STUDY OF OSTEOPOROTIC FRACTURES (V4)

Anthropometry Protocol

I. WEIGHT IN KILOGRAMS

Weight is measured in kilograms using a standard balance beam scale. Body weight and body mass index (a mathematical function of weight and height) are important determinants of bone mass and osteoporotic fractures.

1. Equipment

Standard balance beam scale that can be read from front and back. Ideally, the scale should be positioned so that the examiner can stand behind the beam facing the subject, and can move the beam weights without reaching around the subject.

2 . Maintenance:

- When not in use, rest the counter weight (larger weight) in the far right position.
- The top weight should rest in the left or zero position.
- The counter weight should always be lifted carefully before it is moved across the beam. This prevents wear on the notches which could lead to erroneous readings.
- Keep the scale on a level surface and move it as little as possible.

3. Calibration check:

- Scale calibration should be checked every 2 weeks against known weights. Each center should have a 50 kg weight (Alternatively: two 25 kg weights or two 50 lb weights) for this purpose. (If these are not certified calibration weights, e.g. body building weights, their exact weight should be determined by the local department of weights and measures.) These weights should be available in all FIT clinics.

  Put both the top and bottom counter weights in the zero position. With no weight on the platform, the beam should "float." Then put the known weights on the scale, and adjust the counterweights until the beam "floats."

  If the beam does not "float" at zero with no weight on the platform, or if the measurement of the known weight is off by more than ± 1 kg, the scale may need to be repaired or replaced.

4. Subject preparation

Weight is measured without shoes and wearing light indoor clothing, excluding outdoor clothing or sweaters.

5. Measurement Procedure

1) Before the participant steps onto the scale, lift the counterweight and position it at zero.

   The participant should stand quietly in the center of the platform, facing the balance beam, with her weight equally distributed on both feet, and not touching or supporting herself on anything.

2) If a subject requires support from a cane while being weighed, weigh yourself with and without the participant's cane, etc., to determine its weight. Subtract the weight of the aid from the participant's weight before recording. In the event that it is necessary for the examiner to support the participant during weighing, provide the minimum support that is safe.

3) Adjust the counterweight, and then the top weight, until the beam is evenly balanced.

4) Weight is recorded to the nearest 0.1 kg. (If the scale is calibrated in pounds, measure to the nearest 1/4 pound and convert to kilograms.)

5) A chart for converting kilograms to pounds should be mounted near the scale, so that the participant can be told her weight in pounds.

6) Script.

"In order to measure your weight, I would like you to remove your shoes (and your jacket, sweater, etc.) and step forward onto the center of the scale."

II. Stature (standing height) with a wall-mounted Harpenden stadiometer

Standing height is measured in millimeters with a wall-mounted Harpenden stadiometer. Height will be measured two times. If there is a substantial difference between the two measures, height will be remeasured twice.

1. Equipment

The stadiometer produced by Holtain Ltd. - known as the 'Harpenden" stadiometer because of its development during the Harpenden Longitudinal Growth Study - is a counter recording instrument. The counter gives a reading in millimeters over a range of 600 mm to 2,100 mm. It is a wall-mounted instrument made of light alloy with a wooden headboard fixed to a metal carriage that moves freely on ball bearing rollers.

Place a weight, of about 0.5 kg, on the headboard to standardize pressure on the head and improve measurement performance.

The stadiometer should be mounted on a straight wall which is at a true 90° angle to the floor. The floor should be level. There should be about a foot of unoccupied wall space on either side of the stadiometer.

Maintenance:

- The counter may break if the headboard is 'raced' up or down the backboard. The headboard should therefore be moved to its topmost position when not in use.
- The stadiometer contains a direct reading counter mounted on a counter balanced carriage riding on ball bearings. The counter is a self-contained unit and requires no maintenance. A spare counter is provided if replacements should be required.
- The bearings and counter weight pulleys should be lubricated semiannually with one drop of light machine or instrument oil.
- The "formica" covering may be washed with soap and water as required.

Calibration

- Daily. A metal rod of 600 mm length is placed between the headboard and the floor so that it stands vertically. If the counter does not record the correct length of the rod then it may be loosened by undoing the two metal retaining screws, and pulled away from the main fibre cog of the carriage. In this position the small metal cog of the counter may be turned until the counter records the true length of the metal rod. The counter is then pressed against the backplate so that the teeth of the counter cog and the carriage cog engage and the retaining screws are tightened. The headboard is then moved up and down the backboard a number of times to ensure that the counter continues to give an accurate reading. If not, the counter must be replaced.

