Background

Obesity is a growing problem in the UK and being overweight is associated with an increased risk of developing a number of diseases including diabetes, coronary artery disease and hypertension. In England in 2008, there were 338 deaths related to obesity and in 2008-09 obesity accounted for 8,451 hospital admissions (up from 2,762 in 2005-06), and 20,284 occupied hospital bed days (up from 10,879 in 2005-06). The National Institute for Health and Clinical Excellence (NICE) classifies people as being overweight or obese according to their Body Mass Index (BMI) which is simply a ratio of the person’s weight in kilograms divided by their height in metres squared. Height and weight ratios, such as the BMI, have limitations as a measure of obesity in that they take no account of muscle mass. Being heavier than fat, a heavily muscled person may appear as obese on the BMI scale even if they are lean, whilst the amount of fat tissue present is often under-estimated on those with less lean body mass. Similarly, a number of techniques which base their obesity measurement on total percentage body fat do not differentiate between people who carry excess weight around their waist (‘apple shaped’), who some think to be at higher risk of developing obesity related diseases than ‘pear shaped’ people who carry their excess weight on their hips and buttocks.

Current Practice

In addition to the BMI, various indirect techniques are routinely used to determine the presence and degree of obesity including measuring waist circumference, skin fold measurements at various points on the body, multi-frequency electrical bioresistance across tissue, and abdominal diameter. Other specialist techniques such as dual energy X-ray absorptiometry and magnetic resonance imaging scans allow better measurements of total body fat, but are expensive, require highly trained staff and are only suitable for use in research environments.

New Technology

Available from Select Research Ltd, the 3D Body Volume Imaging Scanner is designed to calculate what the company calls a person’s ‘Body Volume Index’ (BVI), their measure of obesity, by using 3D full body data to determine the shape and volume of the body.

To have a scan a person puts on flesh coloured underwear and steps into a booth.
Clinical Studies and Research Questions

A validation study comparing the use of the 3D Body Volume Index scanner against manual measurements for estimating obesity was undertaken in 80 people. The 3D Body Volume Index scanner was reported to provide a valid, reliable and reproducible method for measuring waist and hip circumferences.

The suitability of measuring BVI in assessing obesity and its relationship to BMI and waist circumference was assessed in 53 obese people. The volunteers had their BMI and waist circumference measured manually before undergoing a 3D BVI scan. The waist circumference measured manually and by the scanner correlated well with the total BVI and trunk volume (p<0.0001). The BMI also correlated well with the BVI (p<0.001).

A study of 53 patients recruited in the UK and USA showed a significant correlation between BVI and biomarkers of risk for cardiovascular disease.

A pilot study investigated the impact of a 3D body scan on encouraging obese people to lose weight. 43 people were given standard dietary and lifestyle advice and reviewed immediately, with follow up reviews at three and six months. Twenty of these forty-three patients were randomised to undergo a 3D BVI scan at each time point, with the results discussed during hospital visits. This study reported that 3D BVI scanning significantly contributed to a reduction in BMI and waist circumference, but not to the decrease in hip circumference. However, a significant reduction in BMI and waist circumference was also seen in the control group which received dietary and lifestyle advice only.

The company state that the accuracy of the BVI scanner to diverse and disadvantaged groups is currently under review. The accuracy of the 3D BVI scan in wheelchair users, or people who are unable to stand or remain still for the required scan period remains to be addressed. Cultural sensitivities may limit the use of the scanner in some sections of society.

Where they are illuminated with white light. The light reflected is picked up by a series of 16 sensors and 32 computer controlled cameras which create a 3D image of the body within 7 seconds. The software detects predetermined body landmarks, including measuring waist circumference at 55% of height and hip circumference at its widest diameter, to accurately calculate body volumes in people with different body shapes and fat distribution. The scanner can accurately calculate the Body Volume Index in people weighing up to 32 stones (205 kg) and with a waist size of 60 inches (150 cm).

Select Research Ltd believe that their 3D Body Volume Imaging scanner may aid in population screening in a variety of healthcare settings, in addition to helping motivate patients to undertake lifestyle changes leading to a reduction in excess body fat. As well as being used to measure obesity, Select Research states that their BVI scanner may be used to better determine pre-operative anaesthetic dosage and allow the development of better fitting artificial limbs, as well as reviewing postural and osteoporosis issues.

The 3D Body Volume Index scanner was CE marked in 2008 and the company state that the scans are safe and non-invasive.

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Potential Impact

Select Research believes that the 3D Body Volume Index Scanner is particularly suited to the measurement of the levels of obesity within large groups of people (including the routine measurement of children in the National Child Measurement programme) and would be less costly than performing individual manual measurements. Such potential cost savings would be likely to be realised only if there was widespread uptake of this system throughout the NHS.

References


