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DOES THE RELATIONSHIP BETWEEN WAIST CIRCUMFERENCE, MORBIDITY AND MORTALITY DEPEND ON MEASUREMENT PROTOCOL FOR WAIST CIRCUMFERENCE?



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Despite the recommendation that waist circumference (WC) should be a routine measure in clinical practice to help identify the high-risk, abdominally obese patient, no consensus exists on the optimal protocol for this measurement, and no scientific rationale is provided for any of the measurement protocols recommended by leading health authorities. Consequently, there is confusion regarding which protocol is optimal for identification of obesity-related morbidity and mortality.

It was in response to this uncertainty and in order to initiate dialogue regarding an internationally accepted standard for measurement of WC that the International Chair on Cardiometabolic Risk convened an expert panel. The panel, consisting of experts in obesity identification and management and obesity-related epidemiology, was assembled to review the published scientific literature and to examine the influence of the WC measurement protocol on the relationships of WC with cardiovascular disease (CVD) and diabetes and with mortality from all causes and from CVD. The panel also discussed other issues relevant to WC measurement, including practical aspects of measurement, such as use of bony landmarks and reliability of competing measurement protocols.

The systematic review of 120 studies (236 samples) revealed statistically significant associations with WC for 65% of the samples, across morbidity and mortality outcomes. The three most common WC protocols for these samples were minimal waist (33%), midpoint of lower rib and iliac crest (26%), and umbilicus (27%). Nonsignificant associations were reported for 27% of the samples; again, most protocols measured WC at the midpoint (36%), umbilicus (28%), or minimal waist (25%). Significant associations were observed for 17 of the remaining 20 samples in univariate models, but these were not significant when adjustment was made for covariates. For these samples, the most common WC protocols were the midpoint (35%) and umbilicus (30%). The panel described similar patterns of association between the outcomes and all WC protocols observed across sample size, sex, age, race, and ethnicity.

The results of the review suggested that the WC measurement protocol had negligible influence on the association between WC and morbidity or mortality. Due to the high correlation among WC measurement sites and subsequent problems of multicollinearity, it would be challenging to design a study to identify one WC protocol for optimal prediction of morbidity and mortality. Thus, the available evidence did not allow the panel to recommend any one WC measurement protocol for prediction of morbidity and mortality. In the absence of a biological rationale, the panel carefully considered additional criteria that would provide a rationale for a recommendation based on practical considerations. Subsequent to these deliberations, the panel recognized that the optimal WC protocol would employ easily identifiable bony landmarks and allow for straightforward measurement. These aspects of a protocol could minimize measurement error, improve incorporation into clinical practice, and aid self-measurement. The panel recognized that both the World Health Organization (WHO) guidelines—the midpoint between the lower border of the rib cage and the iliac crest—and the National Institutes of Health (NIH) guidelines—the superior border of the iliac crest—describe WC measurement protocols that use bony landmarks to identify the proper WC measurement location. The panel acknowledged that, from a clinical standpoint, distinguishing between the WHO and NIH protocols was difficult. However, since the NIH protocol is a more straightforward procedure than the WHO protocol, the panel concluded that it may be more readily adopted by the practitioner and more suitable for self-measurement by the general public.

In summary, the findings of this review suggested that the WC measurement protocol has no substantial influence on the association between WC, all-cause and CVD mortality, CVD and diabetes. The panel did not, therefore, recommend a single WC measurement protocol over another if the prediction of health risk is the objective. Alternatively, based on practical considerations intended to promote the adoption of reliable measures of WC by both the general public as well as the practitioner, the panel recommended that either of the WHO or NIH protocols be recognized as optimal WC measurement procedures since both are based on bony landmarks. Furthermore, given the feasibility of the NIH measure, the panel recognized that the NIH protocol might be more readily adopted by both the practitioner and in particular, used for self-measurement by the general public. Further, the panel also recognized that the sole rationale for selection of the more complex WHO protocol hinged on the observation that currently accepted WC threshold values used to determine health risk have been derived using WHO guidelines. In this way, should future investiga-

tion confirm that differences in absolute WC measures between the protocols are minimal across race and gender, then the NIH procedure would clearly be the preferred protocol.

The reader can obtain a copy of the review at Obesity Reviews which is currently published online ahead of print [1].

References

1. Ross R, Berentzen T, Bradshaw AJ, et al. Does the relationship between waist circumference, morbidity and mortality depend on measurement protocol for waist circumference? *Obes Rev* 2007.

