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Applied nutritional investigation

Comparison between two assessment tools for fruit and vegetable intake relative to the 24-h recall

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ABSTRACT

Objective: The aim of this study was to evaluate the validity of methods assessing fruit and vegetable (FV) intake among Brazilian users of the Primary Attention Health Care Program.
Methods: The present study included 299 participants (age ≥20 y) from a representative sample from a randomized controlled community trial performed as part of a health promotion program in a Brazilian metropolis. All participants completed three methods for the assessment of FV consumption: brief questionnaire of FV (QBrief-FV), food frequency questionnaire of FV, and a 24-h dietary recall. Medians and terciles of FV consumption were compared. Spearman's coefficient, κ, and Wilcoxon's test stratified by sociodemographic and nutritional characteristics were calculated.
Results: The population sample was composed of 86.6% women (median age 57 y; range 48–65). Stronger correlations were observed for the evaluation of fruit consumption according to QBrief-FV ($r = 0.437$) and the median values were comparable to those presented by the 24-h dietary recall ($P \geq 0.05$). This comparison also resulted in a higher proportion of terciles with exact concordance (46.1%). All test methods overestimated the consumption of combined FV.
Conclusions: None of the methods tested was very accurate for the assessment of FV consumption. However, the strongest correlation was found for the QBrief-FV evaluation of fruit intake, indicating that it is an appropriate tool for the investigation of fruit consumption.

Introduction

Fruits and vegetables (FV) are foods that are rich in dietary fiber and different types of minerals and vitamins [1,2]. Due to their beneficial effects on health and their positive role in reducing the risk for chronic diseases, daily consumption of FV at mealtimes is recommended [1,2].

Adequate consumption of FV has been a priority of food and agricultural policies over recent years [1,3]. However, to monitor targets and trends, a proper evaluation of FV consumption is essential [4]. The assessment of dietary information is complex because there are multiple confounding factors that may affect its validity and reproducibility [4].

In the absence of a gold standard for the assessment of food consumption, nutritional epidemiology has attempted to develop a valid and reliable methodology. However, the methodology of some studies remains limited, particularly in developing countries, where FV consumption is investigated with other foods or where there is only a qualitative process of validation [5–8].

It is well known that inadequate FV consumption is associated with an increased risk for chronic diseases and understanding the techniques for FV intake measurement is challenging; however, quantitative and simple measurements are essential to develop and monitor public policies. The aim of this study was to compare the relative validity of methods used to assess FV intake between adult and elderly users of primary health care services in Brazil.

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Participants and methods

Study population

This cross-sectional study evaluated data from a representative subsample of the baseline data (2013–2014) of a community, randomized controlled trial (RCT) that interviewed 3414 individuals from 18 units of the Health Academy Program (HAP). Details of the sampling process are available from a previous study [9].

HAP offers a free program of exercises, health-promoting initiatives, and entertainment, to the population ages >18 y [10].

HAP was implemented in Belo Horizonte in 2006 [11]. Belo Horizonte is the capital of Minas Gerais, with a population of more than 2 million inhabitants [12]. Currently, there are 64 units distributed in the nine administrative districts, with maximum capacity estimated at 400 users per unit [13].

Users (age ≥20 y), participating in unit activities were eligible for this study. Exclusion criteria were pregnancy and severe cognitive impairment.

The validation study included a representative subsample of 299 participants (Fig. 1), including all individuals who had two 24-h dietary recalls (24-h recalls) associated with a kit of homemade measures and had completed all methods to assess baseline FV intake. There was a 95% test power and a 5% significance level with a minimum correlation coefficient of 0.25 between reference and test method [4].

Of the 3414 participants, 203 (5.9%) were excluded for failing to provide complete information about FV consumption. Of the 3211 eligible participants selected, 299 had two 24-h recalls associated with a kit of homemade measures. The use of this kit was not mandatory in the larger study.

Study methods

Trained staff interviewed the participants over 2 d nonconsecutively. The questionnaire used was tested and validated in previous surveys [14,15].

During the first interview, the following information was gathered: demographic data, including sex, age, and education (defined as ≤8 or >8 y of study); morbidity data; habits and lifestyle. Data on specific consumption of FV also was collected. This information was derived from three different sources: a brief questionnaire of FV (QBrief-FV), a food frequency questionnaire of FV (FFQ-FV), and a 24-h recall associated with kit homemade measures.

