Author’s response to reviews

Title: Empirically derived dietary patterns and constipation among a middle-aged population from China, 2016-2018

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Author’s response to reviews:

Reviewer #1:

I appreciate the opportunity to review the manuscript entitled "Empirically derived dietary patterns and functional constipation among a middle-aged population from China, 2016-2018". The manuscript describes an interesting epidemiological study looking for association between constipation and dietary patterns in southern China. It is a well design study; manuscript is well written. Nonetheless, there are several concerns that authors should clarify:

Major concerns

1. Symptoms. For defining constipation, subject's symptoms should have been collected. How was the information about symptoms collected?

Answer: Thank you for pointing this out. The subject’s symptoms were collected by using a validated self-reported questionnaire. The information about symptoms have been added in Definition of constipation in red font.

2. Constipation: it is named as functional constipation all along the study. In my mind, functional constipation is a diagnosis that required a medical evaluation and diagnosis. Just "Constipation" seems to be a better descriptor for an epidemiological study.

Answer: Thank you for pointing this out. We have replaced “functional constipation” with “constipation” in red font in this paper.
3. Confounding variables:

A. Fiber. It is well known that high fiber intake is inversely associated with constipation. Apparently, fiber intake could be estimated with the data collected in the study. Information on the amount of fiber in each diet would be interesting. Fiber intake should be included as a potential confounding factor in multivariate models to clarify whether fiber intake or dietary pattern is responsible of the association.

Answer: Thank you for pointing this out. Dietary fiber intake was estimated by the modified Prosky method (Science and Technology Agency, 2000) from the intake of 74 fiber-containing foods in this FFQ. In the present study, dietary fiber intake data for participants were calculated by the Chinese food ingredient list (2018). The data about fiber intake has been included in Methods section in red font. Moreover, total fiber intake has also been included as a potential confounding in the multivariate models.

B. Medication. One of the confounding variables in multivariate models is usage of medication. It is not described in methods section how information about medication was collected. Moreover, drug usage is labelled as yes/no, although some medications may be associated with diarrhea (i.e. metformin) while others with constipation (i.e. anticholinergic drugs), so the simple adjustment by medication used is not very meaningful.

Answer: Thank you for pointing this out. The information about medication has been added in Methods section in red font. Moreover, we deleted the medication used in the multivariate models.

C. It is not reported the usage of traditional Chinese medicines or remedies which may potentially accelerate bowel transit. It may be speculated that subjects taking a traditional dietary pattern are also prone to use these remedies.

Answer: Thank you for pointing this out. We have added the information on the the usage of traditional Chinese medicines or remedies in red font in this paper. Besides, compared with participants in the lowest quartile, those in the highest quartile of the traditional southern Chinese dietary pattern were more likely to desert cistanche (traditional Chinese medicines). We have added the usage of traditional Chinese medicines across quartiles of major dietary pattern scores in Table 4.
4. Traditional Chinese southern diet is described by the main food included, but I wonder if traditional way cooking includes any flavoring ingredient or spicy that may influence bowel transit.

Answer: Thank you for pointing this out. According to your suggestions and related literature, we found that the flavoring ingredient or spicy may influence bowel transit. But, only one study has reported the effect of red and black pepper on orocecal transit time in PUBMED database. Data on the association of flavoring ingredient or spicy with the risk of constipation are sparse. We have added this part in Discussion in red font.

Minor concerns

1. Although described elsewhere, I would suggest detailing that sample were obtained by stratified cluster random-sampling method in the methods section.

Answer: Thank you for pointing this out. We have added the detailed information about the study design and data collection in this paper in red font.

2. Association of constipation with hypertension. Hypertension is associated with constipation in the whole sample. When looking at figures in Table 4, it seems that overall prevalence of hypertension in the Q4 sample of traditional Chinese diet is quantitative higher than in the other two Q4 samples of diet. Some clarification of the association of constipation, hypertension and diet should be interesting for the reader.

