



Short Communication

How to measure energy and protein intake in a geriatric department – A comparison of three visual methods



Mette M. Husted*, Anders Fournaise, Lars Matzen, Rudolf A. Scheller

Department of Geriatric Medicine, Odense University Hospital, Sdr. Boulevard 29, DK-5000 Odense C, Denmark

ARTICLE INFO

Article history:

Received 5 September 2016

Accepted 6 October 2016

Keywords:

Plate diagram sheet
Malnutrition
Energy intake
Protein intake
Weighing food
Visual methods

SUMMARY

Background & aims: Sufficient energy and protein intake are essential to treatment and recovery of hospitalized older adults. The food intake should be assessed in order to detect patients in need of nutritional intervention. The aim of this study was to compare the accuracy of three visual methods for assessing energy and protein intake as compared to weighing food items.

Methods: We conducted assessment of 103 lunch meals served to geriatric inpatients. Lunch meals were assessed by the nursing staff using three visual methods:

1. Meal Portions (MP): Consumption of each meat/fish, vegetables, potatoes, and sauce
2. Plate Method (PM): Consumption of 100%, 75%, 50%, 25%, or 0%
3. Reduced Plate Method (RPM): All, half, quarter, or nothing

Separate weighing of all food items pre- and post-serving was used as reference method.

Wilcoxon Signed Rank Test was used comparing the accuracy of the three visual methods. Bland–Altman analysis was used to test the degree of agreement. Results are given as median estimates [25%, 75% percentiles]. The Alpha level was set to 0.05.

Results: The total energy served pr. lunch meal was 893.6 kJ [830.4, 1034.3] and the weighed intake 676.6 kJ [421.4, 870.0]. The median intake was 663.0 kJ [389.0, 873.0] ($p = 0.044$), 636.0 kJ [436.5, 873.0] ($p < 0.001$), and 487.8 kJ [316.5, 873.0] ($p < 0.001$) assessed by MP, PM, and RPM respectively. The weighted protein content pr. served meal was 13.0 g [11.4, 15.4] with a weighted intake of 10.3 g [5.3, 13.1]. The median intake was 10.7 g [5.3, 11.7] ($P = 0.045$), 9.3 g [5.8, 11.7] ($p < 0.001$), and 8.0 g [4.8, 11.7] ($p < 0.001$) assessed by MP, PM, and RPM respectively.

Conclusions: All visual methods underestimated energy intake. PM and RPM underestimated protein intake whereas MP overestimated protein intake. However, visual assessment by MP was found to be most accurate.

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1. Introduction

Many hospitalized older adults have problems reaching their nutritional needs. A prior study of food intake in 1707 hospitalized patients by Dupertius et al. [1] showed that even if sufficient food was offered 69% still did not reach their estimated needs. Insufficient food intake increases the risk of malnutrition, and many older patients are malnourished prior to and during hospitalization [2,3]. The intake of energy and protein should therefore be monitored in order to detect patients in need of nutritional intervention. Weighing food items pre- and post-serving are the most accurate

method but time consuming. Alternative methods to estimate protein and energy intake are therefore required [4].

Several visual methods exist for assessment of food intake [4–6]. One method is the “meal portions consumed (MP)” with visual post-serving assessment of single food items (meat/fish, vegetable, potatoes, and sauce) consumed [4]. Others are the visual plate diagram methods with diagrammatic post-serving assessment of the consumed meal [7]. In the “plate method (PM)” the estimates are 100%, 75%, 50%, 25%, or 0% [5], and in the “reduced plate method (RPM)” used by the International Nutrition Day, the estimates are all, half, quarter, or nothing [6].

The aim of this study was to compare the accuracy of the three visual methods MP, PM, and RPM for assessing energy and protein intake as compared to weighing food items pre- and post-serving.

* Corresponding author.

E-mail address: mettehusted@outlook.com (M.M. Husted).