In the second phase, after a further 24-h recall, anthropometric data were collected. The anthropometric evaluation consisted of taking weight and height, according to the World Health Organization (WHO) protocol [16]. Weight was measured on an electronic scale with a capacity of 180 kg and accuracy of 100 g. Height was recorded using a portable stadiometer with a 220-cm tape measure. Body mass index (BMI) was calculated from these measurements. Different categories were used for the classification of BMI in adults (≤59 y) [16] and the elderly (≥60 y) [17]. Participants were categorized according to the presence of excess weight.

All participants provided written informed consent and the study was approved by the University Ethics Research Committee and City Hall. The community RCT was registered with the Brazilian Registry of Clinical Trials.

Dietary assessment

Consumption of FV, isolated and combined, was converted into grams consumed per day. Fruits and vegetables, but not roots and tubers (potatoes, sweet potatoes, yams) [1], were included. Fruit juice and FV in preparations were excluded.

On day 1, the QBrief-FV, followed by the FFQ-FV and the first 24-h recall, were administered. The second 24-h recall was applied on a different nonconsecutive day.

Brief Questionnaire of FV consumption evaluation

The QBrief-FV comprised seven direct questions regarding the frequency of FV consumption, and was adapted from previous surveys [14,15]. It is easy to use and requires less effort and time. However, the QBrief-FV did not specify which FV were consumed.

Consumption was evaluated according to frequency (categorized as 1–2, 3–4 d, and 5–6 d/wk, and every day) and number of servings.

The servings of FV consumed were converted into grams according to guidelines developed by the WHO with one serving of fruit or vegetables corresponding to 80 g [1,18].

Conversion of weekly to daily consumption was performed by calculating the ratio of middle point of frequency reported (the arithmetical mean of the number of days reported) over the total number of days in a week:

Daily FV consumption (g) = [(mean point of intake/7) × number of servings] × 80. Frequencies expressed as *hardly ever* and *never* in the questionnaire were counted as zero.

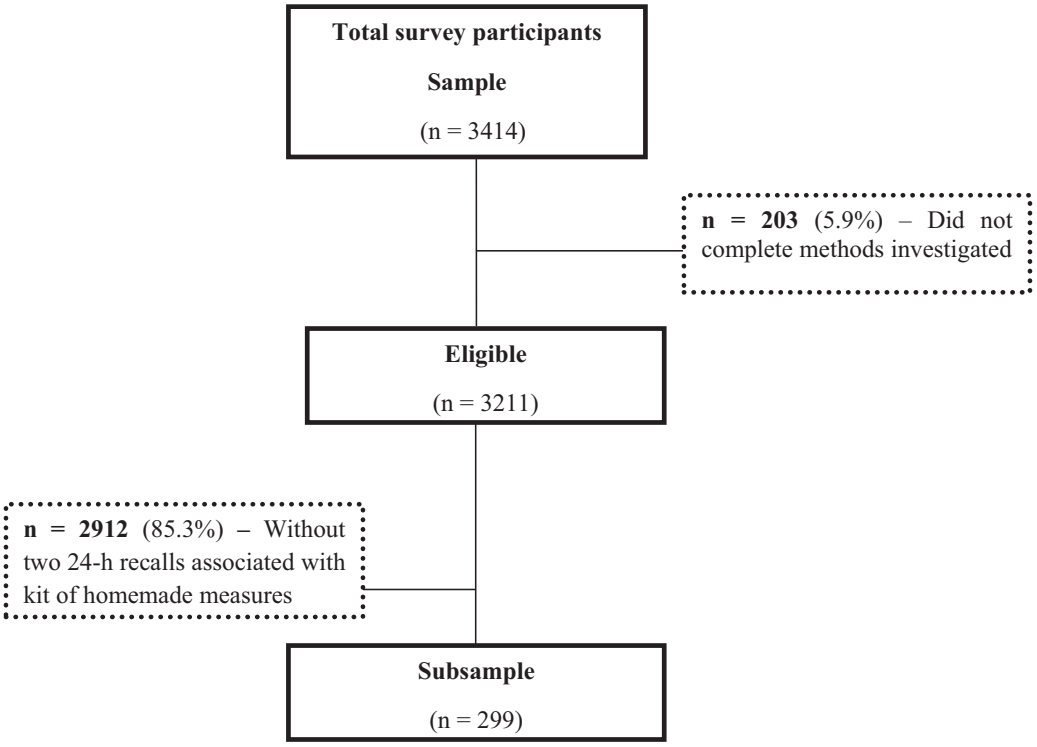

Fig. 1. Study flow diagram.