Reviewer's report

Title: Factors affecting Vitamin D status in different populations in the city of Sao Paulo, Brazil: The Sao PAulo Vitamin D Evaluation Study (SPADES)

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Reviewer: Francisca Pérez-Llamas

Reviewer's report:

The authors have conducted a study in order to evaluate 25-hydroxyvitamin D concentrations and its the relationship to various factors (age, gender, PTH, creatinine, creatinine clearance, ionized calcium, month of the year and BMI) in four different population groups in a city with subtropical weather (São Paulo, Brazil). All the individual population groups reported in this manuscript have already had their results published elsewhere and the objective of this study has been to evaluate all the groups together.

As a result of the growing number of elderly in the world and also because an inadequate vitamin D status, mainly among elderly populations, is associated with increased bone turnover and bone loss, which increases fall and fracture risks, this article should be relevant to all researchers working with elderly people and vitamin deficiencies, as well as health policy makers in São Paulo, Brazil, specifically.

The focus and objectives are clearly stated.

The literature quoted was relevant and from credible sources. The introduction was well stated and the study suitably motivated.

Discretionary Revision:

Methods section. Because not all study participants are patients, the heading "Patients" should be replaced by "Subjects".

Minor Essential Revisions:

1. Methods section. It is recommended that the following be clarified:

Author describe that “The data were obtained in the same city at the same period of time and the same method was used for measuring 25(OH)D (6-10)”. Information on "the same method was used for measuring 25 (OH) D" is really true and relevant. It is also relevant that "The data were obtained in the same city" because all subjects living in the same environment with the same warm and with the same solar radiation. However, this information should not be interpreted as the four age groups studied represent the population of Sao Paolo. Little importance is that the sample of young people (17-35 years), formed only by 72 participants, either in the same city as the elderly, when the city has more
than 10 million inhabitants. The same applies to the population group of older people living in community (CD), which despite being made up of 243 elderly people; they come from only one of the 55 districts that make up the major urban center is the city of Sao Paulo. And also with the NH group, 177 elderly people living in two of the many, I suppose, nursing homes in this city. This should be clarified.

Furthermore, the statement that "The data were obtained at the same period of time" is also confusing; the data of different age groups were obtained in different years and even in different months (NH: 2001, April and July; CD: from July 2000 through November 2001; PA: 2002, June and December; 2002-2004, August-September and January-February).

The age range of the individuals in each age group (NH, CD and PA) should be included and not just the young group. Groups NH, CD and PA are described in the manuscript as elderly, but appear in Table 4 subjects between 35 and 65 years. What age group do these subjects belong? These results are confusing.

The information regarding the ethnicity of individuals within each age group should also be included in this section.

2. Results are well conducted. However, it is recommended that the Following be clarified:

The sex ratio between age groups and the concentration of vitamin D differs significantly between the sexes. Men had higher vitamin D levels than women. Therefore, the average value of each age group is determined by the ratio of men to women in the group.

Age groups NH, CD and PA are described in the manuscript as elderly, but in Table 4 are individuals older than 35 years and less than 65 years. What age group do these subjects belong? These results are confusing and need clarification.

The authors report that "In relation to ethnicity, the sample was predominantly composed of whites (84.4%)". However, the ethnic origin of subjects within each age group is clearly different. For example, in the PA group, only 60.6% of subjects were white (Maeda et al, BMC Endocrine Disorders 2010, 10:12). The proportion of subjects with different ethnic origins within each age group should be described in this section or in the Methods section.

3. Discussion is well conducted. However, it seems necessary to make some clarifications or modifications:

The authors state that "In the same way, the elderly from PA group demonstrated a well defined seasonal variation when prospectively evaluated". However, these same authors, in a previous article (Maeda et al, BMC Endocrine Disorders 2010, 10:12) described for this same age group "when the individuals (group PA) were divided into three groups according to age, a significant increase in 25OHD concentrations was noticed in the summer in the groups aged between 51-60 and 61-70 years old. However, there was no significant variation in the group
aged 71 and over". This last group (71 years and over) is constituted really for the elderly, and also it is more similar in age to the groups NH and CD. Therefore, this paragraph should be corrected. The following sentence: “These data suggest that if more frequently exposed to sunlight, the elderly can achieve an adequate vitamin D status, regardless the atrophic skin” does not appear to be true. In addition, the authors indicate in Discussion Section that "Age was the variable that most significantly correlated with 25(OH)D plasma concentrations, as was demonstrated by a multiple regression model applied".

The authors state in the following paragraph: "In relation to ethnicity, most of the individuals evaluated were white (84.4%), which represented well the population of São Paulo. According to the 2000 Brazilian Demographic Census for the city of São Paulo, the white population represents 67.0%, and the brown and black populations represent 30.0% of the total". In my opinion, 84.4 and 67% are not too similar data. The Individuals evaluated do not represent well the population of São Paulo. In addition, the following sentence: "However, our data cannot be extrapolated to the entire country, because besides different latitudes and weather conditions, the population …". It indicates that the data can be extrapolated to the population of the city of São Paulo, and it is also uncertain. The size of the total population analyzed is relatively high (n = 591), but only represents 0.05% of the population the city of São Paulo, which has more than 10 million inhabitants.

4. Conclusion. My main objection is the following statement: "We found very low 25(OH)D concentrations for the elderly from nursing institutions and under ambulatory care when compared to the physically active elderly and young people. This finding is possibly due to habit-related sunlight exposure differences". These findings have many possible explanations and this conclusion seems quite daring. In addition, elderly people from NH and CD groups are not comparable with subjects from PA group. There are important differences in age. In addition to habit-related sunlight exposure, several other factors potentially affect vitamin D status. These include genetic factors, adiposity, factors affecting the cutaneous synthesis of vitamin D, dietary intake, impaired intestinal absorption, and impaired hydroxylation in the liver and kidneys. Therefore, this first part of the conclusion must be rewritten.

5. Abstract. Changes similar to those indicated in the Conclusion section are recommended.

**Level of interest:** An article of importance in its field

**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.