Reviewer's report

Title: Obesity, metabolic syndrome, impaired fasting glucose and microvascular dysfunction: a principal component analysis approach

Version: 2 Date: 8 June 2012

Reviewer: Keiran Mather

Reviewer's report:

This is a paper evaluating the cross-sectional relationships among anthropomorphic, metabolic and microvascular function features of a group of 189 Brazilian women. The authors applied a principal components analysis to this effort, and found that there were 5 main identifiable clusters of variation among these variables. The vascular function parameters were grouped with others in Component 1, but also exhibited stand-alone clustering in Component 3.

This is a good paper overall, with a good sample size and a reasonable and thoughtful application of Principal components analysis.

Major compulsory revisions

1) Much is made of the relative directions of the relationships among variables. I think this is over-reading the component, and although it is interesting to note which variables are inversely related to others within the component the observation that an individual's aggregate component score is 'low' (for example) does not necessarily mean that they have more of the inversely related factors - could simply be that they have fewer/less of the directly related factors. A similar problem comes with the claim that (top of 13) one factor within the cluster is particularly strongly related to other factors within the cluster. This cannot be discerned from the clustering output, the only thing that is true is that these mutually associate (it's mutually adjusted). Since the PCA approach is not widely used the presentation needs to be refined so as to be clear on the most robust interpretation of the components.

2) It is tautological to observe that the degree of obesity is related to the score of the component that includes obesity, and similarly for the MetS figure. Although it is tempting to make these figures these are nonsensical. I initially was considering suggesting plots of components against one another but I think that is also less than informative.

3) The Discussion does not include comparisons against other PCA analyses of this field (I am aware of a couple of prior attempts, although not generally including the vascular function aspects). Similarly there is nothing to convince me that the PCA approach is superior or even meaningfully additive to the existing literature describing the mutual relationships that are evident in this population. This is not to say I don't see value here, but it needs to be more clearly sold.

3) The menstrual status of the women at the time of study needs to be explicitly
stated - was the timing of the vascular studies adjusted around the cycle?

4) Why are women only included in this study? Are data in men simply not available, or is there some unstated reason to specifically study women for this question?

Minor essential revisions

1) There is a piece of Results in the Methods section on p.5, last 5 lines. This needs to be moved to Results

2) Top of p.13 you cannot comment on pathways, shared or otherwise, with these observations of mutual association.

3) The English usage is good but not great. There are many sentences that may sound great in the original language but get complicated and confusing with translation. Particular focus should be paid to the abstract, revise to make it maximally clear and readable.

Discretionary revisions

1) The duration of forearm ischemia should be stated in the Methods

2) Where you say the analysis 'nominated' the components, I think it would be better to use 'designated'

3) I suggest using the words 'direct association' and 'inverse association' for these relationships, for maximal clarity

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Not suitable for publication unless extensively edited

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests