

Data-in-brief

Validation Data Based on a Web-Based Photographic Questionnaire for Assessment of Skills in Estimating Carbohydrate Portion Sizes in Adults with Type 1 Diabetes

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ABSTRACT

The data in this article present differences and agreements in estimating the carbohydrate content in foods based on web-based photographs vs. real foods in adults with type 1 diabetes (T1D). The Carbohydrate Photographic Questionnaire (CPQ) consists of photograph series of 20 commonly eaten high-carbohydrate foods in the Nordic countries. The CPQ was developed as a simple tool for assessing skills in accurate estimation of the carbohydrate content of foods. Ninety-six adults (52% females) on insulin pump therapy attended the study. Error estimates for the true carbohydrate content were calculated based on the participants' estimations from the CPQ and from real foods. Cross-classifications indicated an overall moderate agreement in estimation errors between the CPQ and real foods. The median percentage of participants classified into the same error category when estimating the carbohydrate content in real foods vs. the CPQ was 39% (interquartile range (IQR) 35–50%). The highest correct classification was obtained for grapes (79%) while lasagne (15%) had the lowest correct classification.

Keywords: Type 1 diabetes mellitus, Basic carbohydrate counting, Carbohydrate estimation accuracy, Food photographs, Patient education.

Value of the Data

- The data can provide new insights on how well adults with type 1 diabetes estimate carbohydrate content in real foods versus two-dimensional learning materials i.e. photos on paper, web-based computer graphics, or photos on smart phone applications
- The data can be used to identify food groups or food items which are particularly difficult to estimate the carbohydrate content of using two-dimensional learning materials
- The data provide important new insight in relation to nutrition education supporting the use of real foods when people with diabetes practice their skills in estimating the carbohydrate content in grams of foods correctly in a controlled learning environment
- The data can support health care professionals within the field of nutrition education by providing access to use or be inspired by a simple tool to assess carbohydrate estimation accuracy in people with diabetes
- The data can be used by clinicians and academia for further research and as reference

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Specifications Table:	
Subject	Nutrition
Specific subject area	Validation of a web-based photographic questionnaire for assessment of skills in estimating carbohydrate portion sizes in adults with type 1 diabetes
Type of data	Table
How data were acquired	From a web-based questionnaire compared with the study dietitian's recordings of the estimated values of the carbohydrate content in the real foods presented
Data format	Analysed
Parameters for data collection	The CPQ was developed as a tool to evaluate the effect of learning how to estimate dietary carbohydrate content so we included patients with T1D who had previously received education in this. The participants were not allowed to use aids i.e. smartphone applications with information on the carbohydrate content during the examination. The examination of the participants' skills was done with only one participant at a time in the examination room to reduce bias.
Description of data collection	Participants (n=96) were presented to 20 different foods sequentially and asked to estimate the carbohydrate content in grams. Subsequently the participants were asked to choose one photograph from a set of six photographs, depicting different amounts of the same food (from the web-based CPQ), which most closely resembled the carbohydrate content in the presented real food. Inclusion criteria were adults (18–75 years) with T1D and on insulin pump therapy, having attended at least one consultation with a dietician within the last two years. Exclusion criteria were carbohydrate counting naive, visually impaired, or people diagnosed with T1D less than 12 months before beginning of the study
Data source location	Institution: Steno Diabetes Center Copenhagen
	City: Gentofte
	Country: Denmark
Data accessibility	With the article
Related research article	Schouw N, Skouboe AG, Bruun JM, Ewers B
	Skills lacking in estimating carbohydrate content: A need for continual education of adults with type 1 diabetes

Experimental Design, Materials, and Methods

Data on error estimates of carbohydrate portion sizes when adults with T1D assess web-based photographs as compared with real foods, the latter considered a "gold standard" for validation of photographs, were collected in a quality assurance project. Patient characteristics have been presented in the related research article [1].

Participants were presented to a serving of real food and asked to estimate the carbohydrate content in grams. Subsequently, the participants were asked to choose the photograph from a set of six photographs depicting different amounts of the same food which most closely resembled the carbohydrate content in the real food. This procedure was repeated for 20 commonly eaten high-carbohydrate foods in Denmark. The 20 photograph series were presented in the newly developed web-based Carbohydrate Photographic Questionnaire (CPQ). Figure 1 shows a diagram of the experimental design.

