Reviewer's report

Title: Maternal Risk Factors Associated with Lead, Mercury, and Cadmium Levels in Umbilical Cord Blood, Breast Milk, and Newborn Hair

Version: 3 Date: 20 August 2014

Reviewer: Enrique Martins

Reviewer's report:

- Discretionary Revisions
  1. Introduction, first paragraph: in the sentence "Toxic heavy metals are fat soluble, non-ionizing low molecular weight (<1000 Da) chemicals that can quickly cross the placental barrier..." replace quickly for readily, or easily.
  2. Introduction third paragraph: replace "samples" for "specimens"
  3. Materials and Methods, second paragraph: replace "samplings" for "sampling procedures"
  4. Materials and Methods, second paragraph of the section "Measurements of Pb, Hg, and Cd": this paragraph regarding specimen collection should be moved to the section "Participants and samplings"

- Minor Essential Revisions
  1. Abstract, Conclusions: the sentence "Most of the study samples had detectable levels of Pb, Hg, and Cd,..." is incorrect because it generalizes a concept that is true for some of the toxic metals in some type of specimens, but not for all. Authors should rephrase it. The conclusion in the abstract should reflect better what it says in the full text.
  2. Introduction, first paragraph: the assertion "Toxic heavy metals are fat soluble, non-ionizing low molecular weight (<1000 Da) chemicals..." is incorrect. Not all the compounds in which form heavy metals can enter the body are fat soluble, and they are definitely capable of ionization. Of course that metallic forms and organo-metallic compounds are fat soluble.
  3. Introduction, second paragraph: authors should state the effects of exposure of each heavy metal separately
  4. Results, first paragraph: there is too much repetition of results in the text and the tables. Authors should consider putting in the text only the most relevant results and leave the others in the table, to make the text easier to read.
  5. Results, second paragraph: rewrite the following sentence: " Maternal anthropometry, level of education, interval between 2 pregnancies, and parity, gestational age, neonatal anthropometry, gender, and mode of delivery were not
affected by Pb or Hg levels in the biological samples." As it is, the sentence says that lead or mercury do not affect the mentioned risk factors, but the work is aimed to study the relation between the risk factors and the toxic metals levels in the different types of specimens. I think that the risk factors should be the ones modifying the toxic metal levels.

The same concept applies to the following sentence in Results, fifth paragraph, "Maternal anthropometry, level of education, time between 2 pregnancies, and parity, neonatal anthropometry, gender, and the mode of delivery were not affected by Cd in the biological samples."


7. Discussion, third paragraph: "Between 1980 and 2011 the reported level of Pb in umbilical cord blood ranged from 0.67 µg dL–1 to 13 µg dL–1"; please state in the text where this reported levels were determined.

8. Discussion, fourth paragraph: it is interesting that a relation has been found between breast milk lead levels and insecticide use, it would be correct to make a comment on this finding. Is there any previous knowledge about this? Is there any hypothesis on how the insecticide use can cause high breast milk lead levels?

9. Discussion, fifth paragraph: the authors say "In the present study the mean level of Pb in newborn hair was 2.72 ± 1.44 µg/g–1, indicating that there was continuous exposure during pregnancy." How can you ascertain that the exposure was continuous and not sporadic?

10. Discussion, eighth paragraph: replace "amelia" for anemia

11. Table 2: the medians for cord blood Hg and Cd are <DL. As you can't ascertain any value under the limit of detection, including a central tendency measure like the median doesn't give any useful information, the range and the cases above DL and safe limit are enough.

- Major Compulsory Revisions

1. Introduction, third paragraph: in the sentence "As such, the present study aimed to measure the level of maternal and fetal exposure to 3 heavy metals, based on 3 biological samples (cord blood, breast milk, and newborn hair), and to determine the possible routes of exposure.", authors should replace the phrase "routes of exposure" for "assessed risk factors" or something similar because they are assessing exposure risk factors in the mother, not the routes of exposure like oral, respiratory, dermal, etc.

2. Materials and Methods, last paragraph: in the sentence "The level of Pb in cord blood indicating toxicity was accepted as 2 µg/dL, according to Gilbert and
Wiess8, and the level of Hg in cord blood indicative of toxicity was accepted as 5.8 µg/L–1(9)."; the authors should state clearly what the accepted lead and mercury cord blood levels mean. Regarding lead, Gilbert and Weiss propose lowering the acceptable blood lead level for children to 2 µg/dL, but they don’t mention cord blood lead levels. So, any chosen reference level for cord blood lead will be arbitrary. I don't mean to say authors can't choose an arbitrary cut level, like 2 µg/dL, but they should put it clearly in the text. For instance, in a recently published work, we defined the cut for cord blood lead levels as the limit of quantization of the analytical technique used to measure lead, assuming that any measurable amount of lead in cord blood can cause harm given that there is not a threshold of blood lead level under which no adverse effects are found.

As for Mercury, US EPA recommendation is for methil-mercury, the authors should make that clear.

3. Materials and Methods, Statistical analysis: Authors should indicate how the calculations for the means were made, did they include values under the limit of detection?

4 Materials and Methods, Statistical analysis: the authors make a number of correlations between the three metals and the different types of samples, but they don't include any comment on the correlations measured in the discussion, so why do they include them in the analysis.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Needs some language corrections before being published

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