Reviewer’s report

**Title:** The Effect of Moderate Physical Activity on Bone Mineral Density and Fracture Rate in Post-menopausal Women aged 75 and over: results from the Canadian Multicentre Osteoporosis Study.

**Version:** 2  **Date:** 31 January 2013

**Reviewer:** Kristina Akesson

**Reviewer’s report:**

This study is a sub-study of the Canadian Multicentre Osteoporosis Study (CaMos) consisting of 1169 women above the age of 75, utilizing data from the baseline investigation regarding physical activity level, fracture, and bone mineral density. The purpose of this study is to evaluate the association between moderate physical activity and bone mass and fracture, fractures occurring prior to the investigation and not prospectively. The authors find that an increasing amount of moderate physical activity is associated with higher bone mineral density at the hip. Prior fracture, however, is not associated with physical activity level. Additionally, the authors are evaluating other factors known to influence bone mineral density, such as anti-resorptive therapy, body mass index and age in relation to bone mineral density and fracture.

Despite being a potentially interesting report with data available for evaluating physical activity, the authors are not succeeding in focusing on their primary outcome. The paper as such is extremely long with numerous repetitious statements throughout Results and in the Discussion. Furthermore, the focus on physical activity is lost since other secondary factors are also analysed in conjunction with bone mass and fracture.

Further difficulties lie in the fact that, despite noting that the CaMos study is a prospective study, all fracture data is retrospective and there is no information on time between fracture and the baseline assessment. With this it is extremely difficult to draw any conclusions of physical activity level which is evaluated as current or within the previous 12 months and fracture.

The paper needs extensive revision focusing on the main outcome and a major reduction in the text.

**Specific comments**

1. **Title:**

The title is not mirroring the design of the study and the findings. The effect of moderate physical activity suggests that it is a prospective study evaluating the effect on bone mineral density when it in truth is an association study.

Furthermore, “fracture rate” suggests that fractures are reported prospectively which is not the case.
2. Abstract:
Already in the Abstract it is unclear; even if stated that it is a retrospective analysis, it is not clarified that we are actually evaluating the association between physical activity, bone mineral density and fracture. The Abstract should also contain the actual study cohort consisting of 1169 women above the age of 75. The time during which fractures may have occurred should also be clarified, whether it is from the age of 50 or over the entire lifetime.
Within a study of this size with over 500 patients with a history of fracture it needs to be clarified why it is not possible to report specific fracture types since they have been verified.

3. Introduction:
The Introduction should highlight the focus that it is physical activity in the elderly that is the main purpose of the study. Furthermore it should be clear what the primary and secondary objectives are, the research questions addressed and the underlying hypothesis. Furthermore that the study is not limited to patients aged 75 and over but to women 75 and over.

4. Methods:
p 6: Already on this page the number of women involved should be reported and Figure 1 referred to.
p 7: Data Collection: Was information from the questionnaires reassessed and the questionnaire validated?
p 7: Assessment of Physical Activity Level: From this presentation it is still not obvious exactly how the various levels were determined. Neither is it clear whether a woman can be both in the moderate activity group and simultaneously also strenuous and vigorous groups. Are strenuous and vigorous subgroups within moderate physical activity or not. Data in the table suggest the former.
It is also unclear what type of data is used for current activity level, what has happened during the past 12 months or the past week.
p 8: Assessment of Fracture: Fractures were self-reported but they were also verified. Hence it is unusual that it is not known when a reported fractures occurred. Were there any limitations in the questions suggesting that it should be fractures after a specific time or if it is lifetime fractures? Why was not proximal humerus fracture, a common fragility fracture, included in the study as a separate entity? Why is not the actual number of specific fractures reported since over 500 patients did have fractures? For example the number of hip fractures and distal forearm fractures, which are common at least prior to the age of 75.
p 9 Statistical analysis: The authors should further specify the definition of moderate physical activity. It is not obvious that the two other categories are excluded, this is reported only later in the text. There is a lack of clarity regarding confounding factors since the confounding factor anti-resorptive therapy, body
mass index and age also are independently reported.

5. Results:
In general each section in the Results is repeating parts from the methodology and it can be extensively abbreviated. Furthermore, much of the information available in the Tables is also repeated in the text. Certain sections are using more extensive descriptions than necessary, for example on p 11 regarding physical activity.

Additionally, most of what is said regarding secondary factors is a repetition of Methods and should be extensively abbreviated and put into context.

p 13 The Effect of Secondary Factors on Bone Mineral Density: This is section purely addresses other factors associated with bone mineral density and not at all physical activity which is the main focus of the paper. As before it is repetitious in relation to Methods and the Tables.

p 15 The Effects on Fracture Rate: The title for this section is problematic since the report utilizes current (or 12 mo) physical activity, while we know nothing about when fractures did occur. Hence it is clearly association with previous fracture and current physical activity level and that needs to be obvious from the analysis in this and the following section.

6. Discussion
The Discussion is 11 pages long. This is an extremely long Discussion and partially it is related to it being repetitive and unfocused as to the primary purpose of the paper. Generally it is describing effects on bone mineral density and fracture where it really is an association study using retrospective data and it is not a prospective study which is acknowledged in the limitations. They should also be mirrored in the Discussion. There is also an unnecessary reporting of data within the Discussion.

p 23: It is said that it is an important finding of the study that bone mineral density decreases with age. This is well known.

p 25: The authors are speculating extensively on the use of anti-resorptive therapy and the marginal effect of anti-resorptive therapy, whereas their second explanation not knowing when fractures had occurred is more likely that fracture patients or high risk patients are receiving appropriate treatment.

The reference by Gerdhem P et al. Osteoporosis Int (2003) on physical activity and bone mineral density in elderly women should be included in among the references.

7. Conclusions
The Conclusions should be abbreviated and focusing on the findings.

8. Tables
Table 1: Height, weight and BMI: The number of decimals should be reduced.
Table 2: It should be clarified exactly how the groups are stratified and that it is current or up to 12 months regarding physical activity. It appears from the Table that those who are reporting strenuous and vigorous activity are also included among those reporting moderate exercise. The moderate group totals 1168, hence it appears that one person is missing.

Table 4: Please define anti-resorptive therapy. This group includes both bisphosphonate and HRT and/or combination therapy? For how long had any of the women been using any of the therapies?

Table 5: Ward’s triangle can be excluded from the report.

**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