Answer: Thank you for pointing this out. Our previous a study has reported the overall prevalence of hypertension in the Q4 sample of traditional Chinese diet is quantitative higher than in the other two Q4 samples of diet. There are several possible explanations for this phenomenon. First, high intakes of refined grains have been found to increase the risk of hypertension. Second, pickled vegetables in the traditional southern Chinese pattern contain huge amounts of salt. Recent a study has shown that the high-salt pattern could increase the risk of hypertension(Zheng PF, Shu L, Zhang XY, et al. Association between dietary patterns and the risk of hypertension among Chinese: a cross-sectional study. Nutrients. 2016;8(4):239.).

Reviewer #2:

Congratulations for this nice work that might help to medical doctor and specially dietitians to understand the link between a functional problem and diet.
I think it’s well written and is in general easy to understand. However, constipation is a multifactorial disease in which diet pattern plays an important role but not the only one. Some relevant factors should be assess in studies about functional constipation: concomitant disease, organic cause of constipation (if possible), concomitant drugs, physical activity and other habits like diary amount of water.

Answer: Thank you for pointing this out. It is well-known that constipation is considered as a multifactorial chronic disease that may be associated with a number of factors, including genetic, psychosocial, socio-economic status, concomitant drugs, smoking status, physical activity, age, gender, and dietary factors. Among them, dietary factors as the modifiable lifestyle factors, have been recognized as an important risk factor for constipation. However, information on this issue is quite limited among Chinese population. Therefore, in the present, we aimed to derive the major dietary patterns existing among Chinese population and to assess their associations with the risk of constipation.

I will specify now some other comments:

52: Risk factors for constipation are poorly explained. The Word "factors " is twice written.

Answer: Thank you for pointing this out. According to previous studies in the West, not only various factors including age, gender, psychosocial, socio-economic status, smoking status, alcohol consumption, physical activity, but also several aspects of diet such as intakes of energy, dietary fiber, and nonalcoholic beverages have been associated with constipation. We have deleted "factors" in this paper.

81: Why were participants with family history of constipation excluded? Since constipation is a multifactorial problem other causes like family history of colorectal cancer should have been excluded.

Answer: Thank you for pointing this out. The reason is that participants with family history of constipation may be related to genetic factor rather than dietary factors. Besides, we have excluded participants who had family history of cancer, including colorectal cancer, because we considered cancer could affect lifestyles of participants.

157: "Participants in the fourth quartile of the traditional southern Chinese dietary pattern were older". Who were older? Those in the highest quartile on the traditional southern Chinese dietary pattern or in the fourth quartile? I have found this sentence difficult to understand.
Answer: Thank you for pointing this out. The sentence should be “Compared with participants in the lowest quartile, those in the highest quartile of the traditional southern Chinese dietary pattern were more older” (Q4: 52.0±0.3 vs Q1: 50.1±0.2). We have rewritten this sentence in red font in this paper.

197: "Finally, the possible explanation of preventive effect of this pattern on constipation may contribute the higher intake of eggs". What is the proposal physiopathological mechanism to explain this fact?

Answer: Thank you for pointing this out. It is known that egg are the major source of digestible proteins. Yang et al. reported that digestible proteins could promote the formation of soft stools in elderly people. We have added the possible mechanism to explain this fact in red font in this paper.

202: I do agree with the complex pattern of the Western diet defined in this article. Have you assessed the differences according to the different amount of fiber? Lactose or sorbitol malabsorption could also explain the absence of constipation in those with high intake of snacks and fast foods, as well as higher CCK secretion (secondary to fat) that induces gastrocolic reflex.

Answer: Thank you for pointing this out. In the present study, we didn’t assess the differences according to the different amount of fiber. But, it is well known that high fiber intake is inversely associated with constipation. Thus, fiber intake has been included as a potential confounding factor in multivariate models, when we evaluating the association between Western dietary pattern and the risk of constipation. Moreover, “Lactose or sorbitol malabsorption could also explain the absence of constipation in those with high intake of snacks and fast foods, as well as higher CCK secretion (secondary to fat) that induces gastrocolic reflex.” have been added in Discussion section in red font.

225: "An earlier research by Towers et al. reported that constipation is closely correlated with intake of energy". This study was conducted in the elderly, which could explain some differences.

Answer: Thank you for pointing this out. We have added this section to explain the difference in red font in this paper.