

Anthropometric measures No: 007D

1. Introduction

Anthropometric measurements are widely used to predict body density or fat content. A variety of different procedures can be done. For this project waist/hip ratio and skinfold thickness will be measured. The subject may experience a slight tightening pressure around the area where the skinfold thickness is measured.

2. Responsibilities

Research nurses trained in the method are responsible for recording all anthropometric measurements from all subjects.

3. Equipment

- Wessex-finger/joint measure tape (for waist and hip measurements)
- Wooden metre rule (for calibration purposes)
- Marker pen
- Holtain/Tanner-Whitehouse skinfold caliper

4. Method

The Omron HEM-705CP digital blood pressure (BP) monitor, which is currently one of the only portable monitors which has been validated by the British Hypertension Society, will be used in this study.

The BP monitor should have the charged batteries already installed; the guidelines for this procedure can be observed in the Omron manual. Additional batteries should also be available to protect against battery failure. The monitor should also be programmed with the correct date & time and printer paper. Any alterations required with the monitor's set up can be achieved by reading the guidelines from the manufacturer.

4.1 Waist circumference

- Instruct the subject to unclothe their waist and hips. They do not necessarily need to undress, but can for example undo trousers and drop them to the top of thighs or hoist skirts up.
- Instruct the subject to stand with their feet pointing forwards and approximately 25-30cm apart. Their weight should be evenly distributed.
- Feel for the subject's lower rib margin and make a mark (with the marker pen) at the exact level of the lowest rib margin.
- Palpate the iliac crest in the midaxillary line and make a mark on the skin surface.



- Measure the distance between the two marks (rib cage and iliac crest) and make a distinct mark between them. Ensure that this mark is easily distinguished from the other two.
- Ensure that you make the marks on both sides of the body, this improves the reproducibility of the measurement.
- Instruct the subject to breathe out gently whilst the measurement is taken.
- Apply the Wessex tape horizontally around the subject's body, line the tape over the two middle marks and ensure that it is sitting evenly (not tilted up on one side). Slot the end of the tape in its designated hold. Tighten/loosen the tape so that it sits comfortably around the subject's body. The tape's have an inbuilt tensioning device, so no further adjustment needs to be applied after the tape has been correctly positioned.
- Record each measurement in centimetres and document each, in the subjects case report file. Take two independent measurements on each subject to ensure reproducibility. Both measurements should not differ by more than 0.2cm.

4.2 Hip circumference

- Following on from the waist circumference, ensure the subject remains in the same position and breathing out gently.
- With the Wessex tape measure the point yielding the maximum circumference. As before the tape should sit horizontally around the body, without a tilt.
- Record the measurement in centimetres in the subject's case report file. Take two measurements on each subject.
- The subject's part in the procedure is now complete.

4.3 Calculation of waist/hip ratio

For example:-

Waist circumference = 25cm

Hip circumference = 34cm

Ratio calculation (example) = $25 / 34 = 0.735$

Upper threshold range = Women = 0.85 Men = 0.95

4.4 Skinfold thickness

The caliper is designed to scientifically estimate the amount of fat a body possesses. It can be expressed either as a percentage of total body weight or actual fat weight.

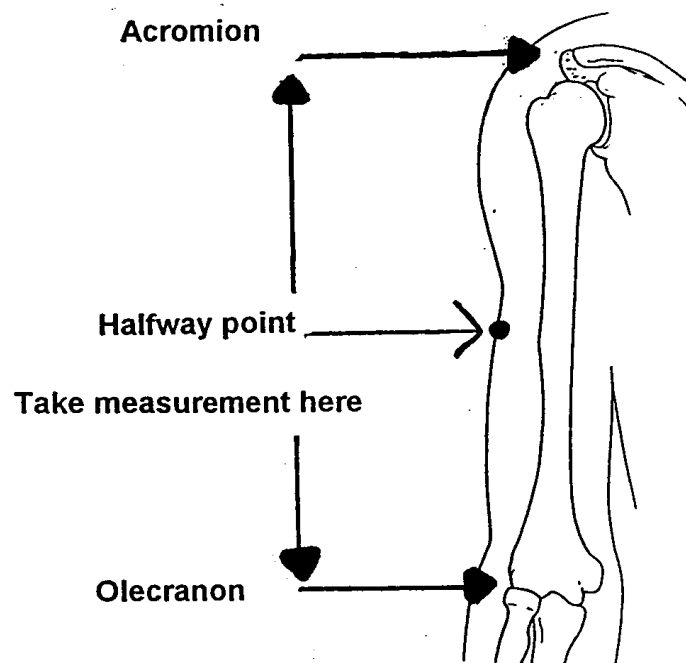
Record all skinfold measurements in duplicate, this means that the complete measurement is repeated twice, including picking up the skinfold. This will greatly improve the reproducibility of the results obtained. When measuring skin folds it is important to note that you are not pinching the fat, but that you are gathering a fold of tissue between your fingers to be measured.

