



ELSEVIER

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

Research review

Effects of polydextrose on different levels of energy intake. A systematic review and meta-analysis [☆]

Alvin Ibarra ^{a,*}, Nerys M. Astbury ^b, Kaisa Olli ^a, Esa Alhoniemi ^c, Kirsti Tiihonen ^a^a DuPont, Nutrition & Health, Kantvik, Finland^b New York Nutrition & Obesity Research Center, St Luke's Roosevelt Hospital Center, New York, USA^c Avoltus Oy, Turku, Finland

ARTICLE INFO

Article history:

Received 29 September 2014

Received in revised form 5 December 2014

Accepted 7 December 2014

Available online 12 December 2014

Keywords:

Appetite

Energy intake

Linear regression

Meta-analysis

Polydextrose

ABSTRACT

Introduction: Dietary fibers help to control energy intake and reduce the risk of developing obesity. Recent studies show that the consumption of polydextrose reduces energy intake at a subsequent meal. In this systematic review and meta-analysis we examine the subsequent effects of polydextrose on different levels of energy intake (EI). **Method:** The review followed the PRISMA methodology. Meta-analyses were expressed as Standardized Mean Difference (SMD). A linear regression approach was used to model the relationship between the polydextrose dose and the different levels of EI expressed as a relative change (%). **Results:** All the studies included in this review administered polydextrose as part of a mid-morning snack. Six studies were included in the analysis of EI at an *ad libitum* lunch; and three were included in the analysis of EI during the rest of the day, as well as total daily EI. The meta-analysis showed that the consumption of polydextrose is associated with a reduction in EI at lunch time (SMD = 0.35; $P < 0.01$; $I^2 = 0$). The dose of polydextrose consumed correlated significantly with this reduction in EI, $EI_{\text{lunch}} (\%) = -0.67 \text{ Polydextrose (g/day)} (R^2 = 0.80; P < 0.01)$. The meta-analysis of EI during the rest of the day and daily EI did not show any difference. Nevertheless, the regression equation indicates that there is a dose-dependent effect on the reduction of daily EI, $EI_{\text{daily}} (\%) = -0.35 \times \text{Polydextrose (g/day)} (R^2 = 0.68; P < 0.05)$. Sex-specific results are consistent with results for the whole group. **Conclusion:** The studies included in this meta-analysis support the notion that the consumption of polydextrose reduces voluntary energy intake at a subsequent meal. Furthermore, this reduction in energy intake occurs in a dose-dependent manner.

© 2014 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/3.0/>).

Contents

| | |
|--|----|
| Introduction | 31 |
| Methodology | 31 |
| Protocol registration | 31 |
| Eligibility criteria and information sources | 31 |
| Study selection and quality assessment | 31 |
| Strategy for data synthesis | 32 |
| Meta-analysis | 32 |
| Linear regression | 32 |

[☆] **Acknowledgments:** The authors gratefully acknowledge the help from authors who provided valuable information for this review: Prof. John Blundell, University of Leeds (United Kingdom); Prof. Neil King; Queensland University of Technology (Australia); Prof. Barbara Rolls, Pennsylvania State University (USA); Dr. Charles Czank, Leatherhead Food Research (United Kingdom); Prof. Jeyakumar Henry and Dr. Viren Ranawana, Clinical Nutrition Research Centre (Singapore); Prof. Ursula Schwab, University of Eastern Finland (Finland); and Dr. Essi Sarkkinen, FoodFiles Oy (Finland). Authors also thank Dr. Julian Stowell, Mr. Michael Bond, Mr. Bram Van Hulsen, Mr. David Bishop, and Mr. Lauri Naski from DuPont for their contributions to improve the quality of the manuscript. **Conflict of interest:** A.I., K.O. and K.T. were employed by DuPont during the conduct of this review. DuPont is involved in the research/development and sales/marketing of Litesse[®] polydextrose for the food and dietary supplements industries. E.A. was employed by DuPont to conduct the statistical analysis of this review. The authors declare no other conflict of interest regarding this study. **Author contributions:** A.I., K.O. and K.T. identified, screened, selected, and included the full-report studies. E.A. analyzed the data. All authors contributed to the interpretation of results and the writing of the manuscript.

* Corresponding author.

E-mail address: alvin.ibarra@dupont.com (A. Ibarra)<http://dx.doi.org/10.1016/j.appet.2014.12.099>0195-6663/© 2014 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/3.0/>).

| | |
|---|----|
| Results | 32 |
| Study selection | 32 |
| Included studies | 33 |
| Quality assessment and risk of bias | 33 |
| Meta-analysis | 33 |
| Linear regression equations | 33 |
| Discussion | 33 |
| References | 36 |

Introduction

The prevalence of overweight and obesity is increasing at an alarming rate worldwide (Burton-Freeman, 2000; Kelly, Yang, Chen, Reynolds, & He, 2008). It is estimated that by 2030 there will be more than 2 billion overweight and 1 billion obese individuals (Kelly et al., 2008). Overweight and obesity are important risk factors for diabetes, cardiovascular disease, cancer, and premature death (Haslam & James, 2005). Epidemiological studies have found that the consumption of dietary fiber is associated with normal weight and less fat gain (Davis, Hodges, & Gillham, 2006; Tucker & Thomas, 2009). The role of dietary fiber in the regulation of energy intake and the development of obesity may be related to the fiber's unique physical and chemical properties that help to generate early signals of satiation as well as enhanced or prolonged signals of satiety (Burton-Freeman, 2000).

