SHORT REPORT

Can self-reported height and weight be relied upon?

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Aims
To assess whether self-reported height and weight [and body mass index (BMI)] can be used in workplace health promotion campaigns.

Methods
Volunteers were instructed how to measure their weight, height and waist circumference (WC). Self-reported values were compared with direct measurements. Accuracy was assessed using simple (self-report – actual) and percentage difference [(self-report – actual)/(actual measurement)]. The distribution of differences (in weight, height and BMI) across age and BMI classes was calculated plus Pearson (parametric) and Spearman (non-parametric) coefficients of correlation, to assess relation of differences (simple and percentage) with actual values. For percentage differences, classes were created to explore differences in mean values of actual measurements across various difference classes, using analysis of variance.

Results
Eight hundred and fifty-seven workers took part; 585 (68%) provided all requested data. ‘Statistical analysis showed that men and the whole group underestimated their BMI due to overestimating their height and underestimating body weight’. Similar trends were seen in females, especially the centrally obese ones (WC > 80 cm), but women as a group were more accurate than men in anthropometric self-reports. Males > 40 years of age underestimated their weight.

Conclusions
This study showed that the differences between actual and self-reported values depend on the actual values and self-reported anthropometric measurements cannot be relied upon, at least in males. Females seem to provide more accurate reports than men and we could consider their measurements reliable, although a further study with a larger number of female participants would be needed.

Key words
Body mass index; height; obesity; weight; workplace health promotion.

Introduction

Obesity is a disorder in which there is increased body fat to the extent that health is impaired. The National Institutes of Health has recommended the use of body mass index (BMI) in the classification of weight status [1]. It is derived by dividing the body weight (in kilograms) by the square of the height (in metres). Individuals with BMI 25–29.9 kg/m² are classified as overweight and those with BMI ≥ 30 kg/m² as obese.

Latterly research has shown that the distribution and biological properties of fat tissue are more important than the body weight or BMI [2]. Central obesity, defined by a waist circumference (WC) ≥ 80 cm in women and ≥ 94 cm in men, is considered an independent risk factor for the development of diabetes later in life [3].

Obesity is an important health condition because of the associated co-morbidities, including hypertension, diabetes and osteoarthritis and the economic cost [4].

In the workplace, obesity has been reported to lead to increased sickness absence and disability benefits [4,5].

As small reductions in weight reduce the medical complications, healthy lifestyle promotion is important. The workplace could be a site for health promotion, but the success of such initiatives depends upon several factors including minimal time away from work (down time). An effective way to reduce down time is to use self-reported data on height and weight rather than spend time measuring individuals.

Methods

In 2005, a large global engineering company undertook a 3-month educational campaign called “Reduce Hazardous Waist!” with the aim of reducing obesity. As part of this initiative, workers were provided with instructions on how to measure their weight and height.
and were made aware of how to avoid errors in reading the scales or height measures. Workers were asked to self-report their measurements and the values were compared with direct measurements. WC was not self-reported but was directly measured by researchers.

Statistical package, SAS v 9.0, was used for analysis. Simple difference [expressed as \((\text{self-report} - \text{actual value})\)] and percentage difference [expressed as \(100\% \times (\text{self-report} - \text{actual value})/\text{actual measurement}\)] was calculated in order to assess accuracy in weight and height (and BMI) estimation. Descriptive statistics (mean, standard deviation, median, minimum and maximum) were used for continuous variables (initial values and differences). Simple \(t\)-test was applied in order to assess the significance of each difference; \(P\)-values < 0.05 were considered statistically significant. Pearson (parametric) and Spearman (non-parametric) coefficients of correlation were used to assess relation of differences (simple and percentage) with actual values. For percentage differences, we created classes and tried to explore differences in mean values of actual measurements across various difference classes, using analysis of variance (ANOVA). To specify

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*Reached statistical significance; ns = statistically not significant.
differences, Tukey’s post hoc test was applied. Finally, the
distribution of differences (in weight, height and BMI)
across age and BMI classes was explored. Pearson’s
chi-square test was applied in the above contingency tables
to assess statistically significance.

Ethical approval was not required or sought for this
study as it involved analysis of data, which was already
being collected for the campaign and did not relate to
named individuals.

Results

Eight hundred and fifty-seven workers participated in the
study, 585 (68%, 517 males and 68 females) reported the
requested anthropometric parameters. Characteristics of
the participants and the relative self-reported assessments
are shown in Table S1 (available as Supplementary data at
Occupational Medicine Online).

Accuracy of the participants’ measurements was
assessed with the calculation of simple and percentage
difference. The statistical analysis showed that misreports
were significant in the total and in males, while the
differences for the total were mainly attributed to
male subjects. In contrast, female measurements were
accurate Table S2 (available as Supplementary data at
Occupational Medicine Online).

In order to see if age and anthropometric characteristics
(weight, height, WC and BMI) of the participants affected
the accuracy of the self-reports, we used the Pearson (para-
metric) and Spearman (non-parametric) coefficients of
correlation. Taking a correlation coefficient of 0.3 as a no-
ticeable relation, we found statistically significant (and no-
ticeable) correlations mainly for female subjects (Table 1).
This is an interesting finding as females as a group were
generally accurate in their reports by simple and percent-
age differences. But using Pearson (parametric) and Spea-
man (non parametric) coefficients of correlation, we
identified that females who reported higher values for
weight, BMI and WC also tended to overestimate their
height. In contrast, we found negative correlations with ac-
tual weight and WC, suggesting that heavier and more cen-
trally obese women underestimated their BMI.

In men, those with higher BMI tended to under-
estimate their BMI. Differences were calculated as
(self-reported − actual), so a positive difference means overestimation, while negative difference means under-
estimation of actual value.

One-way ANOVA revealed statistically significant
errors in anthropometric measurements only in men
who were shorter and heavier as they tended to overesti-
mate their height and underestimate their weight; on the
other hand, taller men and females were accurate in their
estimations.

Statistical analysis of data on measured WC showed
that for percentage difference, central obesity was related
with significant underestimation of BMI but only in fe-
males. With regards to age, in men over 40 years of
age, there was statistically significant underestimation
of weight.

Discussion

The study shows that self-reported anthropometric
measurements are not reliable and are not a substitute for
direct measurements in men. This is compatible with
findings from previous studies in populations with vari-
able demographic and anthropometric characteristics
[6,7]. Self-reports were influenced by factors such as
weight, height and BMI and by gender and age. Women
generally appeared to provide more accurate self-reports
but numbers in the study were relatively small whilst
women with central obesity seemed to represent a sub-
group that behaved differently, in that they significantly
underestimated their BMI. Finally, ageing seemed to af-
flect accuracy of self-reports, especially in men. In conclu-
sion, we do not believe self-reported height and weight
can be relied upon to replace direct measurements in
workplace obesity programmes.

Conflicts of interest

None declared.

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