When picking up skin folds do not pick up the skin fold horizontally, using your middle finger and thumb sweep up the fold of tissue.

Triceps

- Use the left arm to record all triceps skinfold measurements.
- Explain the procedure to the subject and show the subject the calipers. Demonstrate how much pressure is exerted by them on the back of the subject's hand.
- Instruct the subject to remove clothing covering their left arm. The subject may either stand or sit down for this procedure. f
- Stand behind the subject, slightly to their left. Place your right arm directly behind the subject's left arm.
- Instruct the subject to relax their left arm by the side of their body; it should be positioned so the palm is facing forward.
- With the Wessex tape measure the distance between the postero-lateral bony point of the acromion (bony part of the shoulder tip) on the subject's shoulder to the olecranon (elbow tip). The tape measure must not hang vertically, but must join the two bony landmarks, with the right hand edge of the tape on the centre of the upper border of the olecranon. Mark the halfway point, on the right hand side of the tape, with the marker point. The Tape is 1cm in diameter, allow for this by measuring 0.5cm inwards after the initial mark. Use the second mark as the midway marker position. See figure 1 for more details.

Figure 1

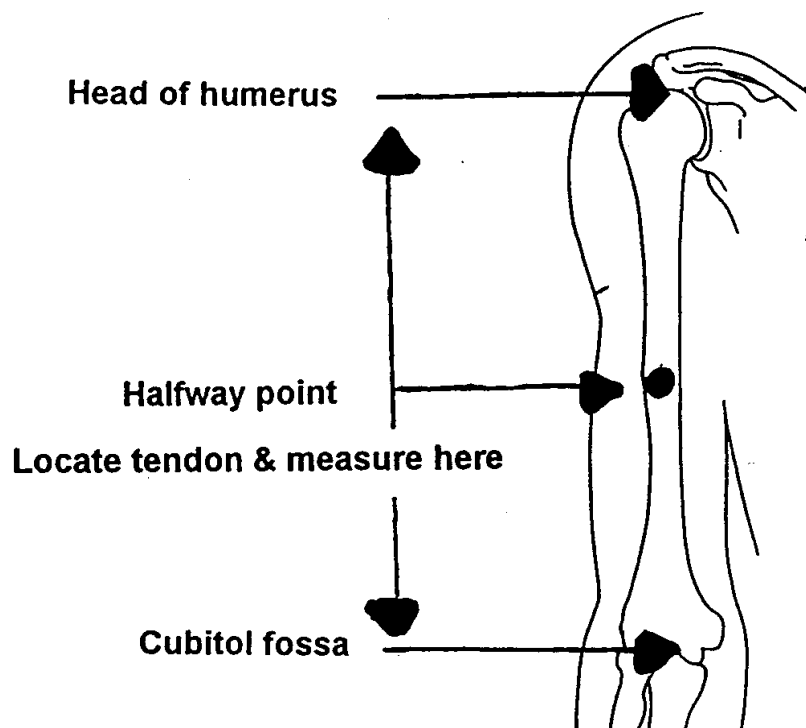


- With your left hand, sweep up a vertical skinfold of about ½" from just above the marked point. Ensure the skinfold is free.
- With your right hand, hold the calipers horizontally behind the subject's arm. Apply the jaws of the calipers so they sit either side of the exact marked point. Slowly and gently release the caliper handle and remove your left arm off the subject's arm. The arm should remain relaxed and poised by the subject's side.
- The caliper needle should initially fall quickly and then gradually come to rest. Take the reading as soon as the needle has stabilised and stopped moving.
- Record the measurement in millimetres to the nearest 0.2 division. **Ensure that you read the measurement in the correct direction - CLOCKWISE**
- After the reading has been recorded, release the calipers.

