	104.21	55.27	48.97	47.83	36.77	124.87	124.99	100.3	30.7
6	141.6	88.08	47.33	40.74	43.78	38.55	118.48	124.38	99.73	36.29
7	154.6	99.52	48.07	51.45	43.96	33.5	119.82	123.27	99.2	33.56
8	146	103.17	54.81	49.36	47.41	38.02	120.34	124.16	101.96	39.17
9	148.2	94.57	50.82	43.75	40.61	34.13	111.72	125.14	93.13	25.97
10	154.5	93.9	51.18	42.72	43.79	26.54	101.77	108.68	88.09	25.7
11	133	85.28	47.94	37.34	38.63	33.54	109.17	116.14	84.26	29.87
12	156.6	95.17	51.78	43.39	42.81	30.63	106.58	115.8	86.76	32.58
13	153	86.3	48.13	38.17	42.07	33.71	116.66	123.96	94.29	34.59
14	160.5	106.25	49.58	56.67	37.77	22.8	98.5	114.35	101.35	36.39
15	153	96.53	52.96	43.57	47.26	33.88	113.97	107.6	96.68	31.72
16	156	95.62	56.8	38.82	47.07	34.87	109.25	124.2	96.34	29
17	146	94.61	51.43	43.18	42.55	35.04	111.68	113.28	86.43	31.55
18	145	92.81	50.28	42.53	40.87	32.66	102.53	108.35	72.32	30.48
19	171.5	113.88	55.08	58.8	46.02	36.52	102.71	110.43	97.09	33.49
20	161	100.08	54.19	45.89	46.95	34.73	102.85	107.27	93.01	29.67
21	167	103	51.13	51.87	40.96	32.7	118.44	123.88	101.12	33.5
22	161	104.58	55.02	49.56	43.34	33.31	107.7	118.24	92.67	35.9
23	166	110.03	55.52	54.51	46.74	37.64	126.59	123.05	101.3	31.79
24	155	95.4	51.4	44	45.64	33.89	114.57	116.51	93.95	29.91
25	149	98.8	49.8	49	40.41	40.89	110.96	112.26	94.95	37.48
26	147	102.39	50.08	52.31	41.28	32.05	104.83	110.02	97.08	35.22
27	158	109.53	60.13	49.4	47.32	37.95	103.21	120.86	92.85	34.96
28	147	86.12	45.5	40.67	37.04	25.16	92.89	102.56	87.15	30.64
29	152	99.62	57.03	42.79	43.64	37.11	105.9	104.92	96.13	36.23
30	155	106.95	56.04	40.91	45.35	35.01	109.9	107	96.63	33.77
31	157.5	108.56	54.81	53.75	49.61	34.27	107.37	111.99	99.5	36.97
32	157	104.38	59	45.38	48	34.28	102.7	109.55	97.05	35.88
33	157	104.64	58	46.64	45.29	31.91	114.1	118.91	105.56	35.75
34	156	99.4	54	45.4	45.61	33.03	111	117.56	100.72	37.28
35	155	98.71	54.24	44.47	45.08	30.13	99.94	102.36	95.32	32.61
36	148	105.06	52.65	52.43	43.94	31.45	100.13	110.1	94.3	30.98
37	146	94.89	54.17	40.72	45.8	30.87	100.2	105.41	89.11	28.72
38	143	98.56	51.39	47.17	42.12	32.74	99.88	98.69	98.2	34.16
39	151	94.28	49.18	45.1	41.74	32.4	99.74	108.22	94	36.49
40	153	100.06	55.08	44.98	44.13	33.08	121.6	110.39	103.7	32.53

41	153	115.29	60.32	54.97	47.52	37.43	114.35	121.96	97.43	36.11
42	153	108.72	54.15	54.57	43.81	31.28	111	120.6	98.6	35.41
43	146	97.1	46	51.1	43.15	29.6	114.91	111.13	87.75	28.36
44	161	98.32	52.22	46.1	44.15	32.93	112.51	119.72	99.92	33.15
45	153	102.12	54.69	47.43	47.29	32.23	118.61	123.51	102.92	38.49
46	170	98.94	55.5	43.44	44.65	33.09	107.48	110.69	92.16	32.46
47	163	107.33	50.19	52.77	42.13	35.47	120.3	133.26	104.85	34.58
48	145	101.76	58.7	43.06	46.44	34.11	104.32	110.59	101.05	33.25
49	145	106.45	54.93	51.52	45.08	38.68	115.43	117.33	102.59	33.34
50	140	93.29	47.94	45.35	42.99	28.94	105.05	100.55	96.25	31.46
51	151.5	102.48	52.88	49.64	44.81	28.93	105.33	107.78	95.21	30.08
52	147	96.15	56.66	39.49	46.34	35.26	114.63	122.79	97.02	35.97
53	145	103.97	57.88	46.09	46.69	31.97	108.43	118.88	101.72	36.05
54	148.5	95.14	50.1	45.04	44.11	30.82	99.54	104	90.42	29.41
55	136	102.44	52.99	49.45	42.79	29.54	112.06	116.92	101.79	34.83
56	157	97.09	48.96	48.13	42.64	33.02	115.1	117.04	97	34.01
57	159	90.3	43.46	46.84	37.83	38.07	109.7	112.93	98.47	32.83
58	151	95.87	45.34	50.53	38.73	34.24	101.32	109.82	92.94	32.81
59	150	104.5	51.59	52.91	37.9	34.93	100.11	106.6	101.08	37.92
60	145	90.3	46.98	75.95	40.23	35.56	116.74	122.93	100.2	31.74
61	147	96.02	46.89	49.13	40.21	29.82	107.08	114.53	93.62	29.29
62	151	95.15	48.8	46.35	44.03	30.54	105.71	124.69	97.7	32.2
63	158	98.77	50.25	48.52	44.76	35.61	99.95	121.98	102.77	31.85
64	139	90.88	47.23	43.65	44.09	34.14	100.04	107.28	97.22	33.65
65	152	100.74	50.63	50.71	48.29	31.14	99.34	110.49	94.02	34.94
66	153	109.57	50.83	58.74	45.92	30.51	1006.08	115.39	105.05	33.1
67	144	89.06	43.39	45.67	41.45	35.31	114.35	125.56	104.82	30.4
68	155.5	97.51	48.46	49.05	42.22	32.31	107.92	119.1	106.56	35.4
69	150	86.28	46.85	39.43	43.56	35.17	101.16	112.37	101.44	34.43
70	139	101.49	52.23	49.26	47.67	31.34	105.1	112.06	96.39	34.87
71	154	92.48	47.78	44.7	41.32	32.29	114.67	126.8	104.26	32.6
72	154	90.98	44.92	46.06	43.16	28.39	94.78	117.18	99.33	30.67
73	136	92.14	51.53	40.61	42.94	31.67	100.17	110.03	92.5	31.35
74	152	101.88	53.17	48.71	47.34	36.25	120.5	129.83	101.48	29.9
75	150	96.8	49.32	47.48	47.09	35.91	111.36	119.68	105.35	32.59
76	164	106.95	57.01	49.94	47.75	34.58	106.01	120.87	97.92	32.51
77	173	108.76	60.05	48.71	47.41	36.03	114.9	122.48	105.39	29.1
78	162	106.8	53.34	53.46	42.79	36.37	112.59	119.15	105.71	36.3
79	155	104.07	48.77	55.3	41.02	26.27	99.03	109.44	95.88	27.45
80	165	105.12	50.65	54.47	41.98	33.41	112.1	120.38	102.7	33.7

