Reviewer’s report

Title: Thyroid function, body mass index, and metabolic risk markers in euthyroid adults: a cohort study

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Reviewer: Fernando Bril

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In this study, Xu et al assessed the association between plasma thyroid hormones and weight (as well as other classic cardiovascular risk factors) in a large cohort of Chinese patients. Their main findings are that TSH and fT3 levels (even when within the normal range) were positively associated with BMI, while lower levels of fT4 were also associated with it. While the authors should be congratulated for embarking on a difficult topic, this reviewer believes there are several issues that need further assessment:

- The main limitation of the study is its lack of novelty as the association between TSH, fT4 and BMI has been extensively assessed in the past. The authors should make an effort to justify what this study adds to prior studies that have assessed the same parameters in other Chinese populations, as well as in other ethnic groups.
- A more novel approach would be to assess as part of the "metabolic risk factors" the presence/absence of NAFLD. Were US done as part of the health check-up? If no information is available, it is still worthy to be mentioned in the discussion. Although this has also been previously done by other groups:


- This is a cross-sectional study, and as such, can only assess the presence of an association between thyroid hormones and BMI. Authors should rephrase their aim, as the study cannot "elucidate whether and how thyroid hormones […] affect weight levels…". It also claims: "[…] to provide important statistical support for further exploration of the mechanism of the relationship […]". No causal relationship can be establish in cross-sectional studies. The study only detected an association.
- Table 2 is really difficult to read as it is (some formatting issues in the pdf). However, looking at
all the r numbers, I could not identify any strong correlation. They are all <0.25. Even when these values are statistically significant these correlations are of borderline (if any) clinical significance. Please add this as a limitation and rephrase your conclusions accordingly.
- What are the differences between the 2 p values in Table 2? Does one represent the univariate analysis and the other one the multivariate analysis? Is one for the r and one for the slope? (if so, why are some of these so different?).
- Results are difficult to interpret in Table 3 due to inconsistencies. For example, the risk of obesity is higher with increasing TSH levels, however this is not true for overweight in the highest quartile of TSH. Increasing fT4 is associated with higher chances of being low-weight, but less so in the highest quartile of fT4. While the risk of being overweight is lower in the highest quartiles of fT4, no changes are observed for obesity.
- Conclusions should be tempered based on the observations mentioned above.

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

Yes

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

Yes

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

No

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

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