Biceps

- Still with the left arm, find the head of the humerus at the subject's shoulder. Place the Wessex tape at this point and run it down by the anterior aspect of the arm to the midpoint between the two epicondyles of the humerus in the cubital fossa. Locate the tendon and place the right hand side of the tape against the tendon. See figure 2 for more details.

Figure 2

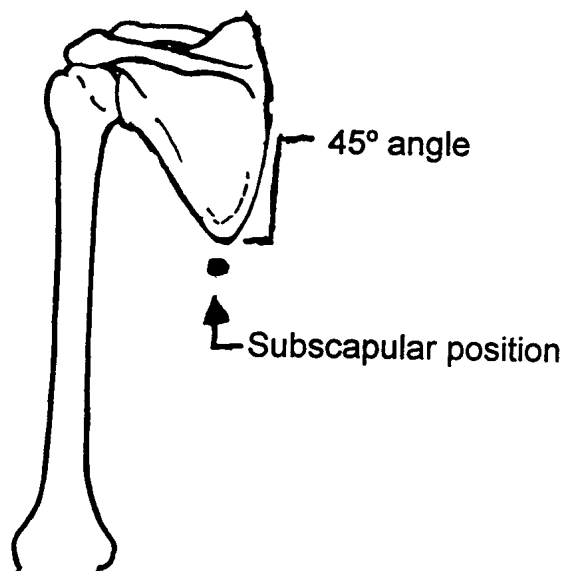


- Mark the halfway point, on the right hand side of the tape, with the marker point. The Tape is 1cm in diameter, allow for this by measuring 0.5cm inwards after the initial mark.
- Sweep up a ½" skinfold above the marked point. Ensure the skinfold is free.
- With your right hand, hold the calipers horizontally and apply the jaws of the calipers so they sit either side of the exact marked point. Slowly and gently release the caliper handle and remove your left arm off the subject's arm.
- As before, record the measurement in millimetres to the nearest 0.2 division. **Ensure that you read the measurement in the correct direction - CLOCKWISE.**
- After the reading has been recorded, release the calipers.

Subscapular

- Instruct the subject to remove any upper body clothes (ladies can keep their bras on for this procedure). The subscapular lies below the lowest point of the scapula.
- Stand behind the subject and locate the left scapula of your subject.
- The scapula border nearest the spine runs downward and outward and then forms an angle of about 45°. Mark immediately below this point with a marker pen. You may find it easier to mark the 45° angle as an addition marker to aid in marking the correct position for the measurement.
- The subscapular measurement should be taken immediately below the 45° angle with the marked point in the centre of the skinfold. See figure 3 for more details.

