Reviewer's report

Title: Body weight status and cardiovascular risk factors in adults by frequency of candy consumption

Version: 1 Date: 9 October 2012

Reviewer: Theresa A Nicklas

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The purpose of this study was to investigate associations between usual frequency of candy consumption and body weight status and selected cardiovascular risk factors among adults in the United States. Although this may be of scientific importance, there are major concerns with the methods and statistical approach that was used. These need to be addressed before a recommendation can be made.

SPECIFIC COMMENTS:

1. The abstract states that appropriate statistical weights were used to yield results generalizable to the US population. There is no description in the methods how the statistical weights were determined using FFQ data. A description and reference should be included. NHANES has a program for obtaining weights for 24-hour recall data but it is not clear if they have a procedure to be used with FFQ data.

2. Usual frequency of candy consumption was determined. One can argue that a FFQ does not assess usual intake of candy or other food groups because of the limited number of foods that are assessed. It may be more appropriate to state “typical frequency of consumption” based on the respondents own interpretation of the two non-defined candy categories. There are two methods which can be used to determine usual intake with 24-hour dietary recall data: NCI or Iowa method. Please clarify if it is appropriate to use the Iowa C-Side program with FFQ data.

3. Some limitations include: portion size information was not collected; definitions of chocolate and other candy were not provided; definitions were based on the respondents own interpretation; and, the use of two candy categories.

4. Pages 6-7, lines 135-161. The whole section on how the authors determined whether an adjustment factor was needed is vague and it is hard to determine if the statistical procedure used is a standard procedure because no reference is cited to support the approach used. It is equally unclear how EO/day were determined using the eleven frequency categories. Two or more times per day could be interpreted as 2 EO or as much as 8 EO/day. What were the eleven frequency categories and how were they converted to EO/day?

5. Adults were divided into three groups based on usual frequency of candy
intake. Are we talking about “usual” or “typical” frequency of candy consumption? Consumption may be a better word to use than intake since portion size information was not collected. How were the three categories selected? Was it based on subjective opinion or based on previous research? It would be helpful to know the frequency of responses in the eleven frequency categories to determine if the three groups, “infrequent”, “moderate”, and “frequent” are reasonable categories. Were these three categories similar to using tertiles for frequency of candy consumption? All of these questions need to be clarified.

6. Page 7, Line 169. Please define “exceeds capacity” and how that was determined. Does NHANES recommend that they be coded assigned values of 44 and 45 mm? If so, please reference. Why were two numbers assigned and not one?

7. Page 8, lines 174-185. The actual methods for determining blood values needs to be referenced with a brief description in the methods.

8. The in-home questionnaire included questions about participation in vigorous or moderate physical activity for at least 10 minutes during the previous 30 days. Is this a validated question? It is unclear how this one question allowed the authors to come up with one of three physical activity groups: none, moderate, or vigorous. What were the exact questions? Based on the single question it is unclear how “none” was determined. It is equally unclear how “vigorous” and “moderate” were determined when the respondents were asked “vigorous” or “moderate”. Please clarify.

9. Page 9, lines 201-204. How was self-reported use of medication handled in the analysis? A person on blood pressure medication is typically categorized as hypertensive.

10. Page 9, lines 204-205. Was blood and cotinine determinations obtained on the whole sample? Were any individuals excluded based on certain criteria, such as unreliable FFQ data; pregnant or lactating; or, lack of blood samples?

11. Page 9, line 210. Overall, additional references are needed for WWEIA, the dietary interviewer manual, etc.

12. On page 6, lines 139-140, it states “on one or both of the two days of dietary recall”. Yet on page 9 and 11 it states two dietary recalls. Please clarify this inconsistency. Did the whole sample have two dietary recalls?

13. Page 10, lines 225-227. Please provide a reference for the USDA hierarchical coding scheme.

14. Page 10, line 229. This section is problematic. Was alcohol assessed in NHANES? I believe it was assessed and it is typically used as a covariate when looking at cardiovascular risk factors. The C-Side software was used to determine usual intake of selected nutrients. Why were those particular nutrients selected? Energy intake is correlated with intake of macronutrients such as protein, fat, saturated fat, total sugars, and added sugars. Typically, total energy
intake alone is treated as a covariate in similar analyses that were done in previous research. One can assume that physical activity and time watching TV/videos are highly correlated as well. It is problematic using multiple covariates that are highly correlated. The adjusted models are problematic. There is no justification for using medications as a covariate. Once again, individuals on blood pressure medication are typically categorized as hypertensive. Why were dietary sodium, potassium, calcium and fruits and vegetables selected as covariates? Another model controls for non-candy saturated fat, monounsaturated, polyunsaturated fat, and cholesterol. What is the rationale and scientific basis for including these dietary variables as covariates? Moreover, energy intake was not a covariate, which is standard in other similar studies previously published. BMI needs to be a covariate for all of the cardiovascular risk factors in Table 3. Of course, BMI should not be a covariate when looking at weight measures. The authors need to be familiar with models and covariates used in similar studies.

15. Page 14, line 312. How was energy adjusted intake determined?

16. Overall, it is difficult to determine the validity of the results because the models and covariates used in the analyses are problematic and are not standard approaches used.

Quality of written English: Acceptable

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:

'I declare that I have no competing interests'