81	161	101.38	50	51.38	44.17	34.93	100.83	115.71	95.19	27.59
82	152	98.99	52.13	46.86	45.54	34.77	109.73	109.04	104.76	30.94
83	153	102.73	57.42	45.31	49.41	34.27	111.37	125.7	100.88	33.59
84	136	95.35	53.41	41.94	42.9	34.56	89.82	110.74	94.28	30.49
85	153	108.85	56.12	52.73	48.27	34.48	107.33	121.49	101.21	34.2
86	150	90.44	48.45	41.99	37.55	29.35	109.73	116.06	97.3	32.08
87	153	96.91	46.3	50.61	39.89	30.79	109.81	117.45	97.86	29.67
88	151	101.79	49.68	52.11	40.64	31.8	96.83	106.75	101.92	30.42
89	155	104.16	52.35	51.81	44.54	32.53	97.81	118.43	96.35	38.58
90	143	101.57	52.57	49	42.44	32.65	104.04	118.38	105.95	36.3
91	156	112.19	59.82	52.37	51.51	39.11	104.36	120.43	105.95	36.3
92	147	101.77	53.15	48.62	40.96	28.56	99.57	114.55	102.82	27.87
93	157	97.71	44.89	52.82	38.54	30.05	98.47	111.76	99.44	31.64
94	151	101.35	48.5	52.82	41.92	24.68	106	121.41	95.12	29.98
95	148	92.77	46.59	46.18	38.97	28.92	92.09	110.03	93.97	29.5
96	151	100.52	48.33	52.19	40.2	29.26	101.24	117.15	95.8	34.36
97	155	93.6	49.84	43.76	44.74	31.95	100.27	122.03	96.83	29.23
98	151	93.02	50.61	42.41	43.41	24.6	96.37	110.12	95.44	26.57
99	150	96.35	53.06	43.29	47.16	37.12	98.89	112.22	97.31	32.71
100	155	99.66	52.53	47.13	45.9	37.73	114.78	121.85	96	30.22
101	150	103.75	49.78	53.97	43.81	33.01	111.27	121.06	100.35	34.46
102	161	105.37	52.47	52.9	48.17	31.17	115.55	113.57	96.47	34.21
103	150	100.71	53.56	47.15	40.17	34.27	101.98	115.65	99.28	29.2
104	158	114.52	60.52	54.01	53.41	37.25	102.14	124.04	104.31	34.61
105	152	100.79	52.8	47.99	44.76	30.85	113.26	113.92	96.35	33.09
106	151	103.39	56.2	47.19	47.9	30.81	100.85	107.98	91.77	28.03
107	149	97.3	53.72	43.58	44.11	29.74	106.47	114.81	94.34	33.86
108	153	105.26	55.83	49.43	50.88	30.5	109.65	118.38	89.57	31.09
109	151	100.01	51	49.01	44.49	28.17	99.17	106.79	94.63	31
110	151	101.07	47.75	52.32	44.99	36.13	119.27	124.56	97.59	30.71
111	146	96.65	47.17	49.18	40.58	32.32	110.09	116.48	92.11	31.59
112	156	103.44	59.93	43.51	54.59	29.89	103.5	115.04	95.44	35.31
113	147	99.83	50.91	48.92	48.28	30.83	98.16	107.57	92.96	32.3
114	146	99.15	52.73	46.42	47.66	33.45	107.19	110.76	98.67	31.89
115	155	110.76	58.66	52.1	51.22	33.86	107.04	111.76	104.52	32.31
116	155	101.55	52.7	48.85	47.08	34.61	104.51	118.08	104.21	33
117	155	92.3	52.81	39.49	46.61	30.92	102	100.86	95.7	34.96
118	150	107.53	52.33	55.2	46.21	18.38	92.62	103.73	91.82	28.71
119	155	90.64	39.08	51.56	35.67	26.56	99.06	106.42	94.19	26.38
120	157	113.32	55.16	57.56	48.95	30.14	113.8	121.06	102.18	32.98

121	152	105.11	57.32	47.79	51.73	33.19	110.73	122.73	102.39	34.13
122	162	103.67	52.3	51.41	42.97	30.84	109.69	112.41	100.05	30.19
123	152	100.71	49.48	51.23	41.88	32.71	97.5	114.2	98.72	32.56
124	167	114.76	56.49	58.27	46.19	33.39	103.02	129.62	107.18	30.02
125	161	112.35	61.52	50.83	51.13	37.17	107.38	119.84	102.78	36.04
126	151	95.9	48.08	47.82	43.51	34.1	103.3	113.2	96.53	32.95
127	152	110.82	55.28	55.54	42.3	37.11	96.73	119.82	102.19	32.48
128	154	102	49.61	52.39	42.4	34.62	104.27	116.28	95.14	31.14
129	155	107.64	52.3	55.34	46.41	34.44	103.17	118.73	102.15	35.3
130	143	95.38	47.98	47.4	45.6	29.8	101.09	102.7	95.52	34.43
131	160	102.94	54.13	48.81	43.34	34.09	119.05	122.49	102.35	32.07
132	154	100.71	55.35	45.36	50.16	31.91	105.29	114.58	95.8	31.96
133	149	92.51	46.04	46.47	38.88	30.05	104.14	112.23	95.45	26.4
134	153	101.91	54.03	47.88	49.23	34.47	98.09	116.45	99.17	33.89
135	163	99.78	50.08	49.7	44.62	36.13	104.23	118.07	98.47	36.77
136	160	99.74	52.35	47.39	42.6	38.12	97.92	112.38	105.67	36.88
137	151	92.5	46.07	46.43	39.62	35.02	103.45	116.08	98.85	34.51
138	154	98.22	46.08	52.14	39.08	33.65	109.26	110.77	95.79	33.56
139	144	102.99	53.88	49.11	45.52	27.43	105.63	117.79	101.33	33.01
140	156	107.4	50.75	56.65	41.93	36.19	102.03	115.34	100.38	32.23
141	150	109.25	60.9	48.35	57.44	49.64	122.38	124.85	107.35	47.39
142	158	103.52	49.6	53.92	43.84	34.02	102.24	117.35	106.37	39.43
143	156	102.67	51.53	51.14	43.89	34.67	99.08	117.47	99.3	33.59
144	149	100.49	52.02	48.47	46.28	37.85	106.1	119.13	100.06	37
145	146	92.77	49.51	43.36	42.73	28.92	89.84	102.07	90.13	33.76
146	155	111.75	56.75	55	47.23	34.08	105.46	116.96	107.46	39.87
147	162	111.4	56.64	54.76	50.74	31.94	105.4	120.73	102.88	36.58
148	157	100.99	51.42	49.57	44.45	37.62	97	116.08	106.28	36.05
149	158	101.68	54.42	47.26	46.04	37.51	104.75	111.48	98.59	33.97
150	148	100.84	49.27	46.26	44.24	32.44	100.66	120.02	99.26	34.26
151	139	96.23	43.79	52.44	40.65	25.56	91.2	107.92	93.91	31.55
152	168	91.98	46.18	45.8	39.53	32.64	112.29	118.3	97.44	31.53
153	166	110.26	52.95	57.31	44.82	32.34	103.86	119.94	97.88	32.93
154	161	116.94	66.73	50.21	60.66	44.63	109.27	130.27	103.7	43.56
155	147	99.41	51.84	47.57	44.77	35.9	109.18	118.41	92.87	30.91
156	161	100.8	49.4	51.4	45.53	33.97	113.12	125.99	108.45	40.42
157	146	93.5	49.13	44.37	41.13	37.34	107.74	122.71	101.01	30.3
158	158	94.5	49.94	44.56	47.04	36.33	106.6	122.74	95.4	34.16
159	153	97.06	45.03	52.03	40.55	32.14	105.23	110.47	89.35	28.47
160	149	107.67	49.14	58.53	45.42	33.44	107.67	123.69	96.33	35.25
161	155	103.49	55.73	47.46	47.66	38.08	105.58	117.63	105.92	36.91
162	165	113.27	58.07	55.2	52.04	31.82	107.89	122.71	105.34	30.04
163	148	91.5	46.06	45.44	40.99	27.28	106.62	114.01	99.92	20.75
164	156	104.01	54.92	49.09	47.71	33.51	102.24	105.69	92.48	31.84
165	154	98.81	52.48	46.33	46.36	34.2	108.36	115.16	94.02	30.97
166	154	94.38	44.7	49.68	40.36	35.79	109.82	121.75	100.36	32.79
167	157	111.89	54.98	56.91	50.51	29.09	117.74	120.02	100.02	33.42
168	158	91.31	51.45	39.86	46.34	33.75	107.46	119.36	104.51	32.35
169	155	106.4	60.95	45.45	52.34	30.96	110.46	121.65	102.32	33.36

