Reviewer’s report

**Title:** In what extent anemia coexists with cognitive impairment in elderly: a cross-sectional study in Greece

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**Reviewer:** Dr Louise waite

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

**Advice on publication:** Unable to decide on acceptance or rejection until I see revised version

This paper examines the previously identified association between haematinic factors and cognitive functioning. The population studied comprises three different sub-populations in a health catchment area in Greece. Associations between HcT, B12 and folate levels and cognitive impairment are examined. The study identifies that an MMSE score 24 is associated with a reduced HcT and B12.

There are several issues that need to be addressed in this manuscript;

1. There is no clear feeling for the reader what the characteristics of the population are. Although the authors refer to a previous publication it would be beneficial to readers of the current paper to have some baseline data regarding the population as a whole and the three sub populations eg age range, mean age, educational status and how this population resembles or differs from other populations including Greek community dwelling populations. Similarly descriptive data regarding the parameters examined (mean, SD and range of MMSE, HcT, B12 and folate levels) is also required. The latter should be used to supplement the data provided in Table 2.

2. The authors acknowledge that they have used the less commonly used HcT. The impact on the interpretation of results need further discussion.

3. The conclusion that this paper supports the previous finding the degree of anaemia is associated with
cognitive impairment (page 8) is not supported by this paper. Anaemia was defined dichotomously and no analysis takes anaemia severity into account. Table 3 identifies that a lower MMSE score has a greater odds of being associated with dementia.

4. The conclusion that anaemia is a risk factor for cognitive impairment is too strong and this conclusion should be tempered. This paper reports a cross-sectional study where causation cannot be assessed. It would be more correct to state that there is an association between anaemia and cognitive impairment and to further discuss why this association exists. For example, the authors have not discussed the known changes in olfactory function and taste associated with AD and the impact this may have on dietary intake, nutritional status and the haematinic factors assessed in this study. Similarly, there is no measure of intercurrent illness which may be contributing to anaemia. The possible contribution from other, unmeasured illnesses needs to be acknowledged in the discussion.

5. The reporting of results is inconsistent. It would be easier for readers to follow if all results were reported in a similar fashion. For example, B12 results are reported for gender and not total population whereas HcT is reported for both total population and gender. Similarly, it is not necessary to report both Chi-squared statistics and odds ratios. It would perhaps be simpler if a table providing the numbers with percentages in brackets for the populations as a whole and for each gender be presented with the odds ratios and 95% CI included in the table. A brief description only in the results section would then be required.

6. In the methods section MMSE scores from 19 to 24 were defined as possible cognitive impairment. Less than 19 was defined as cognitive impairment. Throughout the paper the term possible cognitive impairment was used. Does this mean that subjects with an MMSE less than 19 were excluded from analyses or do the authors mean that any subject with an MMSE of 24 or less was included in the possible cognitive impairment group for analyses?

7. I am unclear as to the purpose of the additional regression analyses and the results of Table 3. They seem to provide little additional information and confirm previous findings in the paper (ie the association between MMSE and anaemia etc) and what would be expected ie MMSE scores lower with advanced age, institutionalisation.

8. In the discussion the authors seem to interchange anaemia and cobalamin deficiency, implying that in subjects with a low HcT cobalamin deficiency was aetiological. This needs to be clarified as the aetiology of the lower HcT is not known and has not been assessed in this study.

9. Mention of Figure 1 on Page 8 is made. I was unable to locate this figure within the file.
10. References 9 and 29 are the same paper

**Competing interests:**

None declared.