Reviewer’s report

Title: Factors associated with impaired colour vision without retinopathy amongst people with type 2 diabetes mellitus: A cross-sectional study

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Reviewer: Dora Fix Ventura

Reviewer's report:

The present paper investigated color vision in type 2 diabetes mellitus patients without retinopathy and compared findings with associated factors. It is a properly designed study whose outstanding aspect is the large sample of participants - potentially a worthy contribution to the field if the points considered below are reviewed. This reviewer’s observations are as follows:

General Comments

- One of the main points is that the findings of the study should be better discussed in the context of the literature and it would be relevant to have hypotheses formulated to try to explain them.

- Findings that deserve further treatment in the discussion are the type of color vision defect that was found and the association of color vision loss in this population with age and level of education.

- The type of color vision defect should be discussed with relation to the type of test used. It should be taken into account that other researchers using other instruments found non selective (diffuse) losses rather than impairment restricted to the tritan axis.

- In view of the fact that the study found better results of blood pressure, glycemia and lipid status in patients with color vision defect, the authors present in the discussion the idea that those patients become more careful and better observant of control of the diabetes. This interpretation strikes me as excessively speculative. In order to make such a statement it would be necessary to show that the subjects are conscious of their color vision losses. It is very likely that they are not conscious that they have impairment in color discrimination, first because the losses are not always very severe and second because their development is very gradual, leading to an adaptation to the condition. It is not uncommon to find subjects with severe dyschromatopsia that are surprised by their color vision test results and were not at all aware that they had any color vision impairment. In the present study, the color vision losses range from light to severe, so they may be in great part not realized by the patient. In any
case, there should be clear evidence that the patient is cognizant of his color vision shortcomings to be able to point dyschromatopsia as a factor that may contribute to his diabetes care.

Other comments:

Methods

- When abbreviating the Lanthony D15 test the authors should use the designation D15d, so that the test used in the study is not confused with the Farnsworth D15 test.

- The illumination used at the testing set should be described. The recommendation that the test should be done under daylight illumination or an illuminant that reproduces this condition is of essence for the color testing situation of this type of test. This information must be added to the methods.

- Treatment of the results of the Lanthony color vision in the paper is not satisfactory. The Lanthony color vision test has been the object of quantification procedures that are available in the literature (Bowman, K. J. (1982) A method for quantitative scoring of the Farnsworth panel D-15. Acta Ophthalmol. 60, 907-916.; Vingrys, A. J. and King-Smith, P. E. (1988) A quantitative scoring technique for panel tests of color vision. Invest. Ophthalmol. Vis. Sci. 29, 50-63.) . The authors must consider the quantification of the data obtained. The binary classification used is very poor, since it ignores the degree of color vision loss. The classification of the test outcome for each subject was done by visual inspection, a procedure that may be useful in clinical practice, but is not acceptable for research purposes as long as an objective, quantifiable procedure is available. If the quantification is applied, the statistical analysis will have to reformulated.

- The Lanthony desaturated D15 test should not be referred to as a screening test. The Farnsworth D15 is a screening test, used to detect severe defect, as in congenital color blindness, but the D15d or Lanthony is a test developed to detect more subtle color vision losses characteristic of acquired dyschromatopsia.

Results

- Results from 31 patients were excluded due to "ambiguous result from the D-15 test". The authors should explain what they meant by this. What have they considered ambiguous in the results of these patients? May the so called ambiguous results point to a diffuse result, rather than a result that is consistent with one of the axes? If so, the outcome of a predominant tritan
defect may be challenged. Again, the point taken above about the need for quantification applies to the question of why these results were excluded.

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

No

**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

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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

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