Author's response to reviews

Title: Potassium urinary excretion and dietary intake: a cross-sectional analysis in 7-11 year-old children

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Author's response to reviews:

Dear Editor of the
BMC Pediatrics

Please find enclosed a revised version of our manuscript to be considered for publication in the BMC Pediatrics.

We thank you for the opportunity to submit a revised version of our work and for the valuable comments that have greatly contributed to improve the manuscript. We took all the suggestions from the reviewer into account and modified the manuscript accordingly. The reviewer comments are outlined below with our point-by-point response.

We hope you will consider the manuscript suitable for publication in the BMC Pediatrics, although we are prepared to further improve the manuscript according to your suggestions.

Yours faithfully,
Pedro Moreira, on behalf of all authors

Reply to the reviewers’ comments
We thank the reviewers for their valuable comments and suggestions for
improving our work.

REVIEWER #1

Major concerns

Comment #1

Although the introduction focused on the association between sodium, potassium and blood pressure, unfortunately no data on blood pressure have been collected.

Reply to comment #1

This study focused on the evaluation of potassium and sodium-to-potassium ratio intake in children, and regrettably no data on blood pressure have been collected. This issue has been acknowledged in the discussion (Page 13, line 367-368).

Comment #2

The potential of the collected data has not been utilized in this paper. In the result section, several data on physical activity, parental educational study etc. are presented but not further evaluated. Questions, which could have been analyzed are for example: Is a high potassium excretion a marker of a healthy lifestyle with high levels of physical activity, low sedentary times, high sleep duration and healthy eating pattern? Is the potassium excretion associated with educational (socio-economic) status of parents (see line 316 ff) or body weight status? Instead, the authors only present simple descriptive tables with p-values on gender differences. Those differences were neither the main hypothesis nor discussed adequately.

Reply to comment #2

Further statistical analysis (page 9, line 243-251) of this study was made to analyze the relation between urinary potassium excretion and other collected data such as anthropometric, lifestyle and socio-demographic variables (BMI categories, sports activities, sleeping, television/video viewing and father’s and mother’s education) by sex, and we used the energy-adjusted method (Willett et al, 1997) to obtain a measure of potassium intake that was independent of total energy intake. We also compared potassium excretion according to high and low levels of food groups consumption based, respectively, on intakes at or above the median and below the median. This data is now shown in the revised manuscript in Table 4.

Data from Table 4 was presented in the Results (page 10, line 274-280): “Table 4 shows the relation between urinary potassium excretion and participants characteristics. After considering the mean urinary potassium excretion according BMI categories, exercise, parents’ education, and time spent watching television/video viewing no significant differences were found for potassium excretion. Moreover, no significant differences were found for potassium excretion according to other potassium rich food groups consumption”.

Accordingly, in the Discussion (page 11, line 313-322) we added: “In this study a
high potassium excretion does not seem a marker of a healthy lifestyle since low levels of physical activity (p=0.28 for boys and p=0.89 for girls), high sedentary time (p=0.44 for boys and p=0.26 for girls) and body overweight status (p=0.24 for boys and p=0.58 for girls) were not significantly associated with urinary potassium excretion. Potassium excretion is not significantly higher in children that consume more fruit and vegetables, both for boys (p=0.992) and girls (p=0.721), as it would be expected. The difficulty in reporting accurately vegetable consumption specially in food preparations in which vegetables are triturated, such as soups (a staple item of the Portuguese diet) may contribute to explain this unexpected observation.”

Comment #3
Overall, in the whole study, lots of data are collected and presented, but not further discussed.

Reply to comment #3
Further data analyses were carried out and data was presented in the Results section (page 10, line 274-280) and additionally discussed (page 11, line 313-322) as referred in the reply to comment #2.

Comment #4
The statistical analysis of the available data is no sufficient, e.g. analysis of gender differences requires adjustment for total energy intake.

Reply to comment #4
Considering the importance of having descriptive data for a given population and the corresponding potassium intake levels, Table 3 provides macronutrient, cholesterol, and food groups that may significantly contribute to potassium intake levels in each gender. Following the suggestion in comment #2, results presented in table 3 are energy-adjusted in the revised manuscript. In table 4, differences in potassium excretion according to socio-demographic and dietary variables were assessed adjusting for energy intake, and no statistical significant differences were found.

Minor concerns
Comment #5
The introduction focused on blood pressure and hypertension, but dietary intakes are not mentioned sufficiently, although indicated in the title.

Reply to comment #5
We agree with the reviewer and we improved the introduction accordingly. This issue is now being added in the discussed in the revised manuscript (page 5, lines 133-135), as follows: “Also, regarding dietary intake, high consumption of fruit and vegetables, important sources of potassium, is associated with a lower risk of all-cause mortality, particularly cardiovascular mortality [37] and stroke [38].”

Comment #6
The introduction can be shortened, repetitions should be eliminated (lines 103 and 144)

Reply to comment #6
As suggested, the sentence in line 103: “WHO suggests an increase in potassium intake from food to control BP in children”, and the sentence in line 144: “Increased urinary K+ is reported to be associated with a healthier diet quality score, better adherence to current dietary recommendations” were deleted.

Comment #7
Validation of 24-h-recalls is mentioned in the discussion and the question arise, whether estimated dietary potassium intakes and the urinary potassium excretion are in accordance.

Reply to comment #7
This study focused on urinary potassium. However, we have revised this issue according to the reviewer’s suggestion. Pearson’s correlation was calculated to test the relation between the estimated dietary potassium intake and the urinary potassium excretion. This question is now discussed as follows (page 12, line 329-331): “The estimated dietary potassium intake and urinary potassium excretion were positively associated, although their correlation was weak (r=0.039), which may be explained by the inaccuracy in dietary reporting in children.”

