Reviewer’s report

Title: Waist Circumference and Risk of Elevated Blood Pressure in Children: A Cross-Sectional Study

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Reviewer: Caroline Fall

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This paper describes a study of blood pressure in relation to waist circumference, among 2334 seven year-old children selected from 6 schools in Taipei, Taiwan. Higher waist circumference was associated with an increased risk of elevated blood pressure defined as >95th sex- and age-specific percentile based on an international blood pressure standard. The authors conclude that waist circumference should be included in the regular serial check-ups for children, in order to detect those at risk of cardiovascular and metabolic disease in later life. The study was well performed, and the paper is potentially interesting and useful. There are some important revisions, and some additional analysis, required.

Background

1. The following statement needs one or more references: “….childhood obesity is associated with high risks for hypertension, type 2 diabetes, abnormal lipid profiles and early atherosclerosis”.

Methods

2. Study design: The term ‘purposive sampling method’ needs to be explained and/or referenced.

3. Study design: The sentence "There was no significant difference in age or sex between studied and non-studied children" should include the numbers in each group – it is currently not clear how many children declined to participate or were excluded for other reasons.

4. Study design: Please explain the following sentence: “Nevertheless, the study population in this study was not representative of either the pediatric population of Taiwan or of Taipei”. Why do the authors consider the children non-representative?

5. Study design: What is meant by “some regular internal examinations”? I think this may be a mistake in the English.

6. Study design: The rationale for measuring neck circumference should be explained. It is not a very commonly-used measurement, and it is not clear to this reader what it indicates. Furthermore, it should be explained why it was adjusted for in the multivariate analysis.

7. Study design: Approximately 4.4% (N=103) of the children were excluded from
the analysis because of ‘incorrect data entry’ or ‘lack of anthropometric information’. This is quite a high percentage, and should be mentioned as a limitation in the discussion.

8. Study design: The text implies that the same quartile cut-offs were used for both sexes. It would be more appropriate to state at this point that waist circumference was significantly higher among boys than girls, and then to use sex-specific quartile cut-offs.

Results

9. Paragraphs 1, 2 and 3 contain a lot of numbers that are already included in Tables 1, 2 and 3 respectively – it is not necessary to repeat these in the text. These paragraphs could thus be written considerably more concisely.

10. A possible reason why waist circumference was related to blood pressure, while BMI was not related, is that waist circumference is usually quite strongly positively correlated with height, which is in turn positively correlated with blood pressure. BMI is already height-indexed. I suspect that some of the association between waist circumference and blood pressure is not because of central adiposity, but merely because taller children have larger waist circumferences. I would therefore like to see height included in Table 2, and in the multivariate models shown in Table 3 – or an additional height-adjusted model shown. The authors did look at waist/height ratio as a predictor of blood pressure, but this is not quite the same.

11. As stated above, I do not understand the rationale for including neck circumference in the models – what is this actually adjusting for?

12. Please also clarify the adjustors in Table 3 – in the footnote, age is included as an adjustor, but age is not mentioned in the list of adjustors in the statistical methods section. Is age and sex adjustment necessary when you have used age- and sex-specific cut-offs for elevated blood pressure?

Discussion

13. The statement (paragraph 2) about sex differences in waist circumference should either be stated in Results, or in Methods – as mentioned above, this justifies the use of sex-specific quartile cut-offs.

14. It is stated (paragraph 3) that the association between waist circumference and systolic blood pressure is stronger than that with diastolic pressure. The authors should suggest possible reasons for this.

15. The final sentence of paragraph 4 (“A previous study….”) should be referenced.

16. The discussion in paragraph 5 may need to be modified after making a height-adjusted analysis.

17. Some of the text describing other studies that have examined associations with waist circumference needs to be improved, as the meaning is not clear. For
example the study by Fredriks – what did this study actually show? Did it show that waist circumference accurately predicts abdominal fat mass in children?

18. The authors conclude that regular waist circumference measurements should be undertaken routinely in schoolchildren. They should give an indication of the predictive power of waist circumference in their study – sensitivity, specificity, positive and negative predictive values – to assess whether this recommendation of a public health screening measure is advisable/justified.

General points
19. The English is generally good, but needs some attention in places.

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

**Quality of written English:** Needs some language corrections before being published

**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