

SOMATOMETRY

INTRODUCTION

Somatometry, a division of Anthropometry, may be defined as the systematized technique to measure living body including head and face. The measurement are of different kinds, like linear measurement, girth measurement, skinfold measurement, weight measurement. Again some linear measurements are quite big, others are comparatively very small. Accordingly, different types of instruments designed specifically for taking measurements of different natures are used in somatometry.

Most of the measurements are taken from one landmark to another. It is always necessary to know the definitions of the landmarks, to locate them accurately and then to take the measurement correctly following standard techniques with the help of specific instruments. In case of taking certain measurements the subject is asked to sit and in some cases measurements are taken on standing position of the subject. In case of paired measurements, usually it is taken on the left side, because it is less likely to be affected by various factors, e.g., occupational deformity, change due to extra work, etc. However, sometimes it becomes necessary to take measurements on both sides, more particularly for comparing bilateral asymmetry.

In the time of taking measurement by spreading or sliding caliper care should be taken not to put extra pressure on the skin but to lightly touch the landmark with the tip of the instrument. Pressure should not be exerted while using the tape also. Though most of the measurements are taken directly, yet some times certain measurements can be obtained indirectly by subtracting one from other or by adding two or more measurements. Personal errors are sometimes allowed to a certain extent. According to martin errors of the following ranges in different measurements may be allowed: head measurements – 0.5- 1.0 mm; head height – 2.0 mm; most of the body measurements – 3.0 – 5.0 mm; stature and span – 10.0 mm.

Before measuring an individual, his her personal information, should be carefully recorded.

Somatometric measurements are used to make comparison among different populations of the different regions of the world. These form the bases of racial classification. The correlation between the form and function of the different parts of the human body can also be studied with the help of somatometric measurements. The studies on physical growth

are done on the basis of measurements. The trends of the changes in the metric morphological traits of the population can be studied with the help of somatometry. Somatometric measurements gives an idea of the general physique of population. Nutritional status can be estimated through metric values. These help in determining certain physiological functions like vital capacity, basic metabolism, etc. In the field of industry also somatometry has made valuable contribution, because it provides basic information needed for designing different objects like garments, footwear , personal equipments so forth.

A large number of somatometric measurements have been recommended by different authorities. Here, however, limited nuber of measurements commonly taken in somatometry will be discussed.

INSTRUMENTS

In somatometry different kinds of instruments are used for taking measurements of various natures on the different parts of the body. Different anthropologists have devised different instruments. Here, however, the most commonly used instruments will be named.

SPREADING CALIPER (of Martin)

The spreading caliper consists of two long arms, the upper half of which are curved outwards, while the ends of the other half are screwed together in such a manner so that the free parts of the arm can be moved freely. One end of the straight scale is fixed at the middle of one of the arms keeping the other end free. The scale passes through a socket fixed on the other arm. The free ends of the two long arm are provided either with small knob – like structures or with pointed ends. The first type is used for taking measurements on the body, while the second type is used for taking measurement on the skeleton. The scale is graduated proportionately to the distances between the two free ends of the curved arms.

This instrument is used for taking such measurements on head, face, etc., where curved areas are involved.

The spreading calipers are of two sizes. The larger one is called Pelvimeter, which is commonly used for taking measurements on the pelvic region.

SLIDING CALIPERS (of Martin)

The sliding calipers consists of a long straight scale graduated on both the sides and two cross bars. One of the crossbars is fixed at one end of the scale, while the other parallel to the first one can be slided over the scale with the help of socket provided with a screw to be used to fixed the socket at any place. Each crossbars has two ends, of which one is blunt, and the other is sharp and pointed. The blunt and the sharp ends are used for taking measurements on the body and the bone respectively.

The scale is graduated starting from the fixed end upto 200 mm. Again, from the free end also it is graduated upto 50 mm. The second graduation is used while taking certain depth measurements, when the movable socket is fitted on the scale on the reverse order.

ANTHROPOMETER (of Martin)

The anthropometer consists of four pieces of hollow metal rods, which when joined together become a rigid rod of two metre length. One side of this rigid rod is graduated in an ascending order from the bottom to the top provided with a fixed socket through which an adjustable crossbar can be fitted. There is another socket having provision for an adjustable crossbar and this socket can be slided up and down on the rod. One end of each of the cross bars is pointed with which the required landmark can be touched.

The anthropometer is used for taking larger linear measurements, mostly the vertical measurements, that is, from the floor where the stands to the required landmarks on the human body.

ROD COMPASS (of Martin)

The upper piece of the anthropometer along with the movable socket and the two cross bars is called the rod compass. And hence actually it is not a separate instrument. It also bears graduation which is in a descending order from the top fitted with the fixed socket.