170	152	104.57	52.69	51.88	46.85	36.26	113.11	122.23	101.95	36.77
171	151	96.44	48.77	47.67	44.09	32.42	96.68	113.99	91.9	32.49
172	157	97.35	48.99	48.36	43.45	31.76	103.81	116.38	95.82	30.29
173	161	111.85	61.05	50.84	52.54	34.96	111.39	118.42	101.32	33.83
174	148	104.45	50.97	53.48	45.09	32.97	96.45	106.15	97.31	30.46
175	155	111.99	62.05	49.94	53.31	35.72	111.52	122.01	105.2	34.95
176	156	109.99	57.51	52.48	48.5	35.71	98.25	110.13	102.81	29.05
177	142	101.96	48.59	53.37	44.23	36.11	98.81	109.47	90.46	34.8
178	159	105.16	50.89	54.27	43.73	33.33	101.19	116.96	100.21	34.86
179	156	95.42	47.89	47.63	42.9	36.1	112.3	116.75	103.91	38.93
180	146	95.55	47.63	47.92	40.45	27.45	103.6	111.39	96.54	30.51
181	151	101.57	50.71	50.86	45.21	33.85	108.98	117.76	96.17	32.78
182	143	98.42	48.12	50.3	45.52	32.05	100.64	116.13	94.84	31.02
183	153	98.31	49.78	48.53	44.28	34.58	96.41	110.62	91.2	30.47
184	150	93.97	47.78	46.19	40.52	36.05	102.94	117.84	90.03	31.57
185	156	102.65	55.21	47.44	48.45	29.36	100.44	111.81	93.51	32.6
186	147	105.46	51.94	53.52	45.08	32.46	120.54	121.11	99.38	33.38
187	148	95.74	46.64	49.1	42.42	30.7	97.81	113.23	87.18	30.6
188	152	99.43	45.24	54.19	41.33	33.94	106.12	115.72	93.27	35.65
189	143	95.83	49.19	46.64	43.93	27.33	109.04	118.11	93.36	29.52
190	153	99.3	50.59	48.71	46.37	35.38	116.53	130.05	102.87	33.92
191	150	100.17	48.14	52.03	42.35	33	101.79	114.34	93.1	34.89
192	143	105.1	49.67	55.43	44.8	34.79	101.74	109.4	90.92	30.22
193	153	93.26	43.64	49.62	39.24	32.71	100.14	108.23	93.13	32.57
194	163	101.11	47.6	53.51	40.8	29.58	96.1	109.62	101.23	33.95
195	153	98.18	50.75	47.43	48.42	34.07	111.74	115.7	102.12	32.42
196	139	97.86	47.17	50.69	40.97	33.41	98.2	104.14	91.54	31.91
197	157	102.71	51.75	51.75	44.7	35.06	105.36	115.35	102.02	37.2
198	146	100.37	51.14	49.23	46.09	32.45	106.79	109.34	91.2	30.98
199	144	96.59	52.2	44.39	46.39	36.39	112.37	113.91	92.58	34.37
200	150	119.66	60.74	58.92	48.93	38.3	106.46	124.91	103.01	37.19
201	159	102.41	57.98	44.43	47.88	32.16	106.3	114.29	97.18	28.89
202	168	102.61	43.36	58.75	43.98	32.12	112.68	117.98	97.9	36.99
203	157	111.62	55.95	55.67	51.28	41.08	128.98	133.1	112.36	44.07
204	159	112.77	56.43	56.34	51.35	43.25	122.08	131.88	113.36	47.54
205	143	94.22	53.26	40.96	47.34	33.95	98.59	112.2	92.28	34.58
206	146	101.02	55.6	45.42	48.14	35.73	98.28	112	98.75	34.36
207	157	113.15	57.98	55.17	50.76	34.46	116.59	120.66	91.68	34.87
208	145	89.29	50.65	38.64	46.85	36.06	101.17	114.62	92.98	32.85
209	142	99.98	57.51	42.07	46.52	32.2	92.35	112.64	87.51	32.64
210	155	108.69	57.04	51.65	48.28	32.88	112.37	123.14	95.61	33.93
211	146	107.31	56.87	50.44	49.21	33.12	98.46	118.22	97.64	36.47
212	153	100.79	58.93	41.86	47.54	39.72	90.39	122.24	88.62	35.34
213	147	104.88	51.54	53.34	39.95	39.87	101.54	120.86	91.53	31.04
214	152	97.32	50.32	47	42.15	39.82	105	114.14	94.35	35.04
215	143	98.84	57.82	41.02	49.6	33.3	99.26	109.98	100.8	31.79
216	149	95.2	53.93	41.27	45.55	35.88	105.2	113.8	92.47	32.97
217	142	105.74	54.02	51.72	46.9	35.3	102.88	114.97	104.88	36.92
218	150	97.48	57.18	40.3	48.6	33.22	107.47	122.87	99.42	34.99
219	146	101.59	49.6	51.99	40.13	32.86	111.07	111.39	99.97	30.61
220	159	112.09	63.37	48.72	50.42	34.75	108.15	118.81	103.07	33.02

221	146	94.06	49.15	44.91	42.83	35.75	106.33	112.78	101.02	33.62
222	169	106.82	52.06	54.76	44.72	40.38	102.82	118.73	98.23	28.05
223	152	96.25	49.14	46.31	42.05	32.07	100.43	106.96	87.12	25.84
224	148	99.31	47.02	52.29	44.96	32.01	106.21	116.81	97.22	33.02
225	158	98.24	54.02	44.22	46.83	33.18	99.46	115.37	91.43	32.06
226	151	92.06	52.61	39.45	46.68	34.29	103.82	118.99	111.12	37.14
227	147	99.07	55.53	43.54	15.46	32.09	103.65	120.04	96.47	31.03
228	164	103.61	52.05	51.56	43.09	31.44	85.19	109.01	97.95	31.39
229	151	98.06	52.05	46.01	47.21	13.32	96.79	109.03	94.17	27.31
230	158	105.12	53.05	52.07	46.28	33.07	107.26	114.09	102.72	36.45
231	154	98.09	48.21	49.88	44.38	34.73	98	105.24	91.32	30.98
232	154	98.28	53.55	44.73	45.31	32.95	93.13	107.13	98.14	35
233	167	111.76	55.1	56.66	51.12	31.07	100.02	127.38	104.78	34.79
234	158	111.42	52.4	59.02	46.24	35.08	105.78	117.04	101.13	33.83
235	155	102.21	56.84	45.37	49.66	31.83	96.53	117.93	99.35	32.21
236	155	96.17	51.17	45	48.26	35.28	91.74	112.4	104.46	38.22
237	149	95.8	50.11	45.69	44.35	30.68	91.47	99.23	92.82	30.04
238	143	91.89	47.81	44.08	44.2	31.64	92.39	110.35	96.91	30.32
239	150	100.36	50.98	49.38	41.89	32.56	107.44	115.96	98.12	32.16
240	154	105.74	53.04	52.7	48.93	32.6	101.02	109.49	91.16	32.99
241	156	113.34	56.53	56.81	49.08	36.32	91.97	108.76	98.1	30.57
242	157	103.63	51.64	51.99	47.42	30.29	99.79	112.61	100.49	33.41
243	160	104.98	54.44	50.44	48.26	35.16	98.83	113.28	105.01	30.51
244	163	102.59	49.72	52.87	45.23	32.01	100.12	110.81	99.36	33.44
245	146	89.24	45.55	43.69	37.09	35.93	104.27	109.45	96.84	34.23
246	161	109.57	51.73	57.84	46.02	32.75	105.25	118.2	101.95	36.06
247	156	102.59	50.96	51.63	47.89	33.91	98.83	116	92.22	26.28
248	157	102.03	53.47	48.56	46.23	30.98	99.02	110.3	96.35	33.03
249	155	105.55	52.01	53.54	44.96	27.06	101.98	112.28	99.75	29.88
250	153	107.27	51.98	55.28	49.64	32.82	100.47	115.44	93.56	32.3
251	152	97.68	54.25	43.4	45.9	31.24	103.38	118.16	95.59	35.43
252	157	101.68	48.35	53.33	43.15	34.11	108.45	117.06	97.67	29.5
253	154	103.36	51.36	52	43.91	29.83	95.85	107.89	102.19	28.89
254	160	103.37	58.28	45.24	50.89	35.76	106.48	110.19	110.34	34.62
255	154	104.59	52.06	52.53	46.08	28.92	91.13	107.56	90.98	26.56
256	155	96.77	51.99	44.78	47.81	34.58	100.36	111.2	92.42	29.62
257	158	106.86	62.93	43.93	50.28	32.13	90.25	116.46	101.1	30.51
258	158	102.5	52.87	49.63	49.42	36.78	97.6	106.84	90.39	32.37
259	163	109.79	58.9	50.89	51.53	34.13	101.17	113.68	102.23	33.93
260	155	93.03	46.26	46.82	43.75	37.56	98.76	109.01	93.76	30.77
261	154	100.36	51.36	52	43.91	29.88	92.85	107.89	102.19	28.89
262	155	101.36	50.36	53	42.91	29.63	95.25	104.89	103.19	26.89
263	153	104.36	51.36	50.01	41.91	25.83	95.85	103.89	105.19	24.89
264	154	103.36	52.36	52.08	40.91	29.83	94.85	105.89	101.19	23.89

