Author's response to reviews

Title: Dietary patterns in Canadian Men and Women Ages 25 and Older: Relationship to Demographics, Body Mass Index, and Bone Mineral Density

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Author's response to reviews: see over
Reviewer's report
Title: Dietary patterns in Canadian Men and Women Ages 25 and Older: Relationship to Demographics, Body Mass Index, and Bone Mineral Density
Version: 3 Date: 2 October 2009
Reviewer: shivani sahni

Reviewer's report:
The authors have improved the organization of this paper. They have further added important details that were missing in the earlier version of this paper. However, I still have two major issues with this paper:

Major compulsory revisions:
1. First issue is related to the authors’ decision to stratify by sex, age, and menopausal status. On page 8, 1st paragraph, authors justify this decision by stating that there are known differences in diet and bone mineral metabolism in these sub-groups. In that case it might be more appropriate to derive the dietary patterns in each sub-group separately.

The factor scores were derived in men and women separately, and the derived factor scores were very highly correlated with those derived from the entire study sample. Using factor scores derived from the entire study sample permits comparison between groups, while having negligible impact (because of the very high correlation) on the associations found between factor scores and BMI and BMD. This information is included in the paper (See page 7, line 16-18, 21).

Sex-specific dietary patterns were derived in a paper by Newby et al. (Newby PK et al. AJCN, Vol. 80, No. 2, 504-513).

A careful reading of the paper finds that even though they derived sex-specific patterns they decided to use the factors derived from the analysis combining both sexes.

This paper also examined statistical interaction between dietary patterns and sex by plugging an interaction term and making the decisions of combining or not combining the sub-groups based on that.

Presentation of stratified analysis provides readily accessible results for comparison with other studies having only a single sex or age group and this was done in the paper that was referenced. It is possible to perform the analysis either using a combined analysis with sex-variables interactions or a combined analysis. With sufficient sample size to detect interactions these approaches are equivalent.

On similar note, why were men stratified by age but not women?

Stratifying by menopausal status in women results in one group which is mostly younger than 50, and a second group which is mostly older than 50, and thus results in a stratification very similar to one considering age. Menopausal status was considered rather than age due to the known and strong relationship between menopause and bone mineral metabolism.

It is unclear why stratification by sex (or age or menopausal status) is a point of contention. Certainly, the reviewer would not object if the study population for some reason included only post-menopausal women. The fact that some other studies have combined men and women is not an argument that this should be done.
2. Second issue is related to the adjustment variables included in the models. Figures 1-3: Models were adjusted for milk consumption and alcohol intake. The exposure variables were prudent and western dietary pattern and total energy intake. Milk consumption and alcohol intake variables are already included in deriving the two dietary patterns therefore these variables should not be included in those two models.

All drinks other than soft drinks had uniqueness higher than 0.9 meaning that a very large portion of the variation in intake is not attributable to the factor scores. For milk the main attribute of intake captured by the factor scores was high fat vs. 1% or skim milk. Both milk intake and alcohol intake are believed to be related to the outcomes. They may be included as separate variables provided that they are not too correlated with one or more of the included variables (assessed by both correlation and variance inflation). For the analyses of total energy intake, I am not sure if these two variables should be included because energy intake variable will take into account energy from these two food groups as well.

It is potentially problematic to include both individual intake of particular food groups and total energy intake due to high correlation. Again, we assessed correlation and variance inflation and were able to include the variables. However, separate adjustment for dietary calcium intake will be required for the models on BMD. Milk had much higher uniqueness than other dietary sources of calcium and vitamin D and is a major dietary source of both nutrients. The main focus of the study was dietary patterns and hence it makes sense to adjust for food items rather than nutrients.

Similarly, table 3 shows the association of milk consumption and alcohol intake with dietary patterns. I am not sure if this adds anything to the paper, considering that these two variables were used to derive the dietary patterns in the first place. Again, there were statistically significant correlations, albeit not strong enough to preclude inclusion of these variables.