The rod compass is used for taking longer breadth measurements which cannot be covered by sliding caliper.

HEAD-HEIGHT NEEDLE

The head height needle consists of two thin metal rods joined at right angle. The free end of the shorter rod has a groove with the help of which it can be fitted to the crossbar of the anthropometer. It is provided with a screw also for fixing the needle.

This instrument is fitted to the anthropometer while taking head-height. It helps to ascertain the mid-sagittal plane and also to know that the anthropometer is in a perfectly vertical position.

PARALLELOMETER

The parallelometer consists of two vertical and one horizontal metal bars. The upper ends of the vertical bars are provided with sockets through which the horizontal bar is passed. The vertical bars can be slid sideways on the horizontal bar and can be fixed at any place with the help of screws. These two bars bear graduation and each one is provided with a movable socket having an inwardly projected end.

This instrument is specially designed to measure head height. In the time of use the horizontal bars rests on the vertex with the two vertical bars on the two lateral sides. Of the head. The projected ends of the movable sockets are adjusted to touch the two trignon points to obtain the required measurements.

TAPE

The tapes is made of flexible steel and is graduated on the two sides. It is wound in a metal case from which it can be pulled out. A push-button system does the winding. This instruments is used for taking the girth measurements on the body as well as on the bones. In the absence of the steel tape, cloth tapes are also used for the same purpose.

SKIN FOLD CALIPER

The skin fold calipers are designed for measuring the thickness of skinfolds at different parts of the bod. Mainly two types are in uses. One is called the Harpenden and the other Lange.

WEIGHING MACHINE

For recording the weight of the subject any type of standard weighing machine suited for the purpose can be used. For the use in the field it should be portable.

PERSONAL INFORMATION

It is always necessary to record certain personal information of the subject for whatever purpose he or she is investigated. These information not only help in personal identification, but also to classify the data for analyses from different angles. The list of items included in the 'Personal Information Card' may vary along with the objectives of the studies. But some basic information are always needed. Some of the basic personal information which are to be recorded before noting the observable traits (Somatoscopy), taking measurements (Somatometry), collecting the dermatoglyphic data, testing the PTC taste sensitivity, investing different properties of blood, etc., are as follows :

PERSONAL INFORMATION CARD

1. Name of the subject:
2. Age/ Date of birth:
3. Sex:
4. Place of Birth:
5. Residence:
6. Caste/ Tribe/ Community
7. Religion
8. Occupation
9. Marital condition
10. Father's name
11. Mother's name
12. Husband's/ wife's name

13. Place of investigation

14. Date of investigation

15. Name of investigator

MEASUREMENTS

1. Maximum head length (g-op) : The straight distance from glabella to the opisthocranium.

Glabella (g): The most lateral point between the eyebrows in the mid-sagittal plane.

Opisthocranium (op): The most distant point from the glabella on the posterior protuberance of the head in the mid-sagittal plane.

Instrument Used: Spreading caliper.

2. Maximum head breadth (eu-eu): The straight distance between the two euryon points.

Euryon (eu): The most laterally projecting point on the parietal sides of the head.

Instrument Used: Spreading caliper

3. Minimum frontal breadth (ft-ft): The straight distance between the two frontotemporale points.

Frontotemporale (ft): The most medial point on the temporal line on the frontal bone.

Instruments Used: Spreading caliper.

4. Maximum bizygomatic breadth or Breadth of Bizygomatic Arch (zy-zy): The straight distance between the two zygion points.

Zygion (zy): The most laterally projecting point on the zygomatic arch.

Instrument Used: Spreading caliper.

5. Bigonial breadth (go-go): The straight distance between the two gonion points.

Gonion (go): The most lateral point on the posterior-inferior angle of the lower jaw.

Instrument Used: Spreading caliper.

6. Nasal height (n-sn): It measures the straight distance between nasion (n) and subnasale (sn).

Nasion (n): The point on the nasal root in the mid-sagittal plane, that is, at the level between the frontal and the two nasal bones.

Subnasale (sn): The point where the lower margin of the nasal septum meets the upper lips.

Instrument used: Sliding caliper.

7. Nasal length or Length of Nose (n-prn): It measures the straight distance between nasion (n) and pronasale (prn).

Nasion (n): The point on the nasal root in the mid-sagittal plane, that is, at the level between the frontal and the two nasal bones.

Pronasale (prn): The most distal point at the tip of the nose in the mid-sagittal plane.

Instrument Used: Sliding caliper.

