



Research report

Validation of a buffet meal design in an experimental restaurant[☆]

Xavier Allirot^{a,b,c,*}, Laure Saulais^{a,c}, Emmanuel Disse^{b,c}, Hubert Roth^{b,d}, Camille Cazal^{b,c},
Martine Laville^{b,c}

^a Centre de Recherche de l'Institut Paul Bocuse, Château du Vivier, 69130 Ecully, France

^b Centre de Recherche en Nutrition Humaine Rhône-Alpes, Centre Hospitalier Lyon Sud, Lyon, France

^c Centre Européen de Nutrition pour la Santé, Lyon, France

^d Pôle Recherche, CHU Grenoble – Inserm U1055-Bioénergétique, Université J. Fourier, Grenoble, France

ARTICLE INFO

Article history:

Received 22 December 2011

Received in revised form 6 February 2012

Accepted 11 February 2012

Available online 17 February 2012

Keywords:

Buffet meal

Cumulative intake

Experimental restaurant

Eating behaviour

Validation study

Reproducibility

Subjective appetite

Food deprivation

ABSTRACT

We assessed the reproducibility of intakes and meal mechanics parameters (cumulative energy intake (CEI), number of bites, bite rate, mean energy content per bite) during a buffet meal designed in a natural setting, and their sensitivity to food deprivation. Fourteen men were invited to three lunch sessions in an experimental restaurant. Subjects ate their regular breakfast before sessions A and B. They skipped breakfast before session FAST. The same *ad libitum* buffet was offered each time. Energy intakes and meal mechanics were assessed by foods weighing and video recording. Intrasubject reproducibility was evaluated by determining intraclass correlation coefficients (ICC). Mixed-models were used to assess the effects of the sessions on CEI. We found a good reproducibility between A and B for total energy (ICC = 0.82), carbohydrate (ICC = 0.83), lipid (ICC = 0.81) and protein intake (ICC = 0.79) and for meal mechanics parameters. Total energy, lipid and carbohydrate intake were higher in FAST than in A and B. CEI were found sensitive to differences in hunger level while the other meal mechanics parameters were stable between sessions. In conclusion, a buffet meal in a normal eating environment is a valid tool for assessing the effects of interventions on intakes.

© 2012 Elsevier Ltd. All rights reserved.

Introduction

The growing concern about global obesity (Low, Chin, & Deurenberg-Yap, 2009) has generated an increasing interest in the study of eating behaviours and the control of food intake. Understanding the mechanisms controlling human appetite and energy intake is recognized as fundamental to nutritional science (Stubbs, Johnstone, O'Reilly, & Poppitt, 1998). The ability to measure food, energy and nutrient intake is critical to our understanding of the processes producing these secular trends (Stubbs, Johnstone, O'Reilly, & Poppitt, 1998). In addition to the many methods used for dietary assessment data in population studies (Tucker, 2007), many techniques, apparatus and methodologies have been developed for the purpose of experimental investigation of human eating behaviours (Hill, Rogers, & Blundell, 1995).

In experimental studies assessing the effects of a specific intervention on subsequent energy intake, the most common way to measure food intake is to allow participants to consume *ad libitum* meals (Blundell et al., 2010). *Ad libitum* single-course meals have been validated by demonstrating a good reproducibility for total energy intake between two identical sessions (Bellissimo, Thomas, Pencharz, Goode, & Anderson, 2008; Gregersen et al., 2008; Lara, Taylor, & Macdonald, 2010). The assessment of food choice and macronutrient preferences is feasible by the administration of a buffet-type meal in which a large variety of food is offered to the subjects. To our knowledge, two studies have assessed the validity of buffet-type meals (Arvaniti, Richard, & Tremblay, 2000; Nair et al., 2009) and concluded that such meals were reproducible tools for measuring total energy and macronutrient intake. These two studies took place in a laboratory setting.

In addition, several studies have demonstrated the importance of taking care of the context and the environment when studying eating behaviours and particularly food choices (Larson & Story, 2009; Meiselman, 2007; Wansink, 2004). A review (Stroebele & De Castro, 2004) pointed towards the major influence of ambience on eating behaviour and highlighted that the magnitude of its effect, particularly of physical surroundings, is generally underestimated. Thus, in order to increase the external validity of studies exploring the effects of specific interventions on subsequent energy intake, the realistic nature of the test meal and the eating

[☆] Acknowledgments: This study was supported by the Foundation Nestlé France. We thank Agnes Giboreau, Research Director of the Institut Paul Bocuse Research Centre and Catherine Roubly (INSERM U1028 – CNRS UMR5292) for their constructive feedback. We thank Chief Patrick Ogheard from the Institut Paul Bocuse, for his technical help in the elaboration of the buffet. We are also grateful for the support from the members of the Institut Paul Bocuse and of the Centre de Recherche en Nutrition Humaine Rhône-Alpes.

* Corresponding author.

E-mail address: xavier.allirot@institutpaulbocuse.com (X. Allirot).

situation should be given particular attention (de Graaf et al., 2005).

