Validity and Reliability of the Smart Food Diary Keenoa Against Recovery Biomarkers: A Study Protocol

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Objectives: Dietary assessment provides essential data for nutrition research, but current methods have limitations impeding the accuracy of reported intakes. Keenoa is a new mobile food diary that integrates artificial intelligence food recognition. Participants take pictures of their meals, specify foods and beverages consumed and estimate portion sizes with the help of visual pictograms. Data are analyzed from the Canadian Nutrient File v2015 and other national databases. Objectives are 1) To assess Keenoa's validity and reliability for energy, protein, potassium and sodium intakes against recovery biomarkers; 2) to determine the optimal number of tracking days for maximal validity; 3) to assess the appreciation and usability from participants.

Methods: Adult participants (18–70 y, n = 120) will be recruited for this 3-month study. They will track their food intake using a weighted written food diary (WFD) and Keenoa, in a randomized order, at month 1 (4 consecutive days), 2 (7 days) and 3 (4 days). At month 2, urinary nitrogen, sodium and potassium excretion will be measured from 24-h urine collections on day 3 of each tracking tool. A subsample of n = 30 will undergo measurement of total energy expenditure using the gold-standard doubly labeled water method. Intakes in other key nutrients will be compared to those reported by WFD, as a relative comparator considered the most accurate among conventional methods. Proportions of under/over-reporters will be analyzed by gender and BMI category. Perceived usability of the Keenoa application will be assessed using the validated System Usability Scale (SUS). The validity of Keenoa will be tested by comparing reported intakes of multiple days against measured recovery biomarkers with paired t-tests and Wilcoxon Signed rank test, as applicable, and Bland Altman's test for bias. Reliability will be tested by comparing repeated measures over time with intraclass correlations. P-values < 0.05 will be considered significant.

Results: N/A

Conclusions: If proven accurate, reliable, and appreciated by users, this innovative tool could be used by researchers in a cost-effective manner. It could contribute to expanding nutrition knowledge and support research on the role of nutrition in health.