Figure 3

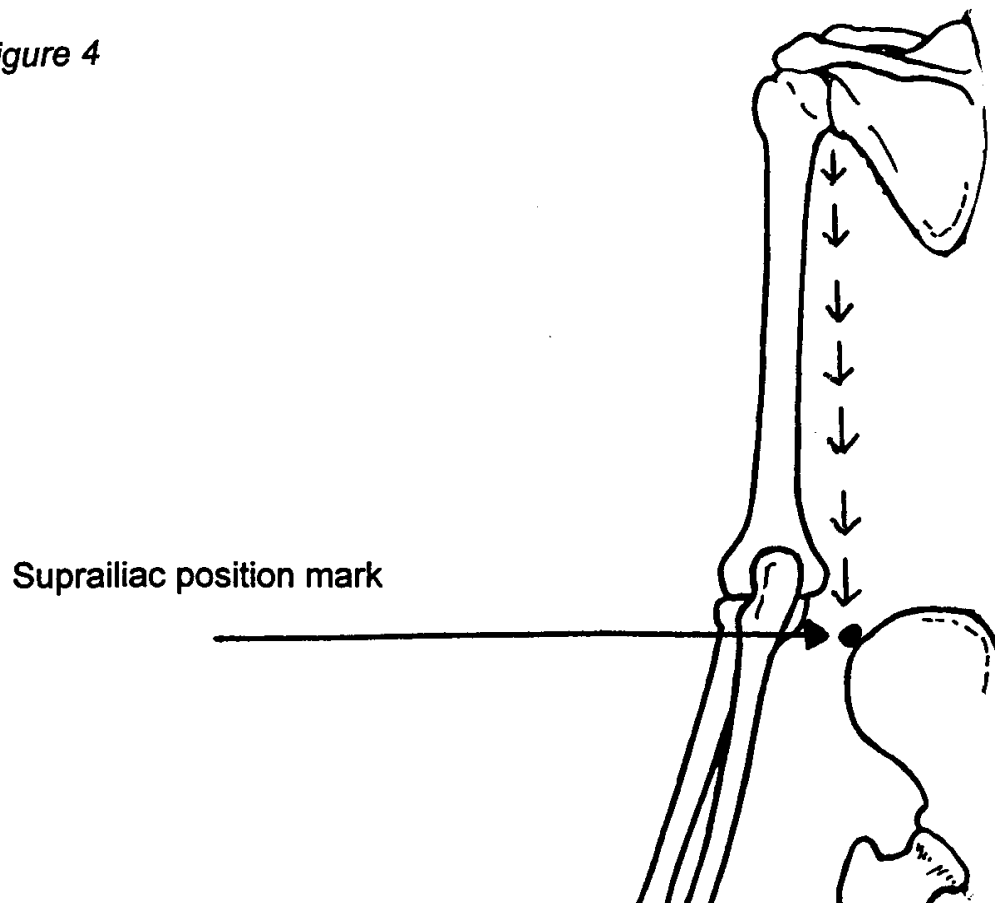


- The skinfold should be picked up in the sloping line. A skinfold of approximately ½" should be measured.
- Use your right hand to hold the calipers horizontally and apply the jaws of the calipers so they sit either side of the exact marked point. Slowly and gently release the caliper handle and remove your left arm off the subject's arm.
- As before, record the measurement in millimetres to the nearest 0.2 division. **Ensure that you read the measurement in the correct direction - CLOCKWISE.**
- After the reading has been recorded, release the calipers.

Suprailiac

- Instruct the subject to unclothe their waist and hips. They do not necessarily need to undress, but can for example undo trousers and drop them to the top of thighs or hoist skirts up.
- Locate the subject's hip-bone, this lies directly in line with their armpit.
- The suprailiac position mark, should be made just above the hip-bone and in line with the armpit. See figure 4 for more detail.

Figure 4



- UNLIKE the other skinfolds, the ½ " suprailiac skinfold should be picked up VERTICALLY and **NOT** HORIZONTALLY. It should still be lifted with a sweeping motion.
- Position the middle finger and thumb in a horizontal line, either side of the mark, sweep the skin together and pick it up vertically.
- As before, record the measurement in millimetres to the nearest 0.2 division. **Ensure that you read the measurement in the correct direction - CLOCKWISE.**
- After the reading has been recorded, release the calipers.

5. Additional Information

- To ensure the reproducibility of antropometric readings it is crucial to maintain the standards laid down in the anthropometric standard operating procedure document.
- Calibrate the tension of the Wessex tape measure using the wooden ruler, on a weekly basis and record the results in the calibration book.
- Each Wessex tape measure has a pre-determined lifespan of about 600 subject measurements, it is therefore vital that a log is kept of each tape's usage. Over-usage could give rise to poor measurements. If a tape does not meet the calibration requirements it will no longer be used.

6. Reference Documents

1. O'Brien E.T et al, (1995), ABC of Hypertension, BMJ Publishing group, London, 1-34
2. Measuring obesity - classification and description of anthropometric data, WHO report - consultation on the epidemiology of obesity. Warsaw 21-23 Oct 1987. .