Author’s response to reviews

Title: The effect of missing teeth on dementia in older people: A nationwide population-based cohort study in South Korea

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Author’s response to reviews:

Re: Your submission to BMC Oral Health - OHEA-D-18-00519

Sadeq Ali Al-Maweri
Associate Editor BMC Oral Health

January 18, 2019

Dear Dr. Sadeq Ali Al-Maweri:

Thank you for the opportunity to revise our manuscript, The effect of missing teeth on dementia in older people: A nationwide population-based cohort study in South Korea. We appreciate the careful review and constructive suggestions. It is our belief that the manuscript is substantially improved after making the suggested edits.

Following this letter are the editor and reviewer comments with our responses, including how and where the text was modified with an attachment. The revision has been developed in consultation with all coauthors, and each author has given approval to the final form of this revision.

We hope the revised version is now suitable for publication and look forward to hearing from you in due course.

Thank you for your consideration.
Mohammed Sultan Alakhali, Associate Professor (Reviewer 1):

1. In the abstract (43 page 2) the conclusion stated "it is important to delay tooth loss and preserve residual teeth to help prevent dementia". The statement is generalized and not accurate because it was showed later in your study (297 page 21) that a history of periodontal treatment was associated with an increase in tooth loss but also with a significantly reduced risk of dementia so in such situation extraction of periodontally compromised teeth will reduce risk of dementia which reverse the conclusion so it is better to state in conclusion as the following "preserve the stable remaining teeth to help prevent dementia" instead of preserve residual teeth to help prevent dementia

   : We accepted your kind suggestion and rewrote this sentence (line 43 page 2).

2. Why the study limited the including criteria to the older people over 60 years (86 page 4), I think it was more appropriate to include also younger age group because dementia within old age people might be affected by the age itself.

   : There are two types of data that we could use for this kind of research: one that includes the entire age range, and the other that we select, which includes over the age of 60. If we had chosen the former, fewer patient with dementia would have been included in the study because the data is spread across all ages. Therefore, the latter was used to increase the number of valid individuals.

3. Why the third molars extracted due to pericoronitis were excluded? (247 Page 19)

   : We classified the number of lost teeth by occlusal force. Most third molars are fully or partially impacted. All extractions of wisdom teeth were excluded from this study due to the limitations of the code-based study. This might be the limit of our study, but it is less biased not to include third molars than to do. That is because only a few wisdom teeth are involved in the occlusion.

4. Does the stage of periodontitis affect the dementia?

   According to the latest classification of periodontal disease on 2017, all subjects who lose their teeth because of periodontitis should be diagnosed as periodontitis stage III or IV where, if they lost ≤4 teeth it is considered as periodontitis stage III, and if they lost ≥ 5 teeth it is consider stage IV periodontitis.
According to the above information, could you determine the percent of patients having periodontitis stage III and IV affected by dementia?

: In this study, the number of missing teeth was not known before the observation period because only the number of extracted teeth was evaluated during the observation period. Thus, only individuals belonging to stage IV could be sure, and it is not clear to which stage each individual belongs.

5. Did the study take into consideration various systemic diseases that may affect the relationship between dementia and tooth loss?

: In this study, we had no considerations for other systemic diseases, which might act as confounding factors. This was pointed out as a limitation of our study in the discussion (line 324 page 22).

6. One suggestion is that dementia is a contributing risk factor for tooth loss, and another suggests that tooth loss is a risk factor for dementia. According the findings of your research, which theory this study supports? (283 Page 20)

: As a prosthodontist, I personally support the latter opinion. However, within the limits of this study, it is difficult to support one of the two opinions. Further research is needed to answer this question.

Arheiam Arheiam (Reviewer 2): This is a very interesting paper on the association between the number of teeth extracted and the incidence of dementia in a large cohort of Koreans.

There are some points which need clarification:

1. line 136- why the extraction groups were classified in this way? and why the authors did not assess the incidence of dementia by extraction groups

: The reasons for dividing extraction group in this way were described in paragraphs starting at line 255 page 19. Additionally, as a prosthodontist, I thought that the impact of tooth loss on masticatory function was important. We have already analyzed the incidence of dementia by extraction groups in Table 9.

2. line 270- (In this study, we found that tooth loss significantly increased the risk for dementia.) This is a big statement suggesting causative association. instead, you should write: The study shows that the number of extracted teeth is associated with higher risk of dementia
We accepted your kind suggestion and rewrote this sentence (line 273 page 20).

3. line 328- Please remove the following statement as it is suggesting a cause-effect association which lacks plausibility. The result of our nationwide population-based study in Korea suggests that it is important to delay tooth loss and preserve residual teeth to prevent dementia.

We accepted your kind suggestion and removed this sentence (line 333 page 23).

Kehinde Umeizudike, FMCDS (Reviewer 3):

The topic is an important one. The Authors have worked extensively on the manuscript and the study has the advantage of a large sample size.

The study design was described but the type should be clearly specified.

We added the type of study to the study design (line 139 page 10).

Some of the information provided on the classifications of impacted tooth extraction (complex etc) dementia, and periodontal treatments were not analyzed and their significance to the topic was not highlighted.

Because this study using the ECD depends on the disease codes and treatment codes recorded in the database, it is important to define disease or treatment operationally. The tables in the manuscript were attached to help readers understand these operational definitions (Table1 page 6). Only a part of the listed tooth extraction was included in the study, which is specified in the manuscript (line 115-117 page5-6).

The differences in the incidence of dementia based on the type of extraction, dementia or periodontal therapy were not analyzed, and further studies are required. This was pointed out as a limitation of our study in the discussion (line325 page 22).

The results of the other socioeconomic factors that were significant in the logistic regression tables were not discussed.

All of the socioeconomic factors we intended to observe were included in the results (line264-page20).

The conclusions should reflect the all the significant findings.

We accepted your kind suggestion and rewrote the conclusion (line331-332 page23).

I suggest that the authors should include only information/results etc that will be utilized in the discussion otherwise it becomes information overload and manuscript may be confusing.
Some unnecessary parts were removed.

Other comments have been highlighted in the manuscript.

The answers to other comments were included in another attachment file.