MUSLIM MALES

1	176	109.8	52.78	57.07	48.59	39.2	127.02	110.71	105.92	34.08
2	147	89.55	45.96	43.59	37.02	25.25	101.18	100.84	77.01	24.36
3	169	116.23	59.85	56.85	48.89	38.02	116.72	119.78	102.63	37.22
4	162	121.22	57.98	63.24	46.7	30.9	116.46	107.69	82.22	26.58
5	164.5	105.69	58.79	46.9	47.86	37.31	117.42	104.49	94.27	32.07
6	156	104.46	56.84	47.63	43.89	36	114.96	112.16	90.74	34.69
7	173	121.33	63.04	58.29	49.48	40.19	114.08	114.26	110.72	38.79
8	154	107.11	52.64	54.47	43.86	36.8	111.37	117.56	97.36	33.12
9	170	107.41	52.92	54.49	41.72	35.24	115.96	117.03	102.72	34.46
10	171	111.09	58.28	52.81	49.61	35.66	109.33	122.07	107.57	32.78
11	184	126	63.29	62.71	51.23	40.76	107.05	124.42	107.39	40.55
12	172	116.12	56.09	60.03	45.6	35.96	107.39	129.91	101.25	34.68
13	176	118.94	56.29	62.65	48.21	34.59	113.31	119.45	100.64	33.32
14	168	110.57	59.12	51.45	46.26	35.95	134.38	126.68	103.3	35.7
15	171	114.36	53.7	60.66	43.32	30.25	96.24	102.82	90.18	28.47
16	164	113.16	59.82	53.34	51.36	39.74	110.03	115.6	103.01	34.73
17	170	105.44	54.2	51.24	46.96	33.69	109.36	111.37	92.45	27.54
18	157	112.33	53.77	58.56	44.33	32.95	98.71	117	89.61	34.15
19	184	126	63.29	62.71	51.23	40.76	107.05	124.42	107.39	40.55
20	172	117.45	66.15	51.3	52.94	33.16	105.4	116.39	96.1	33.85
21	175	115.58	55.72	59.86	48.15	39.77	124.22	134	100	39.6
22	171	108.01	56.15	51.4	47.83	43.06	107.14	116.99	107.16	35.24
23	167	105.68	60.86	44.82	46.82	42.06	110.12	115.06	105.34	34.28
24	171	105.02	54.19	50.83	51.13	39.74	111.14	128.92	102.82	36.92
25	171	111.55	57.56	53.99	49.12	35.79	102.67	109.38	96.92	27.96
26	169	115.37	58.15	57.22	50.26	38.26	101.91	118.35	101.34	33.72
27	170	108.48	60.03	48.45	49.93	33.14	105.39	119.99	93.58	25.49
28	175	118.51	60.48	58.03	52.32	36.1	109.56	126.48	106.22	33.88
29	175	118.51	60.48	58.03	52.32	36.1	109.56	126.48	106.22	33.88
30	169	119.97	60.33	59.64	50.82	38.83	115.43	114.62	103.61	32.6
31	168	113.16	60.82	52.34	51.36	39.74	111.03	115.6	103.01	35.73
32	171	106.44	55.24	50.2	45.96	33.69	110.36	111.37	92.45	27.52
33	156	112.33	58.56	53.77	43.33	33.95	97.81	117	89.61	34.15
34	170	111.57	60.12	51.45	45.25	35.75	134.38	127.78	103.3	35.7
35	159	114.36	60.66	53.7	42.32	30.22	110.32	118.55	90.18	28.46
36	169	107.41	54.49	52.92	40.72	34.24	115.96	117.03	102.71	34.45
37	170	120.33	64.04	57.28	49.47	40.16	114.01	107.51	100.45	30.45
38	164	122.22	70.24	57.98	46	30.92	115.49	107.89	82.22	26.58
39	164	105.69	60.79	44.9	45.86	35.31	115.42	95.87	94.27	32.07
40	168	115.23	59.85	55.37	47.89	39.11	116.79	119.2	100.63	37.22

41	173	110.47	60.28	50.19	52.5	34.35	100.94	102.48	96.53	32.15
42	177	125.78	57.38	68.4	45.67	34.65	112.12	128.42	106.01	35.6
43	172	115.37	61.68	53.69	54.63	35.2	107.65	121.53	104.81	30.34
44	172	114.95	61.05	53.9	46.13	33.28	94.55	117.12	99.1	30.03
45	164	113.04	54.45	58.59	47.74	37.49	109.2	126.05	103.03	38.65
46	163	113.63	56.13	57.5	48.58	36.86	97.7	107.24	99.62	32.55
47	175	111.47	61.28	50.19	42.78	30.59	101.22	103.27	90.37	30.21
48	158	103.66	62.24	41.42	39.99	32.87	100.99	102.63	89.44	29.84
49	164	106.07	51.86	54.21	46.65	37.34	100.06	120.65	103.97	34.36
50	162	110.55	55	55.55	44.63	38.28	94.26	111.04	96.09	33.93
51	159	112.95	59.57	53.38	48.39	40.06	113.04	121.12	105.92	31.86
52	174	114.24	53.34	60.9	46.26	34.33	97.67	121.16	100	36.33
53	166	109.99	59.05	50.94	49.91	36.79	96.97	116.12	107.03	29.33
54	172	116.12	56.09	60.03	45.6	35.96	107.39	129.91	101.25	34.68
55	160	102.02	54.62	47.4	51.23	38.95	101.92	124.4	90.39	31.37
56	170	108.48	60.03	48.45	49.93	33.14	105.39	119.99	93.58	25.49
57	176	104.94	59.84	45.1	41.83	34.78	104.02	114.07	99.38	29.86
58	167	102.02	54.62	47.4	51.2	38.66	117.93	124.87	101.13	33.25
59	170	104.81	55.13	49.68	48.92	32.76	110.59	118.99	96.09	29.63
60	167	102.78	56.02	46.76	44.25	30.08	109.59	118.72	91.89	34.08
61	182	110.32	60.89	49.43	42.65	28.88	100.99	103.79	98.81	30.84
62	180	106.34	58.84	47.5	41.92	30.69	99.93	100.82	97.39	28.72
63	172	115.65	62.09	53.56	49.47	36.13	100.92	115.33	100.22	35.62
64	169	111.93	54.33	57.6	44.24	38.26	110.44	114.65	101.86	34.62
65	173	105.76	56.6	49.16	47.41	31.79	97.12	101.85	98.85	32.83
66	176	127.48	59.81	67.67	47	37.84	99.98	105.38	99.84	30.64
67	168	108.64	58.62	50.02	43.44	38.74	100.86	106.76	88.9	32.62
68	165	112.65	59.64	53.01	34.99	29.24	102.96	104.69	99.59	30.02
69	160	100.95	55.28	45.67	47.27	34.87	99.76	116.82	102.13	32.52
70	169	112.46	60.9	51.56	50.4	35.42	115.67	125.61	96.26	36.99
71	166	126.2	71.21	54.99	53.98	37.1	116.59	134.29	97.7	30.75
72	152	110.53	64.58	45.95	55.21	34.31	101.01	129.56	103.21	34.87
73	170	115.64	64.99	50.65	54.27	33.29	109.83	130.87	101.76	30.86
74	171	113.46	62.87	50.59	50.47	30.28	101.88	108.29	98.75	30.09
75	169	101.64	59.94	41.7	51.08	30.03	100.26	105.74	99.84	28.87
76	171	100.09	60.38	39.71	49.22	29.89	96.68	109.43	96.98	30.01
77	153	89.99	55.2	34.79	51.22	33.28	99.61	120.35	96.98	35.72
78	169	121.45	63.27	58.18	52.65	36.2	100.76	121.63	102.11	37.95
79	146	101.75	52.76	48.99	47.85	42.07	113.38	123.34	93.4	33.92
80	170	115.64	64.99	50.65	54.27	33.29	109.83	130.87	101.76	30.86

