

Validation of electronic diary (PRO-Diary) compared to validated paper questionnaires

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Background

► Paper food VAS responses are time consuming in respect to data handling and this can lead to errors.

► Previous studies using electronic and paper food visual analogue scales have shown them to be reliable but not interchangeable (Whybrow et al 2006, Stubbs et al 2000). A majority of the answer to the questions were significantly different between the two methodologies.

Aims

To establish that responses to the food VAS questions recorded electronically by using a PRO-Diary could be used instead of paper questionnaires.

Methods

Fifty healthy participants (19F,31M) mean age 31 year (range 19-59) with a BMI 22Kg/m² took part in the study. Prior to the start of the study a favourable ethical opinion was obtained from the University of Surrey Ethics Committee (EC/2010/55/FHMS). Participants signed informed consent before commencing the study after which they were randomly assigned to group A or B. The food VAS questionnaire consisted of seven questions which were placed in a random order with eight mood and alertness questions. The food VAS questions were as follows :- how hungry do you feel?, how much can you eat?, how full do you feel?, how thirsty do you feel?, would you like something sweet to eat?, would you like something savoury to eat?, would you like something salty to eat? and would you like something fatty to eat?. The mood and alertness questions asked about drowsiness, tension, happiness, friendliness, uncertainty, interested and whether clear headed. The PRO-Diary produces a random order of questions automatically and therefore the paper questions were also assembled in a random order. Group A participants were asked to record food VAS scores using a PRO-Diary, a compact electronic device worn on the wrist (Figure 1) on their first visit and on the second occasion on paper. Group B participants were asked to complete the protocol in reverse.

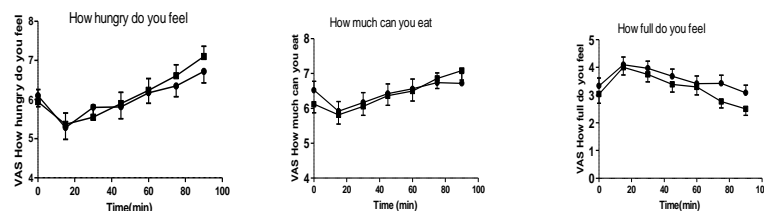


There was at least two days between the visits. Participants were given a standardised meal (460Kcals) the evening prior to attending the study unit and were asked to eat before 20:00h. Nothing was eaten or drunk except water until they arrived in the unit. On arrival participants were asked to complete a food VAS questionnaire (time 0). Participants were then given a cereal bar (88Kcal) plus 200ml water at 09:00h. They were then asked to complete VAS scales at 15, 30, 45, 60, 75 and 90 min after consuming the bar. The food VAS paper questionnaires were manually scored and entered into a spreadsheet. The PRO-Diary was downloaded and data were transferred to a spreadsheet.

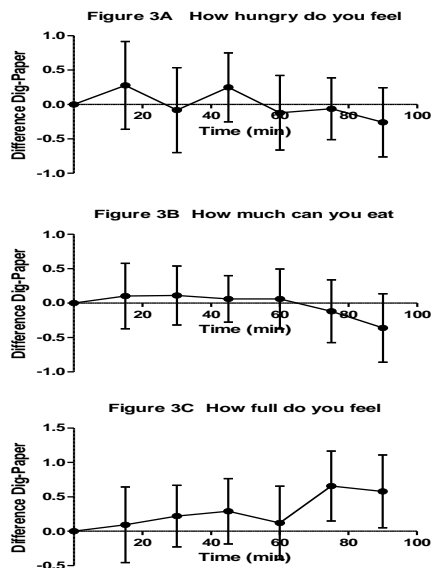
Statistical analysis was carried out on the raw data and the calculated differences between the digital and paper results. All VAS data from the study were analysed using two way repeated measures ANOVA (factor, time and treatment) Any differences were identified with Tukey's post-hoc test with $p < 0.05$ regarded as significant

Results

Two way repeated measures ANOVA showed a significant effect of time in all food VAS answers. No significant differences were observed between the PRO-Diary and paper food VAS answers except for how full the participant felt. Figure 2 shows answers to the three major food questions –how hungry do you feel, how much can you eat and how full do you feel. Participants felt significantly less hungry when using the PRO-Diary than when they used the paper VAS questionnaire but only at the last two time points ($p=0.04$). The PRO-Diary data for how full do you feel was at baseline levels (3.3 ± 0.25 [mean SEM]) after 90 min (3.18 ± 0.28) whereas paper responses were 3.0 ± 0.33 at baseline and 2.5 ± 0.23 at 90 min.



The difference between PRO-Diary and manual data was calculated to establish correlation by plotting the difference and including 95% confidence limits at each time point for – how hungry do you feel, how much can you eat and how full do you feel (Figure 3). Only at the last two time points did the 95% confidence limits fail to cross the X axis.



Discussion and Conclusions

Overall there was no difference in the food VAS scoring for all criteria except how full do you feel. Plotting the difference between the PRO-Diary minus the paper questionnaire data with error bars representing 95% confidence limits is the most useful way of presenting the data. These graphs demonstrate no consistent pattern of disagreement between the three major outcomes. There was a trend toward differences between the two methods in recorded observations from the participants in responses to how full do you feel which occurred after 60 minutes. However the PRO-Diary data return to baseline levels whereas the paper diary showed responses well below baseline levels. So it could be argued that the PRO-Diary gave the more accurate results. However when carrying out food VAS studies using electronic or paper data protocol only one techniques should be used in a study

References

- Stubbs RJ, Hughes DA, Johnstone AM, Rowley E, Reid C, Eilia M, Stratton R, Delargy H, King N & Blundell JE (2000) The use of visual analogue scales to assess motivation to eat in human subjects: a review of their reliability and validity with an evaluation of new hand-held computerized systems for temporal tracking of appetite ratings. *Br J Nutr* **84**, 405-415.
- Whybrow S, Stephen JR & Stubbs RJ (2006) The evaluation of an electronic visual analogue scale system for appetite and mood. *Eur J Clin Nutr* **60**, 558-560.