Polydextrose is a glucose polymer that is completely soluble in water. As a food additive it offers the texture of sucrose but provides only 25% of the equivalent energy, or 4 kJ/g (Achour et al., 1994; Auerbach, Craig, Howlett, & Hayes, 2007; Juhr & Franke, 1992). It has been approved for use in foods in over 60 nations and is recognized as a dietary fiber in more than 20 countries (FAO/WHO, 2009).

Recent studies have shown that polydextrose reduces energy intake at a subsequent meal, especially when administered as part of a mid-morning preload before an *ad libitum* lunch (Astbury, Taylor, & Macdonald, 2013; Hull, Re, Tiihonen, Viscione, & Wickham, 2012; Ranawana, Muller, & Henry, 2013). Although some studies which have examined the effects of polydextrose on appetite suppression have involved male participants only (Astbury, 2014; Astbury, Taylor, & Macdonald, 2008; Ranawana et al., 2013), several others have included both males and females (Astbury et al., 2013; Hull et al., 2012; King, Craig, Pepper, & Blundell, 2005; Konings, Schoffelen, Stegen, & Blaak, 2013; Monsivais, Carter, Christiansen, Perrigue, & Drewnowski, 2011; Schwab, Louheranta, Torronen, & Uusitupa, 2006; Timm, 2012). However, results are very rarely reported on a per-sex basis.

While these studies demonstrate the ability of polydextrose to reduce energy intake, to date there is no other such review which systematically gathers all the disparate evidence on this topic. Therefore, the aim of this review and meta-analysis is to investigate the effects of polydextrose on subsequent levels of energy intake. In addition, this study also aims to assess if there is a dose-dependent effect on the levels of reduction of subsequent energy intake caused by the consumption of polydextrose. This study also evaluates these effects by sexual category.

Methodology

Protocol registration

This review was conducted according to the methodology described by the Preferred Reporting Items for Systematic Reviews and

Meta-Analyses: PRISMA Statement (Moher, Liberati, Tetzlaff, Altman, & Group, 2009). The Protocol was registered at the International Prospective Register of Systematic Reviews (PROSPERO) with number CRD42013005261 on August 9, 2013.

The methodology was used to analyze the available data on the subsequent effects of polydextrose on subjective feelings of appetite and levels of energy intake. This report communicates the results of levels of energy intake. Results on the subjective feelings of appetite are communicated in a separate report.

Eligibility criteria and information sources

Eligible study designs were either acute or chronic, randomized, and placebo-controlled nutritional interventions where polydextrose was administered alone or in combination with other food or food ingredients, including supplements. Participants were either normal, overweight, or obese, but otherwise healthy men and women. Interventions were those intended to assess the subsequent effects of polydextrose on subjective feelings of appetite and levels of energy intake. Subjective feelings of appetite included, but were not limited to: hunger; satiety; fullness; prospective food consumption; and the desire to eat. The different levels of energy intake were those calculated at any given time of the day when a nutrient was measured and administered, including at times of breakfast, lunch, dinner, and snacks between meals.

Eligible reports included papers from scientific journals, conference abstracts and theses reported in English-language literature before July 31, 2013, except for two original manuscripts kindly provided by Dr. Nerys Astbury (Astbury, 2014) and M.Sc. Kaisa Olli (Olli et al., 2014) before their publication in scientific journals. Searches were conducted on the following databases: BIOSIS Previews, CAB Abstracts, Foodline:Science, FSTA, Medline, SciSearch, Science Direct, Wiley Online Library, and www.ClinicalTrials.gov. An example of the generic search strategy is shown in Appendix 1 of the supplementary data file. Further information on recently completed trials, unpublished research, and research reported in gray literature was identified by searches for relevant documents in Google Scholar.

Study selection and quality assessment

One researcher (Dr. Alvin Ibarra) screened and selected the records. The authors of the selected articles were contacted and asked to provide any missing information and the full data sets on anthropometric measurements, subjective feelings of appetite and the levels of energy intake. A second independent researcher (M.Sc. Kaisa Olli) checked the assessment and any discrepancies were resolved by consulting a third researcher (Dr. Kirsti Tiihonen). The reviewed articles which were considered not relevant for this study were recorded along with the reason for their exclusion.

A similar system was followed to assess the risk bias of each included study. The assessment followed the procedure described in

Download English Version:

<https://daneshyari.com/en/article/7309024>

Download Persian Version:

<https://daneshyari.com/article/7309024>

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