81	171	113.46	62.87	50.59	50.47	30.28	101.88	108.29	98.75	30.09
82	169	101.64	59.94	41.7	51.08	30.03	100.26	105.74	99.84	28.87
83	171	100.09	60.38	39.71	49.22	29.89	96.68	109.43	96.98	30.01
84	169	121.45	63.27	58.18	52.65	36.2	123.08	121.63	102.11	37.95
85	169	112.46	60.9	51.56	50.4	35.42	105.65	125.61	96.26	36.99
86	166	126.2	71.21	54.99	53.98	37.1	116.59	134.29	97.7	30.75
87	152	110.53	64.58	45.95	55.21	34.31	121.71	129.56	103.21	34.87
88	170	115.64	64.99	50.65	54.27	33.29	109.83	130.87	101.76	30.86
89	171	113.46	62.87	50.59	50.47	30.28	101.88	108.29	98.75	30.09
90	169	101.64	59.94	41.7	51.08	30.03	100.26	105.74	99.84	28.87
91	171	100.09	60.38	39.71	49.22	29.89	96.68	109.43	96.98	30.01
92	169	121.45	63.27	58.18	52.65	36.2	123.08	121.63	102.11	37.95
93	168	113.16	60.82	52.34	51.36	39.74	111.03	115.6	103.01	35.73
94	171	106.44	55.24	50.2	45.96	33.69	110.36	111.37	92.45	27.52
95	156	112.33	58.56	53.77	43.33	33.95	97.81	117	89.61	34.15
96	170	111.57	60.12	51.45	45.25	35.75	134.38	127.78	103.3	35.7
97	159	114.36	60.66	53.7	42.32	30.22	110.32	118.55	90.18	28.46
98	169	107.41	54.49	52.92	40.72	34.24	115.96	117.03	102.71	34.45
99	170	120.33	64.04	57.28	49.47	40.16	114.01	107.51	100.45	30.45
100	164	122.22	70.24	57.98	46	30.92	115.49	107.89	82.22	26.58
101	164	105.69	60.79	44.9	45.86	35.31	115.42	95.87	94.27	32.07
102	168	115.23	59.85	55.37	47.89	39.11	116.79	119.2	100.63	37.22
103	173	116.27	60.63	55.64	49.72	40.59	126.22	136.5	117.37	48.8
104	175	118.51	60.48	58.03	52.32	36.1	109.56	126.48	106.22	33.88
105	170	120.28	54.94	65.34	45.67	37.26	102.18	109.63	103.29	36.35
106	173	116.56	64.08	52.48	50.47	37.13	101.83	116.35	103.86	35.61
107	165	110.66	61.79	48.87	52.38	38.38	109.56	118	100.44	35.44
108	163	110.53	52.09	58.44	48.99	34.59	96.57	98.25	100.15	31.18
109	169	119.97	60.33	59.64	50.82	38.83	115.43	114.62	103.61	32.6
110	162	106.76	56.6	50.16	48.41	32.89	96.12	102.45	99.35	33.8
111	175	118.51	60.48	58.03	52.32	36.1	109.56	126.48	106.22	33.88
112	171	119.3	58.65	60.65	47.2	36.65	103.76	122.83	110.79	32.83
113	185	112.16	57.31	54.85	46.79	38.44	127.01	137.86	113.01	40.12
114	173	107.4	54.95	52.45	47.5	32.17	115.15	125.46	105.13	41.43
115	159	108.02	59.1	48.92	46.09	36.29	110.27	118.72	103.21	34.28
116	165	106.4	52.22	54.18	47.16	38.24	112.48	124.01	105.75	37.26
117	168	104.99	54.46	50.53	47.68	35.59	117.37	125.23	108.56	37.43
118	166	111.37	58.04	53.33	49.56	32.68	116.64	116.9	99.69	31.35
119	175	115.3	55.3	60	47.4	37.28	114.72	115.93	106.07	37.51
120	166	105.37	57.34	48.03	49.86	36.81	109.8	124.71	102.22	32.19

121	175	106.43	49.11	57.32	45.18	25.95	109.96	120.82	96.9	27.07
122	164	106.72	58.47	48.25	48.43	33.5	108.25	121.67	96.72	31.96
123	172	108.05	57.55	50.5	50.65	35.67	107.47	121.4	95.42	29.31
124	165	107.32	57.43	49.89	47.27	40.4	119.1	119.97	101.85	33
125	159	106.27	53.63	52.64	49.33	37.58	118.52	126.71	103.32	36.51
126	164	95.9	53.48	42.42	47.11	38.37	125.16	127.99	95.12	31
127	176.2	107.42	49.63	57.79	42.96	35.1	130.03	132.42	99.42	33.2
128	156.2	99.72	52.53	47.19	44.03	42.37	128.5	120.93	95.57	25.64
129	154.7	94.83	48.65	46.18	42.61	37.63	116.74	115.26	86.73	32.39
130	175	115.3	55.3	60	47.4	37.28	114.72	115.93	106.07	37.51
131	168	110.57	59.12	51.45	46.26	35.95	134.38	126.68	103.3	35.7

MUSLIM FEMALES

1	161.4	101.04	54.1	46.94	48.86	36.35	108.96	107.05	93.5	33.62
2	152.7	107.75	57.57	50.18	49.93	34	116.24	112.14	91.73	33.62
3	157.5	105.51	55.67	49.84	44.33	33.7	114.65	118.38	91.8	32.48
4	149	107.03	57.49	49.54	43.39	31.91	107.25	108.52	92.71	33.97
5	152.5	107.84	55.7	52.14	42.02	40.02	109.9	117.28	97.32	34.03
6	145	105.02	51.23	53.79	39.99	32.51	103.4	107.24	84.49	33.82
7	152.5	92.75	46.37	46.38	41.43	30.43	110.78	109.35	87.05	29.15
8	148	102.73	57.44	45.29	44.88	34.53	109.65	119.3	99.71	35.67
9	152.5	100.83	47.06	53.77	40.98	37.92	112.69	118.86	100.94	37.11
10	148	95.77	51.03	44.74	43.64	34.31	104.9	110.66	90.23	36.39
11	156	103.13	57.42	45.71	47.42	34.29	101.55	108.91	92	35.27
12	154	96.56	47.57	48.99	38.26	28.59	99.62	106.58	88.38	26.63
13	152	110.72	59.97	50.75	49.7	32.34	103.55	106.7	98.86	31.24
14	155.5	107.26	56.21	51.05	49.77	31.42	105.9	111.83	92.9	34.91
15	148	90.87	51.03	39.84	41.29	25.88	108.34	112.44	91.74	30.64
16	156	99.37	53.27	46.1	49.46	32.5	102.19	113.49	100.3	33
17	155	100.69	60.57	40.12	52.7	29.87	107.05	121.82	100.51	38.67
18	165	90.87	52.86	38.01	41.05	37.36	118.15	125.3	98.82	32.03
19	154	99.15	49.14	50.01	44.63	27.57	103.53	108.88	103.26	30.13
20	152	99.96	49.56	50.4	43.6	29.23	124.32	122.48	91.04	30.32
21	160.5	98.61	47.97	50.64	39.75	24.61	95.8	103.76	96.09	25.6
22	159	105.69	58.53	47.16	53.06	32.72	90.92	105	106.29	35.29
23	148	131.31	51.59	79.72	49.47	31.51	102.37	108.95	95.82	32.41
24	163	108.58	56.3	52.28	46.47	36.91	105.44	121.48	104.39	38.21
25	156	98.82	52.07	46.75	46.59	32.52	102.23	116.81	95.73	30.16
26	157	96.69	52.45	44.24	44.31	33.92	115.29	119.44	95.96	29.82
27	156	97.9	50.04	47.86	44.83	34.1	113.97	120.34	104.44	31.92
28	151	97.99	47	50.99	43.49	34.21	88.98	97.49	92.92	30.19
29	157	105.4	57.38	48.02	51.37	34.62	98.77	113.9	96.24	31.85
30	155	100.69	60.57	40.12	52.7	29.87	107.05	121.82	100.51	38.67
31	150	94.9	57.62	37.28	52.88	32.76	100.43	110.65	91.36	30.12
32	142	106.89	52.96	53.93	46.1	31.37	96.57	111.14	96.34	32.76
33	141	98.15	54.99	43.16	43.53	33.65	96.58	113.8	95	34.64
34	156	104.4	54.64	49.76	44.55	33.22	92.86	125.34	96.35	33.27
35	152	95.21	51.65	43.62	43.96	31.41	112.61	120.05	100.2	29.23
36	162	111.06	57.26	52.8	50.92	31.06	98.2	114.61	86.31	30.66

37	147	90.75	49.58	41.17	41.84	28.8	93.67	119.73	91.97	32.08
38	152	102.6	52.8	50.12	49.36	31.2	83.15	107.09	99.16	33.63
39	159	105.69	58.53	47.16	53.06	32.72	90.92	105	106.29	35.29
40	136	102.44	52.99	49.45	42.79	29.54	112.06	116.92	101.79	34.83
41	157	97.09	48.96	48.13	42.64	33.02	115.1	117.04	97	34.01
42	151	95.87	45.34	50.53	38.73	34.24	101.32	109.82	92.94	32.81
43	154	99.15	49.14	50.01	44.63	27.57	103.53	108.88	103.26	30.13
44	157	96.69	52.45	44.24	44.31	33.92	115.29	119.44	95.96	29.82
45	150	94.9	57.62	37.28	52.88	32.76	100.43	110.65	91.36	30.12
46	155	102.46	55.84	46.61	41.37	35	111.84	109.16	90.74	34.69
47	149	96.77	52.03	44.74	46.21	32	105.09	111.65	90.34	36.31
48	162	103.18	58.85	44.33	50.18	30.48	86.38	102.07	94.27	23.77
49	159	106.65	54.34	52.31	47.97	34.75	92.58	109.77	96.58	31.77
50	163	99.54	53.67	45.87	46.05	30.87	96.52	104.89	88.89	28.52
51	159	98.62	67.33	31.29	40.84	36.41	97.85	99.86	84.76	25.44
52	157	93.28	56.49	36.79	50.11	30.82	101.54	108.5	96.17	29.29
53	148	131.31	51.59	79.72	49.47	31.51	102.37	108.95	95.82	32.41
54	163	108.58	56.3	52.28	46.47	36.91	105.44	121.48	104.39	38.21
55	156	98.82	52.07	46.75	46.59	32.52	102.23	116.81	95.73	30.16
56	161	113.06	55.81	57.25	48.86	34.2	98.45	116.91	100.2	33.08
57	157	105.4	57.38	48.02	51.37	34.62	98.77	113.9	96.24	31.85
58	152	101.44	54.83	46.61	47.46	33.11	104.15	118.29	98.85	31.74
59	152	102.76	57.89	44.87	50.67	30.62	91.64	114.09	96.12	32.92
60	154	94.13	51.14	42.99	45.5	33.04	93.08	115.21	101.38	31.67
61	151	83.88	45.71	38.17	40.13	31.06	91.9	111.41	104.88	32.42
62	154	108.97	52.12	56.85	42.83	36.47	102.96	117.39	102.42	35.82
63	164	102.57	52.01	50.56	43.85	33.58	95.68	110.8	94.67	33.92
64	158	99.34	50.09	49.25	47.3	37.48	101.53	113.09	96.29	33.97
65	150	96.28	53.14	43.14	47.23	33.25	95.21	112.82	89.74	32.52
66	154	97.04	47.9	49.14	42.98	33.09	98.45	112.91	92.88	34.63
67	156	104.4	54.64	49.76	44.55	33.22	92.86	125.34	96.35	33.27
68	152	91.05	49.61	41.44	44.37	30.78	90.35	115.8	89.2	23.82
69	149	103.93	48.86	55.07	43.81	34.01	97.97	117.44	95.88	33.86
70	143	94.63	44.41	52.02	40.95	29.4	90.13	111.92	96.02	31.07
71	155	103.77	49.99	53.78	44.42	29.66	95.7	114.09	94.04	31.75
72	160	108.36	57.7	50.66	55.56	31.53	106.03	125.29	104.64	36.75
73	147	90.75	49.58	41.17	41.84	28.8	93.67	119.73	91.97	32.08
74	148	100.04	55.92	44.12	47.18	30.95	98.84	114.59	93.14	31.71
75	145	99.6	54.62	44.98	46.96	29.86	106.93	117.31	100.73	31.96
76	155	102.6	54.37	48.23	46.27	43	109.76	128.28	100.11	38.09
77	142	100.62	49.92	50.7	43.76	34.9	102.72	117	96.13	36.26
78	162	112	60.46	51.54	53.9	35.14	104.35	127	100.13	30.82
79	150	100.28	60.38	39.9	40.07	29.86	100.51	105.07	98.83	30.84