The web-based photograph series were photographed according to practical guidelines from the National Food Institute at the Technical University of Denmark [2]. Error estimates for carbohydrate portion sizes were calculated for both real food and the CPQ based on (Equation 1):

$$\text{Error estimate (g)} = \text{Estimated carbohydrate content (g)} - \text{Actual amount of carbohydrate (g)} \quad (1)$$

A negative difference was chosen to indicate underestimation of the presented food. To compare the estimation errors in real food and the CPQ, the percentages of participants within each error category

were determined. The error categories were defined as estimation errors within $\pm 10\text{g}$ of the actual carbohydrate content (accurate), above 10g of the actual carbohydrate content (overestimation), and below -10g of the actual carbohydrate content (underestimation). The agreement in estimation errors between real food and the CPQ was determined by cross-classification of error estimates which was used to determine the cumulative percentage of participants who were classified into the same error category in real food and the CPQ (Equation 2):

$$\text{Cumulative percentage} = \frac{n \text{ classified into the same estimation category}}{\text{Total } n} \times 100\% \quad (2)$$

The cumulative percentage of participants, who were classified into the same error category, was calculated for each food. For all statistical tests a two-sided significance level of $p < 0.05$ was used. All statistical analyses were performed with the SPSS software for Windows, version 22.0 (IBM Corp, Armonk, NY, USA).

The study was carried out in accordance with the Declaration of Helsinki. Informed consent to participate in the study was obtained from all participants prior to study inclusion according to Danish regulations. The study was approved by the local ethics committee and the Danish Data Protection Agency and included an approval of an External Data Manager Agreement with the Capital Region of Denmark for data storing.

Data

The article presents data on the agreement in estimation errors when adults with T1D are asked to estimate the carbohydrate

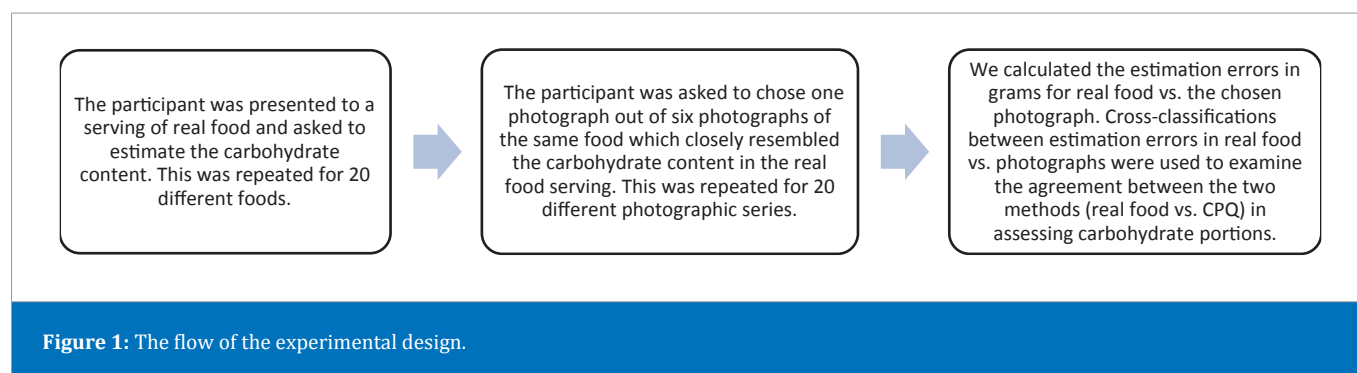


Table 1: The cumulative percentage of participants classified in the same error category for real food and the CPQ.

Presented foods	Participants classified into the same error category based on the CPQ and real food
	Cumulative percentage (%)
1. Grapes	79
2. Milk chocolate	59
3. Raisins	54
4. Potato chips	52
5. Boiled pasta	52
6. Dried apricots	49
7. Pizza	49
8. Fruit pie	45
9. Melon	40
10. Mixed candy	39
11. Dark chocolate	38
12. Bun	38
13. Oatmeal	37
14. Pasta salad	36
15. Boiled rice	36
16. Boiled potatoes	33
17. Ice cream	31
18. Kidney beans	25
19. Potato slices	24
20. Lasagne	15
Median (IQR)	39 (35–50)

content in different portion sizes of real foods versus portions sizes of the same foods presented as photographs based on a web-based questionnaire. Table 1 shows the percentage of participants classified in the same error category for real foods and the CPQ. The percentage was determined from cross-classifications between the percentages of participants who were classified into the same error category.

Acknowledgments

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References

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