2. Materials and methods

2.1. Data collection

The study was conducted at the Department of Geriatric Medicine at Odense University Hospital in Denmark from December

2013 to February 2014. Data was collected on 17 different working days, from 103 hot lunch meals served to geriatric inpatients by the nursing staff on duty. Each nurse assessed up to four meals on a working day. Prior to data collection the nursing staff had been trained in the three visual assessment methods. Furthermore, practical training under supervision was used before

Table 1
Median differences between weighed pre/post kj meal measure and three visual methods.

	Served kj Median [IQR]	Ingested kj Median [IQR]	Difference in median intake (kj)
Weighed pre/post kj	893.6 [830.4–1034.3]	676.6 [421.4–870.0]	
Meal portions consumed (MP)		663.0 [389.0–873.0]	–13.6*
Plate method (PM) 100%, 75%, 50%, 25%, or 0%		636.0 [436.5–873.0]	–40.6**
Reduced plate method (RPM) all, half, quarter, or nothing		487.8 [316.5–873.0]	–118.8**

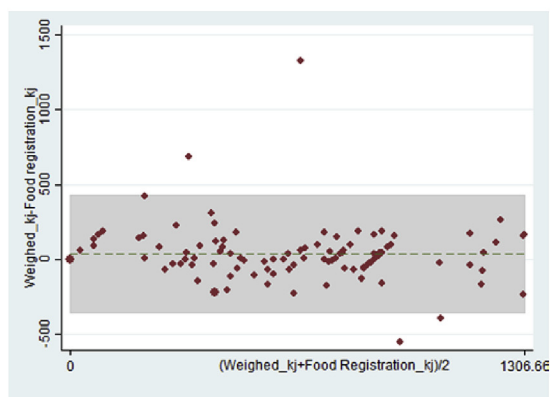
*p < 0.05, **p < 0.001.

Table 2
Median differences between weighed pre/post protein (gram) meal measure and three visual methods.

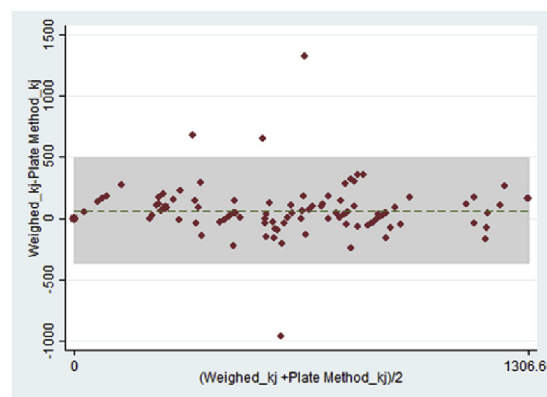
	Served protein Median [IQR]	Ingested protein Median [IQR]	Difference in median intake (protein)
Weighed pre/post protein (gram)	13.0 [11.4–15.4]	10.3 [5.3–13.1]	
Meal portions consumed (MP)		10.7 [5.3–11.7]	+0.4*
Plate method (PM) 100%, 75%, 50%, 25%, or 0%		9.3 [5.8–11.7]	–1.0**
Reduced plate method (RPM) all, half, quarter, or nothing		8.0 [4.8–11.7]	–2.3**

*p < 0.05, **p < 0.001.

Plot a: Weighed kJ – MP



Plot b: Weighed kJ – PM



Plot c: Weighed kJ – RPM

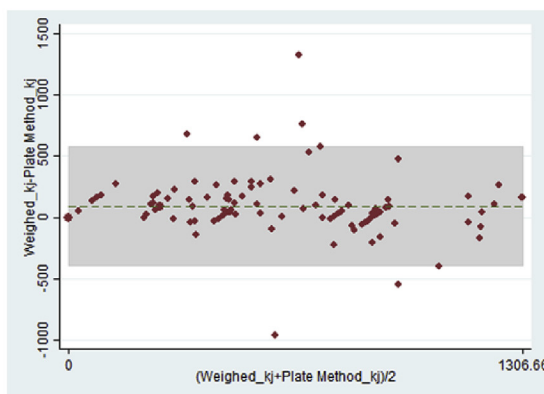


Fig. 1. Bland–Altman plot of the difference between weighed kj intake and MP (plot a), PM (plot b), and RPM (plot c).

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