80	152	99.82	52.09	47.73	40.86	29.72	102.02	104.84	94.64	30.07
81	152	96.86	50.88	45.98	40.24	30.24	99.94	99.86	94.86	20.29
82	159	99.68	52.79	46.89	31.86	27.64	102.87	98.83	96.87	23.84
83	166	114.24	61.45	52.79	52.99	35.08	95.35	109.96	102.02	38.01
84	148	103.74	59.78	21.98	52.96	35.17	101.94	114.63	91.36	31.82
85	156	102.55	58.4	22.07	48.28	34.32	87.66	109.66	95.88	31.94
86	149	100.37	61.72	38.65	55.53	33.22	94.21	110.85	94.99	31.18
87	153	106.3	50.43	55.87	42.76	31.91	97.07	115.2	102.68	37.39
88	143	95.17	55.92	39.25	49.74	30.65	98.4	124.46	100.59	30.64
89	145	87.38	52.78	34.6	47.86	34.74	103.51	120.8	97.04	34.35
90	155	96.78	54.04	42.74	49.24	32.54	94.92	112.11	89.4	33.11
91	149	89.08	50.55	38.53	45.57	33.07	99.57	114.2	98.05	36.24
92	149	99.69	45.99	53.7	46.88	35.84	103.5	122.86	98.43	39.33
93	153	105.92	51.35	54.57	48.6	37.17	94.26	122.4	103.59	38.88
94	165	113.32	59.69	53.63	49.12	39.92	115.97	138.96	106.73	40.13
95	143	96.51	46.2	50.31	39.37	31.23	101.88	112.45	90.28	30.25
96	148	101.84	56.89	44.95	49.36	32.98	101.32	114.77	94.22	31.38
97	150	89.73	51.93	37.8	46.05	40.52	93.04	118	101.05	36.25
98	152	97.44	53.93	43.51	50.1	41.6	105.78	125.87	101.75	35.54
99	136	91.89	50.14	41.75	47.63	30.27	86.93	104.04	95.68	38.52
100	148	107.55	56.11	51.44	48.4	33.89	93.33	117.05	107.69	36.32
101	152	102.6	52.8	50.12	49.36	31.2	83.15	107.09	99.16	33.63
102	147	91.57	53.69	37.88	49.88	33.47	86.71	105.34	93.87	30.17
103	148	101	54.08	46.92	48.12	37.82	107.61	114.25	102.85	32.09
104	148	108.95	58.8	50.12	51.86	35.1	101.72	111.13	93.48	30.6
105	152	110.53	64.58	45.95	55.21	34.31	121.71	129.56	103.21	34.87
106	153	89.99	55.2	34.79	51.22	33.28	99.61	120.35	96.98	35.72
107	148	103.74	59.78	21.98	52.96	35.17	101.94	114.63	91.36	31.82
108	156	102.55	58.4	22.07	48.28	34.32	87.66	109.66	95.88	31.94
109	149	100.37	61.72	38.65	55.53	33.22	94.21	110.85	94.99	31.18
110	153	89.99	55.2	34.79	51.22	33.28	99.61	120.35	96.98	35.72
111	155	102.46	55.84	46.61	41.37	35	111.84	109.16	90.74	34.69
112	149	96.77	52.03	44.74	46.21	32	105.09	111.65	90.34	36.31
113	154	104.59	52.06	52.53	46.08	28.92	91.13	107.56	90.98	26.56
114	153	105.26	55.83	49.43	50.88	30.5	109.65	118.38	89.57	31.09
115	136	102.44	52.99	49.45	42.79	29.54	112.06	116.92	101.79	34.83
116	157	97.09	48.96	48.13	42.64	33.02	115.1	117.04	97	34.01
117	159	90.3	43.46	46.84	37.83	38.07	109.7	112.93	98.47	32.83
118	151	95.87	45.34	50.53	38.73	34.24	101.32	109.82	92.94	32.81
119	150	104.5	51.59	52.91	37.9	34.93	100.11	106.6	101.08	37.92
120	145	90.3	46.98	75.95	40.23	35.56	116.74	122.93	100.2	31.74
121	148	90.87	51.03	39.84	41.29	25.88	108.34	112.44	91.74	30.64
122	161.9	94.8	43.88	50.84	43.53	37.68	125.29	131.54	97.63	36.08
123	148.6	93.55	49.46	44.09	40.49	34.94	120.73	123.62	96.9	32.27
124	146	103.17	54.81	49.36	47.41	38.02	120.34	124.16	101.96	39.17
125	153	105.26	55.83	49.43	50.88	30.5	109.65	118.38	89.57	31.09
126	148	100.04	55.92	44.12	47.18	30.95	98.84	114.59	93.14	31.71