2. Subject preparation

The subject should be relaxed, without shoes and barefoot or wearing thin socks or stockings.

Hairpiece should be removed, and hairdress altered, if it will interfere with firm contact between the headboard and the scalp.

3. Measurement Procedure:

1) The participant stands with her back against the wall-mounted stadiometer, with the back (scapulae), buttocks and both heels touching the wall-plate. The heels are together. If the subject has 'knock-knees' then the heels are separated so that the knees are in contact but do not overlap.

   Check that the subject is in the correct position, starting with the heels and checking each point of contact with the wall-plate. Obese subjects and those with a kyphotic posture may not be able to place the heels, buttocks, scapulae and back of the head in a single vertical plane while maintaining a reasonable natural stance. These subjects may be positioned so that only the buttocks and the heels or the scapula are in contact with the wall-plate. For some women, contact may only be possible with the buttocks. In these women, ensure that maintains erect posture while being measured. For participants with severe spinal curvature, if the spine is the part that protrudes the farthest, then that should be the part that is touching the wall-plate.

   Check that the arms are relaxed and hanging loosely at the sides and that the shoulders are relaxed by running your hands over them and feeling the relaxed trapezius muscle.

   The head should be in the "Frankfort Horizontal Plane" in which the lowest point on the inferior orbital margin (orbitale) and the upper margin of the external auditory meatus (tragion) form a horizontal line (Figure 1).

   Be sure that the participant maintains the correct posture during the measurement.

2) The horizontal bar is brought down firmly onto the top of the head. (Place a weight, of about 0.5 kg, on the headboard. This weight presses down on the hair, thus flattening any hairstyle and overcomes the natural friction of the machine so that any upward or downward movement during the measurement is recorded on the counter.) It may also be necessary, upon occasion, to remove or alter the hairdress of some of the participants for the horizontal bar to make contact with the top of the scalp.

   (Optional: To ensure that the Frankfort Plane has been achieved the examiner may find it helpful to grip the head with her open hands and pivot it gently backwards and forwards and at the same time observe the counter. The counter should register the greatest height when the head is tilted not too far forward or backwards. It is a relatively easy matter to ensure correct positioning.)

3) Have the participant inhale deeply. She should not alter her position by, for example, raising the heels off the floor as she inhales.

4) Record the reading on the stadiometer just before the subject exhales.

5) Have the participant step away from the stadiometer, then step back in to the measurement position. Repeat steps 1 - 4 and take a second measurement.

6) If the two measurements differ by ≥ 4 mm, take an additional two measurements.

7) A chart converting millimeters to inches should be mounted near the stadiometer so that the participant can be told her height in inches (and centimeters).

8) Script:

"Please stand with your back against the board mounted on this wall. Your heels should be together (as close as possible) and both heels, your buttocks and back should be touching the wall-plate. Look straight ahead and stand tall. (Optional: I will position your head so that I can measure your height more accurately.)"

"Take a deep breath."

"Exhale."

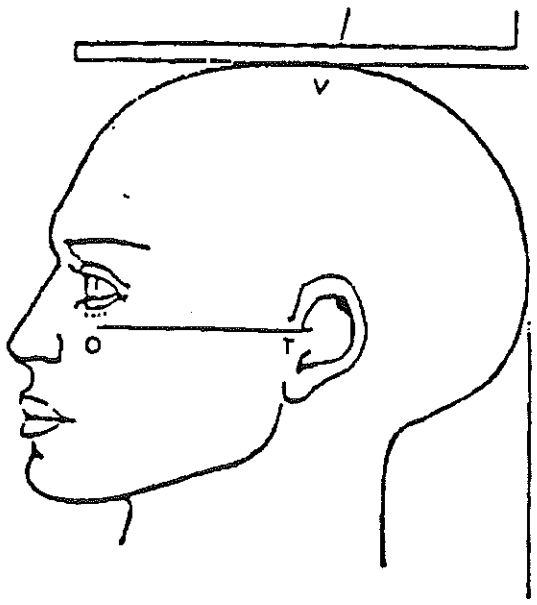

Figure 1.
Orbitale: Lower margin of eye socket
Tragion: Notch above tragus of ear
Frankfort plane: Orbitale-tragion line horizontal

9) For women with extreme kyphotic posture, it may not be possible to obtain contact between the headboard and scalp when the participant's back is against the wall-plate. In this case, measure height with the participant standing sideways (side of arm and shoulder in contact with the wall-plate) and positioned so that the headboard contacts the scalp. Record that the participant was measured in the sideways position on the scoring form.