Comment #8
It is a really good idea to recalculate the Goldberg Cut-offs for a pediatric population, but it would be helpful to give the references of the used values (e.g. within subject variation, variation in BMR etc.) Please discuss the results of the recalculation for example in comparison with Sichert-Hellert et al. 1998 http://www.ncbi.nlm.nih.gov/pubmed/9800315).

Reply to comment #8
We thank the reviewer for the important remark. We have revised the Goldberg Cut-offs for a pediatric population accordingly. The description and the recalculation of the data was improved (page 8, lines 216-231) as follows: “To identify under-reporters, Goldberg cut-offs were used as direct comparison of energy intake (EI) to energy expenditure [51]. The Goldberg cut-off values were applied to exclude under-reporters, based on PAL (Physical Activity Level) and compared with the ratio of EI to BMR (Basal Metabolic Rate). BMR was calculated using the Schofield equations for children based on age, gender, height and weight [52].

While the principles of the Goldberg et al (1991) cut-offs still hold when assessing the EI of children and adolescents, appropriate age- and gender-specific cut-offs should always be applied in a pediatric population [53]. Therefore, according to the formulas proposed by Goldberg et al. [54], we calculated individual “CUTOFF 2” values using coefficients of variation for BMR
of 8.5%, coefficients of variation for EI (23%) given by Nelson et al. [55], and published levels of light physical activity (1.55 for boys and 1.50 for girls for this age group) given by Torun et al. [56]. We used these estimated limits specific for age and sex instead of the single “CUT-OFF 2” for adults as proposed by Goldberg et al. Thus, records with EI:BMR ratios up to 0.95 for boys and 0.92 for girls were considered not plausible records. This result is in agreement with Sichert-Hellert et al. 1998 [57], although differences may occur due to the number of days of dietary assessment (1 versus 3 days)."

Owing to this recalculation, the 24h dietary recall questionnaire of 6 children (4 girls) were considered under-reporters, as we can read in the revised manuscript (page 6, line 162-164).

Comment #9
The authors presented in the tables a lot of results with are never mentioned again (e.g. sleep duration) in the discussion.
Reply to comment #9
As it was mentioned in the reply to comment #3, further analyses were carried out and the results were presented in the discussion in the revised manuscript (page 11, line 313-322).

Comment #10
Please indicate in the tables, that the molecular ratio of K/Na is given.
Reply to comment #10
As suggested the title in the table 2 was rewritten as follows (page 19, line 601): “Sodium excretion, potassium excretion and sodium-to-potassium ratio by sex”.

Comment #11
Please discuss the sodium excretion not only with respect to the AI but also with respect to Upper intake levels.
Reply to comment #11
As suggested, it has now been considered not only the AI, but also the Upper Intake levels of sodium excretion, as it is written in the revised manuscript (page 11, lines 297-298): “Moreover 54.0% of the children exceeded the Tolerable Upper Intake Level for sodium [60]”.

Comment #12
Conclusion: It is not new, that children should eat more fruits and vegetables.
Reply to comment #12
We have revised the conclusion according to the reviewer’s suggestion. It was improved the following part of the sentence “which may result from a low intake of fruits and vegetables”. It now reads “In conclusion, this study reports a lower K+ intake estimated by 24-h urine excretion than the recommended for 8-10 year-old children. This data shows the need towards health promotion interventions to broaden public awareness in order to increase K+ intake” (page
13, lines 366-368). The conclusion in the abstract was also rewritten accordingly.

REVIEWER #2

Comment #1
Because sodium and potassium excretion increases with age (see Moriyama M1, Saito H. Twenty four-hour urinary excretion of sodium, potassium and urea in Japanese children. Tohoku J Exp Med. 1988, 154:381-8.), and the authors do not intent to study potassium excretion as a function of age, it would be better to narrow the age-range of the subjects. Because only one subject was 7 year old, 4 were 11 year old, the data may not be representative for children at 7 and 11. It may be better to focus on participants from 8 to 10.

Reply to comment #1
We agree with the reviewer, and these five children were taken out of this study, as suggested. This information is now being provided in the methods section (page 6, lines 166-168) as follows: “From these, 5 children (one with 7 years old and four with 11) were also further excluded to narrow the age-range of the subjects, remaining a final sample of 163 participants (82 girls).”

Comment #2
Line 113 “High blood pressure (BP) and hypertension [10, 11] are main risk factors for”. High blood pressure (BP) = hypertension, thus, the sentence could be changed as “High blood pressure (BP) or hypertension [10, 11] is a major risk factor for”

Reply to comment #2
As suggested the sentence was rewritten as follows: “High blood pressure (BP) or hypertension [10, 11] is a major risk factor for” (line 107).

Comment #3

Reply to comment #3
Different opinions on salt restriction on prevention of cardiovascular morbidity and mortality were taken into account. This is now being stated in the revised manuscript (page 4, lines 116-122), as follows: “A diet that includes modest salt restriction serves as a strategy to prevent or control hypertension and decrease cardiovascular morbidity and mortality [12, 21, 23, 24, 26]. However, this issue is not consensual as some authors argue that blood pressure effect of sodium restriction on blood pressure can no longer be accepted as a surrogate for health outcomes [24] and both low sodium intakes and high sodium intakes may be reported has being associated with increased cardiovascular risk [28] and mortality [29].”

Comment #4
Line 249: “and early one third was 9 years old.” “early” or “nearly”?
Reply to comment #4
As suggested the word in line 249 was rewritten as “nearly”.
Comment #5
Line 309 and Line 310, the abbreviations of SFA and PUFA were not defined in the text.
Reply to comment #5
This information is now being provided in the revised version of the manuscript (page 12, lines 332-333).