Considering the above, we designed in our experimental restaurant (Giboreau & Fleury, 2009) a buffet-type meal situation, which was as close to a typical eating situation as possible, in terms of foods choice and eating environment. In a previous paper (Alliot et al., 2011), we highlighted the potential interest of such a tool and the need to validate it. To our knowledge, the validity of an *ad libitum* buffet-type meal trying to preserve the ecological character of the eating situation has never been assessed. In this paper, we also demonstrated how video recording of the meals could allow us to go beyond the single measurement of total energy intake, commonly used in the buffet literature. Through a bite analysis and inspired by the more thorough works on the microstructure of human ingestive patterns (for reviews, see Kissileff, 2000; Westerterp-Plantenga, 2000), we could particularly assess meal mechanics parameters such as cumulative intakes, number of bites, bite size, bite rate, for the whole meal, and for each temporal quarter of the meal, as proposed earlier (Barkeling, Rossner, & Sjoberg, 1995). A bite analysis of a meal could help in terms of better understanding the effects of specific variables on the control of appetite, and the underlying mechanisms. Recent studies assessed for example the effects of bite size on satiation (Zijlstra, de Wijk, Mars, Stafleu, & de Graaf, 2009), or the role played by bite size in the portion size effect (Burger, Fisher, & Johnson, 2011; Orlet Fisher, Rolls, & Birch, 2003).

The aim of the present study was to assess the validity of an ecological buffet-test meal in an experimental restaurant, including not only energy and macronutrient intake, but also meal mechanics parameters assessed through a bite analysis of the meals.

The two specific objectives of the present study were:

- (i) to test the intra-individual reproducibility of energy intake and meal mechanics parameters between two identical sessions;
- (ii) to assess the sensitivity of the above parameters to differences in hunger level induced by a period of food deprivation before the meal.

Indeed, as doubts on sensitivity of buffet-test meal scenario have previously been expressed (Blundell et al., 2010), we aimed at verifying that context effects, such as offering a wide variety of foods, do not overwhelm the effects that the study intends to measure. We took advantage of the present protocol for describing subjects' responses to food deprivation, in terms of energy intake, food choices and meal mechanics.

Methods

Subjects

Fourteen healthy normal-weight men aged between 22 and 33 years (mean \pm SEM = 25.4 \pm 0.9 years) with a mean body mass index (BMI) of 22.6 \pm 0.4 kg/m², were recruited through advertisements. None of the subjects had food allergies. All subjects reported moderate levels of physical activity (less than 4 h of sport per week). All were used to eating at breakfast and lunchtime. Before initiating the protocol, all subjects had to rate the foods served in the test meals on an 8-point Likert scale (1 = "I hate it", 8 = "I love it"). To be eligible, subjects had to indicate liking at least 75% of the test food items and to not detest any of them. Although all subjects gave their written consent to participate in the study, they were not informed of its real purpose.

Design

Subjects were invited to four experimental sessions, each separated by at least 7 days, and consisting of lunch in the experimental

restaurant of the Institut Paul Bocuse Research Centre (Giboreau & Fleury, 2009). They were requested to avoid vigorous activities and to abstain from alcohol consumption the day before each session. Subjects were also asked to select a meal they consume regularly and to eat this same meal the evening before each session.

In the first session (session 1), food consumption was not measured. Instead, the aim was to familiarise subjects with the environment and foods used. In this session, all subjects were invited to the experimental restaurant at 12:30 pm on the same day and were asked to taste all of the food items proposed, during a collective buffet-type meal. A choice of classical hot and cold French food items with varied macronutrient compositions was offered: grated carrots, "pâté de campagne", rice, French beans, fried potatoes, sausages, chicken breast, cottage cheese, cheese ("comté"), stewed fruit, chocolate cake, white bread and sugar. The energy content and macronutrient composition of these food items are described in Table 1. Subjects were instructed to eat *ad libitum*. Their liking for each food item was also recorded in order to verify the responses provided during the screening phase: subjects had to rate their liking of each food item on a 100 mm visual analogue scale (VAS). The mean rating for food items varied from 5.5 \pm 0.7 (for fried potatoes), to 7.0 \pm 0.4 (for chicken breast) (Table 1). Twelve of the fourteen subjects rated at least 75% of food items tasted in the test meals with a score higher than 5. The two remaining subjects did not show a lower consumption than other subjects in number of food items chosen or in energy, for the entire study. Thus, we ensured a good level of homogeneity in food item liking between subjects.

Of the three other sessions, two were identical: sessions A and B (for reproducibility assessment), and for which subjects were instructed to eat their regular breakfast in the morning and to report at 12:30 pm for a lunch in the experimental restaurant. In the other session, (session FAST) (for sensitivity assessment), subjects were instructed to report at 12:30 pm for a lunch in the experimental restaurant, in a fasted state since the evening before. Whether the FAST session occurred before, between or after sessions A and B was randomly assigned for each subject. For these three sessions (A, B and FAST), subjects were invited in groups of five and were offered exactly the same eating situation each time, for which a detailed description and explanation of potential value are available elsewhere (Alliot et al., 2011). A "brasserie" ambiance was created in the experimental restaurant, using brasserie furniture and background music, to construct a pleasant context for eating. Five individual spaces of service (buffet) and consumption were created, using decorative folding screens, where subjects were invited to eat and not to communicate with others. Subjects ate, seated in front of a small table. Each buffet meal was individual and located close to each subject's table. Each food item previously tasted in session 1 was proposed and available in larger quantities (see Table 1) than the expected intake for an average subject. All food items were cut into small pieces, to avoid suggesting an appropriate amount to eat. Subjects were invited to eat as long as they wanted, until comfortably full. They could get up and help themselves to any food item in any quantity freely during the meal. Chafing dishes, commonly used for French buffets, were used in order to keep hot food items at constant temperature all throughout the meal.

Measurements

The same measurements were performed during the three sessions A, B and FAST.

Electronic visual analogue scales were used to assess feelings of hunger just before and immediately after the meal. Each electronic VAS consisted of a 70 mm line (Almiron-Roig et al., 2009), presented on Dell Netbook (Latitude 2100 model, Dell Inc., Round

Download English Version:

<https://daneshyari.com/en/article/940400>

Download Persian Version:

<https://daneshyari.com/article/940400>

[Daneshyari.com](https://daneshyari.com)