CHRISTIAN MALES

1	167	111.67	55.26	61.41	48.48	39.48	124.66	120.8	102.05	28.33
2	161	112.88	56.95	55.93	49.09	33.64	115.16	104.56	107.91	32.1
3	171	123.07	63.09	59.98	56.42	36.02	107.96	113.99	106.37	36.39
4	168	115.18	57.91	57.27	51.48	39.48	118.69	121.35	105.1	34.59
5	176	107.36	55.68	51.68	52.95	39.01	105.82	120.21	102.76	32.5
6	161	108.61	52.24	56.37	44.56	36.96	103.43	121.98	108.92	37.49
7	161	112.88	56.95	55.93	49.09	33.64	115.16	130.35	107.91	32.1
8	161	112.88	56.95	55.93	49.09	33.64	115.16	117.86	107.91	32.1
9	179	116.77	59.88	56.89	45.58	35.82	106.64	122.62	107.82	37.9
10	178	116.93	67.07	49.86	47.86	40.34	122.57	128.9	102.01	34.61
11	168	113.33	59.59	53.74	50.86	41.28	113.37	116.59	101.23	33.05
12	161	100.86	61.87	38.99	51.12	38	101.74	116.56	99.83	32.28
13	156	101.92	58.64	50.22	46.37	36.41	103.34	133.77	96.18	35.93
14	161	111.7	55.26	56.44	48.02	36.94	101.34	124.42	106.1	36.83
15	172	118.94	61.66	57.28	50.66	39.61	104.02	130.74	106.45	36.98
16	168	109.32	59.48	49.84	47.64	44.43	120.23	116.59	106.46	38.31
17	164	110.54	66.3	44.24	52.39	44.05	113.27	116.59	94.02	33.79
18	172	110.22	61.1	49.12	53.05	41.86	100.08	131.44	108.46	38.54
19	160	112.23	65.64	46.59	56.83	39.31	97.02	122.33	98.71	38.02
20	174	110.96	58.21	57.75	48.74	41.58	100.91	120.06	101.87	39.95
21	163	108.09	61	47.09	50.76	34.52	106.61	116.28	108.43	31.73
22	155	101.56	52.52	49.04	42.3	38.73	120.86	118.32	96.41	34.76
23	161	101.92	56.56	45.36	48.64	32.5	126.85	128.19	104.66	35.15
24	160	115.79	58.85	56.34	50.22	38.32	120.05	125.9	100.04	30.21
25	176	109.93	51.76	58.17	45.23	37.79	94.14	128.46	104.19	34.73
26	176	107.36	55.68	51.68	52.95	39.01	105.82	116.24	102.76	32.5
27	179	116.77	59.88	56.89	45.58	35.82	106.64	115.77	107.82	37.9
28	161	108.61	52.24	56.37	44.56	36.96	103.43	116.88	108.92	37.49
29	175	128.42	58.57	69.85	46.85	38.95	106.39	119.69	101.09	34.65
30	172	113.12	63.78	49.34	51.33	45.34	106.78	121.99	104.25	33.54
31	163	108.78	53.91	54.87	45.37	38.06	106.28	109.56	91.77	28.88
32	159	115.35	61.86	53.49	51.07	36.72	117.11	121.28	99.38	29.4
33	165	109.9	49.57	60.33	43.92	29.25	106.5	121.88	92.52	38.58
34	160	106.62	49.26	57.36	40.93	38.2	99.6	116.6	99.89	37.5
35	162	114.1	60.46	53.63	47.66	37.79	108.24	124.42	100.31	39.08
36	175	110.54	56.28	54.26	48.91	39.27	104.04	131.44	100.24	38.56
37	161	102.98	50.06	52.92	41.4	35.17	95.17	130.74	90.77	31.5
38	172	119.83	56.54	63.29	48.4	40.47	103.56	119.19	104.67	35.05
39	176	115.85	67.07	48.77	43.86	39.34	120.55	122.73	100.01	33.41
40	165	100.44	59.08	41.36	42.64	39.29	118.15	113.45	100.88	23.89
41	170	100.95	54.78	46.17	48.12	38.02	102.56	129.09	101.34	33.37
42	162	105.3	53.21	52.09	46.15	37.23	116.01	116.41	105.22	36.26
43	171.5	115.26	60.26	55	48.62	39.59	125.21	118.34	115.35	45.5
44	173	110.59	48.99	61.2	39.86	36.81	115.55	117.08	101.01	30.04
45	169	115.65	53.54	62.11	40.01	38.83	111.78	120.58	111.05	29.83
46	173	120.99	54.58	66.41	47.18	30.95	105.29	115.61	100.98	34.85
47	170	111.89	60.08	51.81	46.94	29.86	109.27	134.1	102.13	29.85
48	165	103.99	52.48	51.51	41.4	32.48	104.87	121.33	98.63	33.84
49	170	110.56	59.64	50.92	44.79	38.58	105.98	120.55	99.46	32.28

50	165	100.86	52.89	47.97	40.63	31.79	98.78	112.62	94.67	29.84
51	169	113.84	60.83	53.01	41.84	32.87	96.84	123.23	100.96	30.84
52	175	120.38	56.67	63.71	43.34	33.89	101.88	135.5	96.88	29.38
53	170	111.12	61.78	49.34	50.32	44.34	104.35	120.88	95.87	27.86
54	173	110.59	48.99	61.2	39.86	36.81	115.55	136.08	101.01	30.04
55	169	115.65	53.54	62.11	40.01	38.83	111.78	117.19	111.05	29.83
56	173	120.99	54.58	66.41	47.18	30.95	105.29	127	100.98	34.85
57	170	111.89	60.08	51.81	46.94	29.86	109.27	111.84	102.13	29.85
58	165	103.99	52.48	51.51	41.4	32.48	104.87	100.97	98.63	33.84
59	170	110.56	59.64	50.92	44.79	38.58	105.98	100.09	99.46	32.28
60	155	101.56	52.52	49.04	42.3	38.73	120.86	104.84	96.41	34.76
61	161	101.92	56.56	45.36	48.64	32.5	126.85	105.08	104.66	35.15
62	160	115.79	58.85	56.34	50.22	38.32	120.05	121.81	100.04	30.21
63	161	112.88	56.95	55.93	49.09	33.64	115.16	120.88	107.91	32.1
64	146	104.97	55.51	49.46	50.94	31.14	102.34	136.08	102.28	33.68
65	178	116.93	67.07	49.86	47.86	40.34	122.57	117.19	102.01	34.61
66	168	112.69	54.09	58.6	45.23	38.28	115.64	127	103.52	32.85
67	168	113.33	59.59	53.74	50.86	41.28	113.37	111.84	101.23	33.05
68	165	115.02	53.92	61.1	49.47	39.29	115.13	100.97	104.26	36.47
69	173	117.06	58.76	58.3	51.79	36.14	101.32	109.56	102.07	32.58
70	173	116.27	60.63	55.64	49.72	40.59	126.22	121.28	117.37	48.8
71	161	112.88	56.95	55.93	49.09	33.64	115.16	121.88	107.91	32.1
72	158	98.57	49.07	49.5	42.95	32.37	112.74	116.59	100.97	29.17
73	176	113.4	58	55.4	50.61	39.38	117.19	111.68	104.65	34.3
74	153	100.9	51.9	52.06	44.81	42.26	120.94	122.33	96.41	34.76
75	144	99.81	56.81	43	43.24	33.49	119.97	124.44	96.78	32.11
76	167	110.67	61.84	48.83	47.87	42.22	125.45	120.06	103.65	36.2
77	160	102.92	57.56	45.36	47.65	40.79	128.45	120.91	105.66	36.15
78	161.5	117.19	58.34	58.85	50.26	38.41	120.08	114.15	101.04	29.93
79	166	122.61	64.41	58.2	49.57	43.25	112.93	136.5	105.99	37.12
80	165	119.73	63.39	56.34	50.94	38.98	117.75	116.59	108.97	34.28
81	165	100.33	54.33	46	42.51	33.47	117.46	120.27	107.41	32.61
82	164	122.22	70.24	57.98	46	30.92	115.49	128.19	82.22	26.58
83	164	105.69	60.79	44.9	45.86	35.31	115.42	125.9	94.27	32.07
84	168	113.33	59.59	53.74	50.86	41.28	113.37	128.46	101.23	33.05
85	161	100.86	61.87	38.99	51.12	38	101.74	116.24	99.83	32.28
86	156	101.92	58.64	50.22	46.37	36.41	103.34	121.28	96.18	35.93
87	161	111.7	55.26	56.44	48.02	36.94	101.34	120.27	106.1	36.83
88	172	118.94	61.66	57.28	50.66	39.61	104.02	104.56	106.45	36.98
89	168	109.32	59.48	49.84	47.64	44.43	120.23	113.99	106.46	38.31
90	164	110.54	66.3	44.24	52.39	44.05	113.27	121.35	94.02	33.79
91	172	110.22	61.1	49.12	53.05	41.86	100.08	120.21	108.46	38.54
92	160	112.23	65.64	46.59	56.83	39.31	97.02	121.98	98.71	38.02
93	174	110.96	58.21	57.75	48.74	41.58	100.91	130.35	101.87	39.95
94	163	108.09	61	47.09	50.76	34.52	106.61	117.86	108.43	31.73
95	155	101.56	52.52	49.04	42.3	38.73	120.86	120.8	96.41	34.76
96	161	101.92	56.56	45.36	48.64	32.5	126.85	104.56	104.66	35.15
97	158	98.57	49.07	49.5	42.95	32.37	112.74	128.19	100.97	29.17

