Peer Review File

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Reviewer Comments

The author (s) aimed to assess the relationship between five anthropometric indicators in Chinese children and adolescents, and select which could better predict cardio-metabolic risk factors. The study provides very interesting findings but, in my opinion, with little novelty.

In general, the manuscript is well written. I have listed some important suggestions below for your consideration. Please consider them as constructive recommendations.

Major comments

1. Introduction section, what's new about this study? Previous studies among Chinese children and adolescents suggest similar results (for example): DOI 10.1186/s12889-017-4238-3; http://dx.doi.org/10.1136/bmjopen-2020-037040

Reply 1: There are two main differences compared with previous studies: a. The study population was usually adolescents and adults in previous studies, the evidence in preschool children is limited and controversial, in our study, we included people aged 3 to 6 years to supplement relevant evidence; b. We added two new anthropometric indicators into the comparation, which are a body shape index (ABSI) and body roundness index (BRI), these two indicators were proposed in 2012 and 2013 respectively. Some studies found ABSI is significantly associated with cardiometabolic risks in adolescents (Mameli2018, Duncan2013), furthermore, conclusions about the association between BRI and cardiometabolic risks in adults are also controversial (Xu2021, Feng2019), and lack of relevant evidence in children and adolescents. Therefore, we incorporated these two new indicators into our study and compared them with traditional anthropometric indicators.
we have modified our text as advised: Compared with previous studies, we not only included children aged 3 to 6 years, but also added two new anthropometric indicators (ABSI and BRI) into the comparation, which have not been evaluated between 3 to 17 years old children and adolescents. (see Page 5, line 101-105).
Changes in the text: Page 5, line 101-105.
Here are the references mentioned above:
Mameli C, Krakauer NY, Krakauer JC, Bosetti A, Ferrari CM, Moiana N, Schneider L, Borsani B, Genoni T, Zuccotti G. The association between a body shape index and cardiovascular risk in overweight and obese children and adolescents. PLoS One. 2018 Jan 3;13(1):e0190426. doi: 10.1371/journal.pone.0190426. PMID: 29298340; PMCID: PMC5752028.
Duncan MJ, Mota J, Vale S, Santos MP, Ribeiro JC. Associations between body mass index, waist circumference and body shape index with resting blood pressure in Portuguese adolescents. Ann Hum Biol. 2013 Mar;40(2):163-7. doi: 10.3109/03014460.2012.752861.

Epub 2013 Jan 18. PMID: 23327095.
Xu J, Zhang L, Wu Q, Zhou Y, Jin Z, Li Z, Zhu Y. Body roundness index is a superior indicator to associate with the cardio-metabolic risk: evidence from a cross-sectional study with 17,000 Eastern-China adults. BMC Cardiovasc Disord. 2021 Feb 16;21(1):97. doi: 10.1186/s12872-021-01905-x. PMID: 33593274; PMCID: PMC7885560.
Feng J, He S, Chen X. Body Adiposity Index and Body Roundness Index in Identifying Insulin Resistance Among Adults Without Diabetes. Am J Med Sci. 2019 Feb;357(2):116-123. doi: 10.1016/j.amjms.2018.11.006. Epub 2018 Nov 22. PMID: 30665492.

2. My main concerns are the statistical analyses performed in this study. The differences in accuracy by AUC values have not been quantified, and it is unclear whether the differences are having statistical significance. For example, as stated by authors, "The AUCs showed that in 3-6 years old children, BMI performed better in identify hypertension and hyperglycemia, WHtR and BRI were performed better in identify abdominal obesity and clustered CMRFs". What are the rationales behind the claim, like “were performed better” in the results and discussion sections? This information has not been provided in research method, but that is crucial for authors to justify their conclusion. Please see the following reference: https://doi.org/10.1148/radiology.148.3.6878708.