Minor essential revisions
Methods
1. Data collection: Please state briefly how height and weight were measured in this study?

Data collection procedures for height and weight now included (See page 5, lines 8-10).

2. Page 6, first paragraph, line 4 in the section on bone mineral density: were the conversions to Hologic values done only for the lumbar spine and femoral neck? Please clarify this sentence.

All measurements were converted to Hologic values, but the given reference is only for lumbar spine and femoral neck. The sentence has been clarified (See page 6, line 8-9)

3. Statistical method: How did you exclude subjects with extreme energy intakes/outliers?

In addition to regression diagnostics, we used robust regression to determine whether regression was sensitive to extreme values and found only minor differences not impacting overall interpretation (See page 8, last 3 lines).
4. Page 8, 1st paragraph: please define moderate alcohol intake
   *Moderate intake is now defined (See page 8, lines 4-5)*
5. In the same paragraph, please state briefly how activity was measured.
   *More details on this variable are now included (See page 8, lines 6-7)*
6. Please specify how the food groups were entered into the Factor analysis- was it entered as number of servings?
   *The frequency responses were all converted to servings/month (See page 7, line 4)*
Results
7. Page 11, 1st paragraph, 2nd last line: “the association between the energy dense score and BMD was more negative in each sub-group” I think you mean to say its more negative relative to the nutrient dense group (since the association is actually positive in two sub-groups). Please clarify the sentence.
   *Sentence has been corrected to indicate the comparison was between analysis without and with adjustment for body mass index (See p. 12 line 2-3)*
Discussion
8. Page 11, 1st paragraph, 1st two lines and then again on page 12, 2nd paragraph, 1st line: The authors have stated that they confirmed the hypothesis that BMI was strongly associated with BMD. This is incorrect since the study focuses on examining association of lifestyle variables with dietary pattern and further examining association of dietary patterns with BMD with and without BMI in the model. I don’t see any analysis where association of BMI and BMD was examined.
   *The association between BMI and BMD was analyzed, both in univariate analysis and with BMI as an adjustment factor for BMD. Modifications to the text have made this point more clear (See page 8, lines 15-16 and page 11, last three lines)*
Tables and Figures
9. Table 1: As I had pointed out earlier, it’s best to show these characteristics by dietary patterns. If the dietary patterns are different in how they affect BMI and BMD then it would worthwhile to see and be able to compare different patterns with respect to age, weight, BMI etc. It might be useful to add some dietary variables in this table as well such as total energy intake and other bone related variables such as intake of dietary vitamin D and dietary calcium. This descriptive table will be easier to read as compared to table 3, which gives beta-coefficients.
10. Table 3: The word “predictors” in the title should be replaced with “associated with” because this table shows results from a cross-sectional analysis.
   *The analysis was not strictly cross-sectional as the “predictors” were baseline variables and the factor scores were measured at Year 2, yielding a proper time sequence of the measurements. Table 3 provides a clear concise indication of the strength and direction of multivariate associations. Descriptive univariate analysis is strongly confounded by age and other factors and would be difficult to interpret.*
Discretionary revisions
1. Page 7, 3rd paragraph, line 3: Multiple linear regression was used to assess the relationship between factor scores and other variables… Please specify the variables here.
   *The text has been revised so that the methods section includes the list of variables at the point in question. (p. 8, lines 2-8)*
2. Page 13, strengths of the study: The authors might want to add the strengths of dietary pattern technique for example this method takes into account interactions between different nutrients and food groups, which a single nutrient approach is unable to achieve. 
This has now been added (See page 14 last line to p. 15 line 1).

3. Page 9, 2nd paragraph, 1st line: it would be better to clarify here that this data is not shown in the manuscript.
This has now been clarified (See page 10, line 12).

Which journal?: Not appropriate for BMC Medicine: an article whose findings are important to those with closely related interests and more suited to BMC Musculoskeletal Disorders

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

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