Reviewer's report

Title: Is waist-to-height ratio the best predictive indicator of hypertension incidence? A cohort study

Version: 0 Date: 06 Oct 2017

Reviewer: Wilson Wai San Tam

Reviewer's report:

The authors aimed to elucidate the power of anthropometric indicators in predicting hypertension incidence based on a cohort study.

The authors have the anthropometric measurements of the subjects, like BMI, WC and WHtR, collected in 2002 and then examine the predictive power of each measure to hypertension. The idea is interesting but I am not sure if the authors used a correct approach to analyze the data. For cohort study, one should divide the subjects according to exposure, for example, Normal weight (non-exposure) vs. Overweight or Obese (exposure) for BMI. The authors can then compare the number of subjects with hypertension in the exposure and non-exposure group respectively so as to see whether BMI would be a risk factor. Similarly, it can be applied to the other 2 measures. Using this approach, at least, they can compare the relative risks between the 3 measures.

However, the authors started to divide the subjects according to the current disease status (i.e. with or without hypertension). I think it is a more like a case-control design but there is significant different among the demographic characteristics between the two groups. From Table 1, clearly the age for those with hypertension is 10 years older than those without hypertension. Therefore, the analysis may be less powerful although authors tried to adjust age.

Another problem is the use of Cox regression in the analysis. Cox regression is used for time-to-event data, for example, one may have a group of patients recruited and then follow them to say 5 years to see how many of them reached the event (like death) and WHEN they reached. So there should be variation on the time to the event. In the current design, basically the time is around 13.2 years for all subjects (because 2015-2002=13), so why the authors choose to use Cox regression?

Some specific comments are as follows:

Abstract

1. Line 62: should be 'was initiated' instead of 'occurred'.
Introduction section

1. Line 107-122: It is a bit confusing when you write about the association between central obesity and HTN in paragraph 1, then mention it again in paragraph 3. It may be better if you start with the prevalence and the severity of HTN, and then mention its associations with obesity and the relevant anthropometric indicators.

2. Line 122: 'They are not without limitations' does not like a normal phrase. Please consider other expressions.

3. Line 123-133: I suggest the author to put two paragraphs into one.

4. Line 132-133: Please elaborate on how the cut-off points of central obesity vary with genders and races, e.g. highlighting the differences between guidelines, and how the prevalence may differ by definitions. Are there any adverse health consequences if subjects are being misclassified in their central obesity status?

5. Line 147-148: 'Moreover, most publications on this subject have the cross-sectional design as limitation.' Do you mean the cross-sectional design is the limitation for most publications on this research area?

In recent years, two meta-analyses have been published to quantify the discriminatory power of waist-to-height ratio when screening for cardio-metabolic diseases. Authors can consider to include these two studies in the introduction and/or discussion.


Methods section

The author mentioned "The 2002 sample size was calculated based on the total population at the time, a 25% prevalence of HTN, a 95% confidence interval and a 10% estimation error to obtain n = 1,030."
I tried to re-calculate the sample size using the standard formulae in Elementary Survey Sampling by Scheaffer et al 1996 (P.93) and the online calculator by Lenth (2006) https://homepage.divms.uiowa.edu/~rlenth/Power/index.html
I think the authors should use a margin of error +/-2.5% instead of +/-10%? Please confirm.

I have a question about the use of Cox-regression in this study. As the author collected the baseline data in 2002 and the current study is based on the data collected in 2015 as the outcome. Therefore, those who have and don't have HTN would have the same number of years in the analysis (i.e. 13 years), then what is the purpose of using Cox-regression? As it seems that there is no variation in the time to the event.

Specifically

1. Line 158: should be 'completed' instead of 'finalized'.

2. Line 159: should be 'was initiated' instead of 'occurred'.

3. Line 162: 'the 2002 sample size' refers to 'the sample size of the baseline cohort'? It's a bit confusing when '2002' is used without explanation.

4. Line 173: Please replace 'in 2002' with 'at baseline', as well as other paragraphs in the manuscript. It can be hard to follow for first-time readers because they do not remember when the cohort started.

5. Line 175-179: Please state the % of subjects remained in the cohort. The attrition rate can be a good indicator to reveal the representativeness of the sample.

6. Line 231: It may be more appropriate to name these variables as 'confounders' or 'demographic variables' instead of 'control variables'.

7. Line 236: What is the reliability and validity of the tools used for assessing physical activity levels? Could authors provide more information how to classify a subject is active or sedentary in work/ commuting to work/ leisure time [Should it be commuting to work not commuting to work?]
8. Line 250: 'to present a risk of CVD' sounds unclear. Do you mean the consumption of food in Group A increased subjects' CVD risk? Please provide some food examples of both groups or provide a list in appendix.

9. Line 267-269: Please present the correlation data of the indices.

10. Line 276-278: Please identify the cut-offs to indicate a good test performance.

Results

1. Line 289: Should it be 13.2 years?

2. From Table 1, it is clear that those older people would have (44.3 vs. 34.7) higher chance to have hypertension after 13 years (i.e. 57.3 vs. 47.7). The prevalence of hypertension would be higher in elderly, thus, what is the point of conducting a Cox regression analysis as age would be the determined factor to the difference. The comparison would be meaningful if the subjects were recruited at similar age.

3. Line 296-297: Please indicate if the differences are statistically significant.

4. Line 306: can delete the word 'control variable'.

5. Line 313-315: How did you test for significant differences in the AUC values?

6. Line 323-324: Similarly, how did not test for the significant differences in the cut-offs?

Discussion

1. Line 344-345: What does that mean by 'However, differences in the associations have been noted'?

2. Line 360-361: If the discrepancy in findings originated from the ethnic differences, why did the study in Brail (ref 39) had different results from your study?
3. Line 383-385: Please elaborate on the differences in anthropometric variables, and why do the changes lead to the significant associations being found among women only.

4. Line 446-447: The huge loss of subjects may lead to lower study quality in this cohort. Please provide the data comparing the demographic features of included subjects in two phases.

5. Other comments: Please elaborate on the implications of this study, particularly how can it be translated into the changes of practice when screening for obesity.

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

No

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Unable to assess

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

Quality of written English
Please indicate the quality of language in the manuscript:

Needs some language corrections before being published
Declaration of competing interests

Please complete a declaration of competing interests, considering the following questions:

1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?

3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?

4. Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript?

5. Do you have any other financial competing interests?

6. Do you have any non-financial competing interests in relation to this paper?

If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

I declare that I have no competing interests

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license (http://creativecommons.org/licenses/by/4.0/). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal