Author's response to reviews

Title: Hyperopia: a meta-analysis of prevalence and a review of associated factors among school-aged children

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Version: 4 Date: 14 July 2014

Author's response to reviews: see over
Author's response to reviews

Title: Hyperopia: a meta-analysis of prevalence and a review of associated factors among school-aged children (MS: 1740598651109263)

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The author (Rodrigo Dalke Meucci) has been included. He worked on the statistical analysis (meta-analysis) and assisted with the final revision of the article.

Version: 2 Date: 10 July 2014

Author’s response to reviews: see over
Reviewer's report

Title: Hyperopia: a systematic review of prevalence and associated factors among school-aged children

As the meta-analysis was included in the study, the title was changed to: Hyperopia: a meta-analysis of prevalence and a review of associated factors among school-aged children

Version: 2 Date: 9 February 2014

Reviewer: Jenny M Ip

Reviewer's report:

General

a. The articles below were removed, because the examination was not performed with cycloplegic autorefraction or cycloplegic retinoscopy, not filling the inclusion criteria of this study.


As the studies were excluded from the systematic review, the final number of studies has changed in the second paragraph of the methods: “A further 44 articles were excluded due to: non-random sample of the general population and schools;” With that, Figure 1 has also been modified with respect to the final number of articles used in systematic revision.

b. In the methods, it was included a section explaining the methodology used in the meta-analysis

c. The first paragraph of the results was modified because two studies were excluded: “The review included 40 cross-sectional studies...” “Seven studies are from Europe (two were conducted in the United Kingdom; Poland and Sweden carried out two studies each and Finland one study).”

d. In the results, fifth and sixth paragraphs about meta-analysis were included.

e. Figure 2 was created, referring to Foster Plot of meta-analysis.

f. In the Results, the section about “Ethnicity and hyperopia in children” was abridged
g. In the third paragraph of discussion it was included a comment referring to the meta-analysis

h. The last paragraph of the conclusion was modified and improved

**Major Compulsory Revisions**

1. Abstract section. The abstract should have a clearly stated aim within the “background section”

Abstract: the objective of the study has been made clearer in the Background. The methodology has been completed including the study of meta-analysis and the conclusion was improved and expanded.

2. Background section, line 3. Please provide a reference to the statement “….presence or absence of associated accommodative and binocular dysfunctions”.

Reference [1] has been added, the first paragraph of which indicates the importance of accommodative and binocular dysfunctions in sequela: “Hyperopia in childhood, particularly when severe and/or associated with accommodative and binocular dysfunctions may be a precursor of visual motor and sensory sequelae.[1]”

3. Discussion. In the section relating to ethnic differences:

“The particularly low hyperopia prevalence could be partly explained by ethnicity, as in Durban, South Africa [27], where the majority of the population are black followed by Asian people. Regarding ocular components, both African and Asians have an axial length larger than white individuals. Since the study was Majorly based in the black ethnicity, it is important to consider that the hyperopic error might be underestimated due to a smaller cycloplegic action in eyes with dark irises.[27, 60]”

Further clarification is needed. Given that hyperopia is associated with shorter axial length and myopia with longer axial length, we should also expect higher rates of myopia in South Africa. However, this is clearly not the case (2.9-4.0% Naidoo et al). It seems unlikely that in the report by Naidoo et al (and other RESC studies) incomplete cycloplegia could under-estimate hyperopia as a strict protocol for pharmacological dilation was used, and pupil diameter was assessed.

The article mentions that low hyperopia prevalence is partially explained by ethnicity. The explanation in relation to darker irises has been removed from the text since we agree with the reviewer’s argument.
4. Tables 1& 2 seem to have a lot of duplication of data – the authors could consider condensing the two tables into one.

Table 1 & 2 have been combined into one table (Table 1) and the number of eyes examined has been included (by eye or by child) and which examination was performed (cycloplegic autorefraction or cycloplegic retinoscopy). Table 3 was renumbered as Table 2.

**Minor Essential Revisions**

5. Results. In the sentence: “...prevalence of hyperopia at age of 7 years ranges from 2.8%[27] to 28.9%[28]. Even excluding outliers, the prevalence ranges from 4.0% [29] to 10.7% [30].”, please elaborate or clarify what is meant by “excluding outliers”.

Meta-analysis of hyperopia prevalence by specific age has been undertaken, resulting in a comprehensive modification of the results description (Results: fifth and sixth paragraphs).

6. Discussion. The sentence “On the other hand, females have greater acceptance and participation in studies, trials and interviews with scientific purpose that could lead to positive selection bias” should be referenced, or else another explanation provided, as in these paediatric studies, consent is not accepted from the child participants, but from the parents.


**Minor Comments not for publication**

7. Please ensure consistency in number of decimal places for statistics within the manuscript. Eg. In Abstract, line 8 and line 9, change 4% to 4.0%, and 7% to 7.0%.

Done

8. Abstract, line 11. Please change “white people” to “white children”.
9. Background, line 4. Please insert “with” after “child may present”.

Done

10. Background, line 6. Please insert “with” after “children may present”.

Done

11. Methods section, line 14 -15. please remove the”e” after “dysfunction” and the “e” after “dyslexia”.

Done

12. Methods section, line 18. Please correct “researches” to “research”, and remove extra spacing.

Done

13. Results. Please insert “refraction” after “spherical equivalent” throughout the manuscript.

Done

14. Results. In the sentence: “girls appear to have, on average, a smaller AL when compared to boys.[6, 38, 39, 48]”, please change “smaller” to “shorter”.

Done

15. Results. In reporting confidence intervals, the convention is usually (95% CI 8.5 – 13.2), rather than 95% CI (8.5 – 13.2)

Done

16. Results. In the gender associations, please specify age of the sample from Poland

Done

17. Results. In the ethnicity associations, please consider being consistent with either referring to children as “white” or “Caucasian”

Done. We have considered “Caucasians”.

18. Results, ethnicity association, line 3. Please insert “et al” after “Kleinstein”, and insert the appropriate reference.
In the Results, the data about “Ethnicity and hyperopia in children” was abridged and this reference was modified.

19. Results, ethnicity associations. In the sentence “In another English study with children at the age of 7 years, the non-white ones were less likely to be hyperopic when compared to white children OR= 0.16 95%CI: (0.03 – 0.82); p=0.028 (Table 3).[24]”, please replace “ones” with “children”.

Obs: the article below was removed, because the examination was not performed with cycloplegic autorefraction or cycloplegic retinoscopy, not filling the inclusion criteria of this study.


20. Results, ethnicity associations. The sentence “…The results showed that 6-year-old white children presented the highest prevalence of hyperopia 15.7% 95%CI: (13.2 - 18.2) than children of the same age coming from Eastern Asia 6.8% 95%CI: (4.0 - 9.5) and South Asia 2.5% 95%CI: (0.0 - 7.5). [49]” needs to be amended for grammar.

In the Results, the data about “Ethnicity and hyperopia in children” was abridged and this sentence was excluded. The data were maintained in Table2.

21. Results, ethnicity associations. In the sentence “Moreover, it was also found a higher prevalence of hyperopia in children from the Middle East when compared to children from Southern Asia, yet no significant difference was found between white children and the ones from the Middle East.[39]”, please replace “ones” with “those” or “children”

In the Results, the data about “Ethnicity and hyperopia in children” was abridged and this sentence was excluded.

22. Results, parental education, socioeconomic status. The last paragraph refers to adult findings, and would not be relevant in this review.

This information (among adults) was excluded from results. We recovered this information in discussion (eighth paragraph) to support the association between socio-economic status and axial length, once do not exist which investigate this association in children:
“As for ocular components, in the United States Lee observed a statistically significant association (p<0.01) between years of education and larger AL in individuals aged 43-84 years, indicating that this aspect should be better studied in children.[60]”

23. Results, outdoor activities. After “Rose”, please insert “et al”. Similarly, please amend “this author” to “these authors”, and insert “et al” to after “Mutti”.

Done

24. Conclusion line 8. Please change “loss” to “loss to follow up”.

Done

25. Table 1. Please correct “staded” to “stated” in column “Response rate”; consider inserting description of population setting as “rural” or “urban”

Done

Discretionary Revisions

26. For this review to be clinically relevant and useful for public health implications, the authors should consider a discussion on current recommendations on hyperopic correction (eg, from AAO preferred practice guidelines), and levels of visual impairment (eg. A discussion on visual acuity in relation to levels of hyperopia).

27. Despite concluding statements about evaluating the social impact of hyperopia, there was no mention of this in the discussion or results – perhaps a more balanced approach would be to include some of this in the preceding discussion.