Reply 2: Thanks for your kind suggestion, we have supplemented our statistical analysis work in this area as you advised: a. We tested whether the AUC of each indicator is statistically significant and bolded those significant ones; b. Afterwards, we compared whether significant difference exist among AUCs of different indicators by using the algorithm suggested by DeLong *et al*.
we have modified our text as advised: In 3-6 years group, BMI, WHtR, ABSI-adolescents and BRI showed excellent ability to identity clustered CMRFs in both genders, while ABSI was failed to Identify high-risk children from all the participants. In 7-17 years group, WHtR and BRI showed the highest and equal AUCs in identifying hypertension (0.71, 95%CI: 0.66-0.75 for boys, 0.61, 95%CI: 0.55-0.66 for girls), dyslipidemia (0.65, 95%CI: 0.61-0.70 for boys, 0.59, 95%CI: 0.53-0.64 for girls), abdominal obesity (0.98, 95%CI: 0.97-0.99 for boys, 0.98, 95%CI: 0.96-0.99 for girls) and clustered CMRFs (0.85, 95%CI: 0.81-0.88 for boys, 0.86, 95%CI: 0.83-0.89 for girls). (see Page 11, line 227-236)
Changes in the text: Page 11, line 227-236.

3. I suggest to include optimal cut-off points to determine each risk limit, you can use the Youden index. For example, a recent meta-analysis in children and adolescents proposes a cut-off point of 0.46 or more in East and Southeast Asian regions (please see the following paper: https://doi.org/10.1111/obr.13375), China among them.

Reply 3: Thanks for your kind suggestion, we have supplemented our statistical analysis work in this area as you advised: we calculated the optimal cut-off value, sensitivity, specificity and Youden index of each indicator in different gender and age group, and results were shown in Table 4 and Table 5.

we have modified our text as advised: ROC analysis was used to evaluate the predict ability of different anthropometric indicators to identify CMRFs. Area under the receiver operating characteristic curves (AUCs) and 95% confidence interval (CI) were reported to demonstrate the predictive ability of indicators more intuitively. Difference among AUCs of indicators were compared by using the algorithm suggested by DeLong et al., the cut-off value, sensitivity, specificity and Youden Index were provided by ROC analysis, and the optimal cut-off value of each anthropometric indicator was based on the maximum Youden Index. All the statistical analysis mentioned above were accomplished by MedCalc (version 19.6.1). (see Page 9, line 180-188; Page 32-42, Table 4 and Table 5)
Changes in the text: see Page 9, line 180-188; Page 32-42, Table 4 and Table 5.

4. Why did you include both children and adolescents jointly? (7-17 years old)

Reply 4: The main reason we put 7-17 years old population in one group is that previous studies did not find significant difference between 7-12 and 13-17 years old (e.g., for example: https://doi.org/10.1515/jpem-2018-0018; https://doi.org/10.1016/j.mayocp.2019.05.026), as well as ours, therefore, we combined children and adolescents aged 7-17 years into a group.
Changes in the text: None.

5. I am not sure if it is appropriate to include the WC in the definition of CMRFs, since most of the anthropometrics parameters include it. Did you test a possible colineality?

Reply 5: Thanks for your kind suggestion, we analyzed the partial correlation coefficients among five anthropometric indicators, and the correlation between anthropometric indicators and biochemical indicators in Table 1 and Table 2 of the manuscript, separately. Results showed that in two different age groups, the correlation among BMI, WHtR, ABSI-adolescents and BRI were strong, but the correlation among anthropometric indicators and biochemical indicators were weak. Therefore, we think include the WC in the definition of CMRFs is considerable. As far as we concerned, multicollinearity usually exists in linear regression models, and the model estimates are distorted due to the high correlation between explanatory variables. However, in our study, we adopted the ROC analysis method to evaluate and compare the ability of different indicators to recognize CMRFs, and did not build a linear regression model. Furthermore, research shows that abdominal obesity is a risk factor of cardio-metabolic diseases, and the research design of some studies is similar to ours, for example: http://dx.doi.org/10.1136/bmjopen-2020-037040; Feasibility of body roundness index for identifying a cluste... : Medicine (lww.com).
Changes in the text: None

Minor comments
Abstract. Please define all of the abbreviations "To assess the relationship between five anthropometric indicators (BMI, WHtR, ABSI, ABSI-adolescents, BRI) in Chinese..."

Reply: We have modified our text as advised: To assess the relationship between five anthropometric indicators, which includes body mass index (BMI), weight-to-height ratio

(WHtR), a body shape index (ABSI), ABSI-adolescents and body roundness index (BRI) in Chinese children and adolescents, and select which could better predict cardio-metabolic risk factors (CMRFs) (see page 2, line 27-31).
Changes in the text: Page 2, line 27-31.