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. Higher waist circumference was associated with higher blood pressure independently of height and BMI. 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.

The paper has been revised and has improved substantially. The data are excellent and have the potential to make a useful addition to the literature. The Introduction and Methods are good. I still think the paper as it stands, especially the Results and Discussion sections, falls short of achieving this. It is still overlong and repetitive, and could be more intelligently written.

1. The Results section still repeats a lot of numbers already in the tables. For example, the entire first paragraph of Results could be replaced with the following sentence: “All anthropometric measurements, including height, weight, BMI, neck circumference and hip circumference, and all measures of blood pressure, including SBP, DBP and elevated BP, increased with increasing waist circumference (Table 1).” If there is anything to be added it would be a sentence saying that SBP, DBP and the prevalence of elevated BP rose by X (regression coefficients and 95% CI) per cm increase in WC.

2. In paragraph 2 of Results: the first sentence states that boys with elevated BP had higher WC than girls with normal BP. Surely this isn’t the point. It would be better to say: “Within each sex, children with high BP had higher WC than those with normal BP.”

3. When describing Table 2, it should also be noted that height is also positively correlated with BP.

4. In the third paragraph of Results, again there is extensive repetition of figures given already in the Tables. In this unnecessary and long list of ORs, the important point, that BP is as strongly related to hip circumference as to waist circumference, does not come out clearly, and should be pointed out.
5. The authors have not clearly brought out the fact that both WC and BP are related to stature (skeletal size, height) and overall body weight and fatness (BMI). Presumably the relationship of neck and hip to BP reflect these relationships. BP is higher in tall people, presumably as a physiological effect to ensure perfusion of a taller body. As far as I know it is not known whether the higher BP associated with being taller is as ‘harmful’ as a risk factor for later disease as the higher BP associated with being fatter. Anyway, the main purpose of the adjustments in Tables 3 and 4 is to establish whether the association between WC and BP is still present after adjusting for these measures of body size. The footnotes of these tables state that the analyses are adjusted for sex, and yet only one sex is presented per table. Instead of the current presentation, I would suggest that Tables 3 and 4 are merged into one table (sexes combined, with sex retained as an adjustor in all models) and that the number of outcomes is reduced (either elevated SBP and elevated DBP or elevated BP, not all 3) and that three distinct models are presented across the page (should be possible in landscape format): 1) adjusted only for sex, age and operator; 2) adjusted for sex, age and operator + height; 3) adjusted for sex, age, operator, height + BMI. We would then see the serial reductions in ORs as one serially adjusts out the effects of skeletal size and overall body weight or fat, leaving still substantial effects of WC and HC. This would also make a logical progression of ideas in the Discussion more attainable.

6. The authors have not really dealt with neck circumference, except to say that it has been included in many other papers about blood pressure! That may be true, but still some discussion, even speculation, about the meaning of this association is required. What is neck circumference telling us? Why is it related to BP? I do not think it helps to add it as an adjustor in Tables 3 and 4 – which would be much easier to interpret if confined to adjustments for height and BMI. If neck circumference needs to come into the paper, its association with WC and BP could be mentioned in couple of sentences in Results.

7. The authors recommend measurement of waist circumference as a screening tool in children. It could be argued that rather than screening by WC, why not just measure BP in the first place? The answer is that BP requires greater operator skill, and is liable to be falsely elevated unless measured with care and in stress-free situations. Also, high WC is associated with other cardio-metabolic risk factors, like lipids and insulin resistance. I agree, therefore that the data, taken alongside what is known about the relationship of WC to metabolic risk, that screening with WC is a reasonable recommendation – the authors could argue the case for this more cogently.

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

**Quality of written English:** Acceptable

**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