The study aimed to synthesize existing knowledge about the prevalence of hyperopia among children and associated factors, not focusing on the consequences of hyperopia. However we brought this important aspect to the conclusion once it is know that the optimal method and timing of screening to prevent sequelae still unsolved. The last paragraph of conclusion was reviewed.
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
Reviewer's report

**Title:** Hyperopia: a systematic review of prevalence and associated factors among school-aged children

As the meta-analysis was included in the study, the title was changed to: Hyperopia: a meta-analysis of prevalence and a review of associated factors among school-aged children

**Version:** 2  **Date:** 8 April 2014

**Reviewer:** Brendan Barrett

**Reviewer's report:**

a. The articles below were removed, because the examination was not performed with cycloplegic autorefraktion or cycloplegic retinoscopy, not filling the inclusion criteria of this study.


As the studies were excluded from the systematic review, the final number of studies has changed in the second paragraph of the methods: “A further 44 articles were excluded due to: non-random sample of the general population and schools;” With that, Figure 1 has also been modified with respect to the final number of articles used in systematic revision.

b. In the methods, it was included a section explaining the methodology used in the meta-analysis

c. The first paragraph of the results was modified because two studies were excluded: “The review included 40 cross-sectional studies...” “Seven studies are from Europe (two were conducted in the United Kingdom; Poland and Sweden carried out two studies each and Finland one study).”

d. In the results, fifth and sixth paragraphs about meta-analysis were included.

e. Figure 2 was created, referring to Foster Plot of meta-analysis.

f. In the Results, the section about “Ethnicity and hyperopia in children” was abridged
g. In the third paragraph of discussion it was included a comment referring to the meta-analysis
h. The last paragraph of the conclusion was modified and improved

**Major Comments**

1. Relationship to myopia studies. The authors do mention the fact that populations with high rates of myopia “generally have low prevalence of myopia…” [discussion]. But to me this point is crucially important and so deserves much more attention in this paper. How can the story of hyperopia prevalence be told without talking extensively about the prevalence of other refractive errors (in particular myopia)? If myopia is more prevalent and of greater magnitude in population 1 versus population 2, might not this fact alone dictate differences in the % of hyperopia in the two populations? I’m not sure therefore about the value, or even the validity, of presenting hyperopia data alone. Indeed most of the papers/studies cited here present refractive error data in general. In my view, this issue of the value and justification for considering hyperopia data alone needs to be tackled explicitly before this paper can be considered for publication. To elaborate: in one sense, comparison of prevalence rates of hyperopia can only be usefully be made when differences in myopia prevalence are taken into account. At the very least, for any population in which hyperopia prevalence is considered, we also need to know the rates of other refractive errors. One possibility would be to present hyperopia prevalence data separately for populations with different underlying myopia rates. This is not trivial to address because of course the myopia prevalence rate changes (dramatically in some populations) over the age range considered here.

The first version of this systematic review included hyperopia, myopia and astigmatism. However, during the submission process a systematic review about myopia was published (Pan C-W, Ramamurthy D & Saw S-M. Worldwide prevalence and risk factors for myopia. Ophthalmic Physiol Opt 2012, 32, 3-16). For this reason we decided to remove the part relating to myopia and astigmatism from our review.

Hyperopia and myopia are complementary events, but they do not have causal association. In most cases the complementarity of these events is due to the anatomical characteristics of the eye typical in certain ethnic groups, which is clear in the seventh paragraph of discussion. The causal factor analyzed is therefore ethnicity. As a parallel it can be stated that populations which on average are tall have lower prevalence of short individuals, nevertheless one of these events does not cause the other, they are complementary and what needs to be examined are the causes.
2. Prevalence data are presented but there is little or no mention of the severity/magnitude of this hyperopia. In Table 3 there is mention of differences in the amount of hyperopia in different ethnic groups (e.g. Ip et al., 2008 study) but to me severity/magnitude information must go hand in hand with prevalence. As the authors point out, prevalence depends on the cut-off/criterion. For example, the prevalence of low hyperopia might differ markedly between two populations, but prevalence might be very similar in the two populations when considered in terms of the proportions of samples with moderate or severe hyperopia. Thus, to understand hyperopia in any population, don’t we need to know about both magnitude and prevalence? In my view, I think that we do.

Undoubtedly only studies with the same cut-off points are comparable. Although we have described all the studies, the assessment of hyperopia prevalence was performed on those studies using the ≥ +2.00D cut-off point (moderate hyperopia).

3. Presentation:

(a) Table 1 & 2 could be combined into one table. They both deal with prevalence as a function of age. Where there are age-specific prevalences presented for children at different ages within the sample these can be presented in a final right hand column. Where no age-specific prevalence is presented, this column will have no entry.