8. Nasal breadth (al-al): The straight distance between the two alare points.

Alare (al): The most laterally projecting point on the nasal wing.

Instrument Used: Sliding caliper.

9. Physiognomic facial height (tr-gn): The straight distance between the trichion (tr) and gnathion (gn).

Trichion (tr): The mid-point of the anterior border of the hairline on the forehead.

Gnathion (gn): The lowest point on the lower border of the jaw in the mid-sagittal plane.

Instrument Used: Sliding caliper.

10. Morphological facial height or Total Facial Height (n-gn): The straight distance from nasion to gnathion.

Nasion (n): The point on the nasal root in the mid-sagittal plane, that is, at the level between the frontal and the two nasal bones.

Gnathion (gn): The lowest point on the lower boarder of the jaw in the mid-sagittal plane.

Instrument Used: Sliding caliper.

11. Physiognomic Upper Facial Height (n-sto): It measures the straight distance between nasion (n) and stomion (sto).

Nasion (n): The point on the nasal root in the mid-sagittal plane, that is, at the level between the frontal and the twonasal bones.

Stomion (sto): The central point in the oral fissure when the lips are closed.

Instrument Used: Sliding Caliper.

12. Morphological upper facial height or Upper Facial Height (n-pr): The straight distance between nasion to prosthion.

Nasion (n): The point on the nasal root in the mid-sagittal plane, that is, at the level between the frontal and the twonasal bones.

Prosthion (pr): The lowest point on the margin of the gum of the upper jaw between the two middle incisors in the mid-sagittal plane.

Instrument Used: Sliding caliper.

13. Head Circumference or Horizontal Circumference of Head (g-op-g): The measurement gives the maximum circumference of the head taken in one horizontal plane.

Glabella (g): The most lateral point between the eyebrows in the mid-sagittal plane.

Opisthocranium (op): The most distant point from the glabella on the posterior protuberance of the head in the mid-sagittal plane.

Instrument Used: Tape.

14. Stature or Height Vertex (v-floor): The vertical distance between the vertex and floor.

Vertex (v): The highest point on the head in the mid-sagittal plane.

Instrument Used: Anthropometer.

15. Sitting Height or Sitting Height Vertex (v-sitting plane): The vertical distance from the vertex to the plane where the subject is sitting.

Instrument Used: Anthropometer.

16. Body weight: The weight of the subject is taken by means of weighing machine of standard make. The subject should not wear any foot wear, head gear, etc., and wear as little garments as possible. It is not advisable to measure just after taking meals.

Instrument Used: Weighing Machine.

SUBJECT - I

1. Name of the subject:

2. Age/ Date of birth:

3. Sex:

4. Place of Birth:

5. Residence:

6. Caste/ Tribe/ Community

7. Religion

8. Occupation

9. Marital condition

10. Father's name

11. Mother's name

12. Husband's/ wife's name

13. Place of investigation

14. Date of investigation

15. Name of investigator

SUBJECT - II

1. Name of the subject:

2. Age/ Date of birth:

3. Sex:

4. Place of Birth:

5. Residence:

6. Caste/ Tribe/ Community

7. Religion

8. Occupation

9. Marital condition

10. Father's name

11. Mother's name

12. Husband's/ wife's name

13. Place of investigation

14. Date of investigation

15. Name of investigator

SUBJECT - III

1. Name of the subject:
2. Age/ Date of birth:
3. Sex:
4. Place of Birth:
5. Residence:
6. Caste/ Tribe/ Community
7. Religion
8. Occupation
9. Marital condition
10. Father's name
11. Mother's name
12. Husband's/ wife's name
13. Place of investigation
14. Date of investigation
15. Name of investigator

Sl. No.	Measurement	Instrument Used	Subject- I in cms	Subject- II in cms	Subject-III in cms
1.	Maximum Head Length	Spreading caliper			
2.	Maximum Head Breadth	Spreading caliper			
3.	Minimum Frontal Breadth	Spreading caliper			
4.	Maximum Bizygomatic Breadth	Spreading caliper			
5.	Bigonial Breadth	Spreading caliper			
6.	Nasal Height	Sliding caliper			
7.	Nasal Length	Sliding caliper			
8.	Nasal Breadth	Sliding caliper			
9.	Physiognomic Facial Height	Sliding caliper			
10.	Morphological Facial Height	Sliding caliper			
11.	Physiognomic upper facial Height	Sliding caliper			
12.	Morphological Upper Facial Height	Sliding caliper			
13.	Head Circumference	Tape			
14.	Stature	Anthropometer			
15.	Sitting Height	Anthropometer			
16.	Body Weight	Weighing Machine			

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