CHRISTIAN FEMALES

1	163	122.33	50.87	50.26	45.02	32.81	111.89	122.33	100.24	33.21
2	155	82.12	37.4	44.72	26.65	21.29	94.21	105.61	83.75	23.83
3	141	76.68	36.33	40.35	30.11	18.24	91.92	99.02	82.76	19.02
4	152	96.19	50.21	45.98	46.15	32.19	116.12	119.23	97.21	31.44
5	154	99.5	58.35	41.15	49.65	36.48	119.76	126.84	103.57	31.34
6	161	97.94	48.69	49.35	39.3	32.57	113.51	117.19	103.31	30.97
7	160	108.54	52.31	56.23	43.6	37.6	119.89	129.55	100.97	33.68
8	158	99.05	52.25	46.8	46.59	35.48	101.97	108.2	103.21	30.11
9	155	92.47	45.82	46.65	37.56	29.6	100.77	106.48	96.62	30.47
10	145	90.53	44.06	46.47	37.62	29.65	84.22	96.39	89.62	28.93
11	156	104.22	54.16	50.06	48.23	33.15	101.81	109.08	96.12	30.14
12	155	98.17	52.49	45.68	47.08	34.63	115.56	122.48	95.71	38.4
13	149	89.15	52.43	36.72	42.24	31.59	101.09	121.29	96.22	33.91
14	158	102.5	52.87	49.63	49.42	36.78	97.6	106.84	90.39	32.37
15	141	76.68	36.33	40.35	30.11	18.24	91.92	99.02	82.76	19.02
16	141.6	88.08	47.33	40.74	43.78	38.55	118.48	124.38	99.73	36.29
17	154.6	99.52	48.07	51.45	43.96	33.5	119.82	123.27	99.2	33.56
18	155	82.12	37.4	44.72	26.65	21.29	94.21	105.61	83.75	23.83
19	152	96.19	50.21	45.98	46.15	32.19	116.12	119.23	97.21	31.44
20	161	97.94	48.69	49.35	39.3	32.57	113.51	117.19	103.31	30.97
21	158	99.05	52.25	46.8	46.59	35.48	101.97	108.2	103.21	30.11
22	156	102.09	51.64	50.45	44.98	34.74	111.61	122.06	93.15	31.52
23	160	99.83	51.97	47.86	45.78	31.68	92.91	106.53	94.41	31.39
24	158	99.05	52.25	46.8	46.59	35.48	101.97	108.2	103.21	30.11
25	158	106.86	62.93	43.93	50.28	32.13	90.25	116.46	101.1	30.51
26	147	98.48	53.71	44.77	47.1	36.17	97.24	113	100.25	31.58
27	154	99.48	45.09	54.39	42.27	35.8	94.2	118.18	107.87	37.57
28	147	91.87	46.37	45.5	41.76	40.89	97.33	114	89.61	33.53
29	139	97.45	54.29	43.14	49.93	38.49	98.64	117.57	92.9	30.27
30	153	97.24	56.59	40.65	52.23	36.81	101.62	110.1	101.77	31.13
31	155	99.95	54.55	45.4	45.23	34.25	100.51	110.17	105.31	37.2
32	155	91.25	47.22	44.03	44.05	36.8	104.83	117.33	104.24	36.2
33	162	119.73	60.91	58.82	50.6	33.11	100.84	113.35	96.34	35.64
34	154	94.68	54.37	42.28	40.89	32.61	112.87	119.91	98.44	24.46
35	158	104.02	57.99	46.03	49.78	36.02	103.07	108.12	101.07	31.38
36	150	104.53	49.81	54.72	41.73	32.34	103.94	111.3	91.15	27.62
37	156	102.09	51.64	50.45	44.98	34.74	111.61	122.06	93.15	31.52
38	146	95.29	58.74	36.55	51.5	41.15	97.05	111.25	97.7	32.3
39	151	101.51	55.3	46.2	45.61	34.54	105.49	118.48	99.17	34.14
40	156	103.6	55.31	48.29	45.85	31.34	103.58	117.72	92.76	34.61
41	160	99.83	51.97	47.86	45.78	31.68	92.91	106.53	94.41	31.39
42	163	101.29	55.94	45.35	49.63	32.84	96.47	115.28	93.93	32.34
43	154	95.92	52.25	43.67	45.24	32.85	103.97	115.63	97.57	34.3
44	150	96.71	49.62	47.09	44.98	30.66	93.54	111.91	89.22	27.24
45	158	94.39	48.51	45.88	41.66	36.2	106.86	123.93	97.48	34.21
46	152	96.68	48.21	48.47	40.01	30.14	101.23	114.77	93.08	31.48
47	158	103.39	55.17	48.22	47.23	32.15	107.28	116.85	98.56	35.74
48	157	93.65	50.11	43.54	44.85	34.63	94.17	108.16	98.13	33.96
49	152	89	48.42	40.58	40.95	29.94	92.82	109.38	96.3	31.91

50	149	94.91	51.86	43.05	44.43	33.66	99.51	115.5	105.03	33.03
51	167	109.68	52.12	57.56	49	31.62	102.61	117.7	96.74	28.17
52	152	99.03	53.24	45.79	42.15	30.8	120.23	102.42	99.45	33.34
53	156	96.07	50.4	45.67	46.2	34.11	118.92	100.21	96.26	33.9
54	155	104.72	50.43	54.29	45.67	34.17	109.04	127.44	98.16	34.8
55	150	98.06	53.56	44.5	41.47	31.74	91.98	118.53	96.24	30.64
56	149	89.15	52.43	36.72	42.24	31.59	101.09	121.29	96.22	33.91
57	150	83.53	49.46	34.07	41.26	31.31	104.17	123.47	102.06	30.58
58	172	109.64	62.68	46.96	50.62	32.41	97.88	109.61	98.87	38.81
59	154	96.06	50.18	45.88	45.22	34.57	100.96	115.67	89.19	27.58
60	148	94.68	49.45	45.23	40.3	34.78	85.5	106.3	96.57	33.96
61	153	97.87	54.81	43.06	44.52	37.37	98.54	121.42	90.64	35.31
62	152	95.52	46.54	48.98	32.86	32.9	114.28	92.1	90.61	22.32
63	152	102.74	49.37	53.37	38.61	39.91	102.98	118.3	92.33	34.08
64	157	105.74	57.69	48.05	44.4	34.28	93.93	118.05	95.59	35.71
65	145	103.97	49.91	54.06	43.31	33.18	95.46	111.3	95.04	30.58
66	147	103.18	47.36	55.82	32.28	35.75	105.33	116.38	91.53	32.02
67	155	100.74	53.2	47.54	47.25	31.87	99.18	122.11	95.52	33.31
68	152	94.32	54.08	40.24	43.49	32.8	100.09	110.82	91	32.49
69	149	101.97	49.93	52.04	43.9	35.46	108.59	123.52	91.64	26.18
70	159	101.83	52.07	49.76	46.47	35.41	107.55	125.87	99.57	35.38
71	150	100.09	46.79	53.3	43.88	35.13	118.25	123.9	96.55	29.81
72	149	95.64	48.43	47.21	40.22	36.57	100.96	106.3	100.11	32.55
73	160	99.94	50.98	48.96	40.86	30.68	100.01	104.86	99.83	28.24
74	150	99.89	59.06	40.83	41.22	30.64	100.02	101.68	93.86	23.24
75	159	100.84	53.47	47.37	37.89	30.86	100.02	105.76	98.71	30.76
76	150	100.09	46.79	53.3	43.88	35.13	118.25	123.9	96.55	29.81
77	149	95.64	48.43	47.21	40.22	36.57	100.96	106.3	100.11	32.55
78	160	99.94	50.98	48.96	40.86	30.68	100.01	104.86	99.83	28.24
79	154	94.68	54.37	42.28	40.89	32.61	112.87	119.91	98.44	24.46
80	158	99.05	52.25	46.8	46.59	35.48	101.97	108.2	103.21	30.11
81	155	96.77	51.99	44.78	47.81	34.58	100.36	111.2	92.42	29.62
82	158	106.86	62.93	43.93	50.28	32.13	90.25	116.46	101.1	30.51
83	159	105.69	58.53	47.16	53.06	32.72	90.92	105	106.29	35.29
84	158	102.5	52.87	49.63	49.42	36.78	97.6	106.84	90.39	32.37
85	158	99.05	52.25	46.8	46.59	35.48	101.97	108.2	103.21	30.11
86	163	122.33	50.87	50.26	45.02	32.81	111.89	122.33	100.24	33.21
87	147	96.02	46.89	49.13	40.21	29.82	107.08	114.53	93.62	29.29
88	155	82.12	37.4	44.72	26.65	21.29	94.21	105.61	83.75	23.83
89	151	95.15	48.8	46.35	44.03	30.54	105.71	124.69	97.7	32.2
90	141	76.68	36.33	40.35	30.11	18.24	91.92	99.02	82.76	19.02
91	158	98.77	50.25	48.52	44.76	35.61	99.95	121.98	102.77	31.85
92	152	95.88	51.56	45.32	45.32	28.17	111.57	113.33	94.61	28.42
93	154.7	99.55	50.11	45.39	40.65	34.19	118.75	136.78	91.99	32.1
94	156.2	104.21	55.27	48.97	47.83	36.77	124.87	124.99	100.3	30.7
95	141.6	88.08	47.33	40.74	43.78	38.55	118.48	124.38	99.73	36.29
96	154.6	99.52	48.07	51.45	43.96	33.5	119.82	123.27	99.2	33.56
97	149	101.82	52.25	49.57	43.25	38.5	111.27	112.92	101.84	33.64
98	160	97.97	49.57	48.4	43.74	36.38	121.29	117.39	105.18	33.59
99	155	94.65	52.37	42.28	48.73	32.01	111.87	118.91	101.83	32.09
100	138	94.49	45.45	49.04	35.96	36.85	118.72	111.21	95.46	33.26

101	152.5	107.56	56.8	50.76	48.84	35.5	94.93	102.28	91.46	30.52
102	135	87.95	46.93	41.02	40.08	38.27	99.73	106.5	88.98	30.63
103	141.6	88.08	47.31	40.74	42.7	38.55	118.45	124.38	99.73	36.29
104	149	89.14	52.41	35.73	42.21	31.56	101.01	121.13	95.43	33.91