Table 1 & 2 have been combined into one table (Table 1) and the number of eyes examined has been included (by eye or by child) and which examination was performed (cycloplegic autorefraction or cycloplegic retinoscopy). Table 3 was renumbered as Table 2.

(b) I would like to have seen a figure of age v prevalence. This could help to draw together the huge volume of results presented in the Tables. As well as showing the decline in prevalence with age in childhood, it would show the variation across studies. An age v hyperopia severity figure would also be useful.

Following the reviewer’s suggestion that it would be interesting to present a figure on age versus prevalence, we undertook a meta-analysis of hyperopia by specific age, using those studies that had a response rate of 80% or more and a hyperopia cut-off point of +2.00D or more (moderate hyperopia). Figure 2 was included, referring to Foster Plot of meta-analysis.

We opted not to present a figure on the relationship between age and severe hyperopia because the studies do not provide information about severe hyperopia by specific age.
(c) The information in Table 3 is useful but not that easy to understand; in my view it could be presented in a much shorter and clearer fashion. Take the very 1st study in Table 3 (Ip et al., 2008) as an example: Does “in the same age range (p=0.005)” refer to the results for 6 year-olds or across age more generally? If for 6 years olds, then it would be much clearer if “the same age range” was deleted. You have given a p-value for 6 year olds comparison of males v females, but why not do the same in 12 year olds? Another example: for Gao (2012) you say “no association” between urban and rural hyperopia rates? What does ‘no association’ mean? That urban and rural rates of hyperopia were significantly different (the figures you quote look different)? Or that they were not significantly different? Rather than using language like ‘no association’ I suggest reducing the volume of text and saying something like: Urban (%) v Rural (%): NS, p=???? [use NS for non-significant, S for significant etc..]. You can abbreviate the others also by listing for example, “Age 12, Maternal Education, p=????” rather than saying “Paternal Education: (maternal education) at age 12, less maternal education was borderline significant factor associated with hyperopia (p…..)”. A more consistent style of presenting the data throughout Table 3 would make it much more helpful.

Several aspects of Table 3 have been condensed, taking the reviewer’s suggestions into consideration and Table 3 was renumbered as Table 2.

(d) Much of the text in the ‘results’ section replicates what is provided in the tables. This is particularly true in the case of ‘ethnicity and hyperopia’ results section. I suggest that this duplication is reduced and only the main points/trends rather than specifics are included in the text.

In accordance with the reviewer’s suggestion, the results relating to ethnicity have been abridged.

Specific comments

In the Tables, please explain (perhaps using footnotes) “Response rate” and make it clear that “hyperopia definition” was based on “mean sphere” (if this is indeed the case in all the studies that are included). It should be made clear in the Tables which studies examined one eye only and which studies examined both eyes. In other words are there instances where the prevalence quoted refers to the proportion of “eyes” that are hyperopic? Because some studies examined both eyes, won’t prevalence in these cases refer to the proportion of “children” that are hyperopic.

The information requested has been included in Table 1.

Where cycloplegia retinoscopy/autorefration was used in studies of say children aged 6 to 18 years, was cycloplegia only used in the case of the
younger children, was it always used in all of the children, irrespective of their age?

The cycloplegic retinoscopy/autorefraction examination, as an inclusion criteria of the study, was performed in all the studies and in all ages.


In my version, something appears odd with the formatting in Table 2 for the He (2007) and Saw (2007) results (specifically, “Gombak district” appears twice, and out of place.

Modifications have been made in relation to “Gombak district”. This had been duplicated.

Methods “The searches were limited to the age range of 0-18 years, and English language”. Does this mean that no study that include data from both children and adults was included? Also, I can see why it makes it easier to exclude articles not written in English but is this valid?

By mistake the Methods section stated that the search for articles was limited to those published in English. The search made no restriction regarding language and this has been corrected in the Methods section.

There is mention of “outliers” in the text. But I didn’t see any description of what definition they used for ‘outlier’.

Meta-analysis of hyperopia prevalence by specific age has been undertaken, resulting in a comprehensive modification of the results description (Results: fifth and sixth paragraphs).

I don’t understand “07 cited papers were included in the selected articles” that appears Figure 1 and at the end of the results section.
We have changed the title of Figure 1 to: “papers cited in selected articles” and we have rectified the sentence at the end of the Methods section in keeping with the reviewer’s suggestion.

Table 1: ‘Not staded’ appears in several places instead of ‘not stated’. Also ‘rigth’ instead of ‘right’ (Czepita studies). “Table 1” is headed “Tabela 1”. There are many other typographical errors in the document.

All other typing errors have been corrected.