von Rosen-von Hoewel J, Laitinen K, Martin-Bautista E, Campoy C, Jakobik V, Decsi T, Schmid MA, Morgan J, Gage H, Koletzko B, Raats M (2009) Obesity related programming statements in materials on infant feeding aimed at parents in five European countries. *Advances in Experimental Medicine and Biology* 646, 175-182. (Oral presentation at “Early Nutritional Programming and Health Outcome in Later Life: Obesity and Beyond”, Budapest, Hungary, 20-21 April 2007)

Abstract

Early nutrition programming as an origin of obesity is well acknowledged, but to what extent is this concept communicated to parents? In five European countries, UK, Finland (FI), Germany (DE), Hungary (HU) and Spain (ES), a total of 130 stand alone leaflets and 161 articles from parenting magazines providing information on feeding of healthy infants aged 0–12 months were identified and screened for nutrition programming statements. Obesity was mentioned in 8.5% (54/638) of the statements, and was the fourth most frequent outcome after allergy (20.7%), risk of infections (15.5%) and growth and development (11.4%). A temporal prognosis was given in 39% of obesity related statements, 6% referring to short- (< 5 years), 13% to medium- (5–15 years) and 20% to long-term (>15 years) duration of effects. So advice on obesity focuses on the intrinsic long-term perspective of programming in contrary to other surveyed health-outcomes where only 8% considered a lifelong approach. The major programming related behaviour concerned breast-feeding compared to formula and complementary feeding with meaningful differences concerning the recommended duration: for ES and HU the predominant advice was for exclusive breast-feeding for 6 months, for DE exclusive breast-feeding for 4–6 months and for UK and FI breast-feeding without further specification. In summary, statements relating to the programming of later obesity have been partially integrated into feeding information in five European countries. These countries have slightly different breastfeeding recommendations, but consistently refer to the preventive potential of breastfeeding in general. This is important as obesity and its resulting morbidity are of increasing public health concern in developed countries.

Keywords Breastfeeding • infant feeding • metabolic programming • nutrition programming

Abbreviations BF: breastfeeding; CF: complementary-feeding; CVD: cardiovascular diseases; GOV: government; IND: industry; MF: milk-feeding; PROF: professional associations; RCT: randomised controlled trials; SIG: special interest groups

1 Introduction

Childhood obesity is considered a global epidemic with worldwide prevalence and severity increasing at alarming rates (WHO 1998; Kopelman 2000; Popkin and Doak 1998) and it concerns affluent countries as well as countries in economic transition (Drewnowski and Popkin 1997; Martorell et al. 2000). Serious short and long term consequences of childhood obesity arise in terms of impairments of quality of life, performance and health. In addition to genetic predisposition and current lifestyle, nutritional programming is considered as an important risk factor for developing obesity. It is broadly defined as “either the induction, deletion, or impaired development of a permanent somatic structure or the setting of a physiological system by an early stimulus or insult operating at a sensitive period, resulting in long-term consequences for function” (Lucas 1991). Several indications exist that modification of infantile nutrition, such as promotion of breast feeding, may contribute to decreasing later obesity risk (Schack-Nielsen and Michaelsen 2006). The concept of early nutritional programming has recently gained wide acknowledgment among researchers (Koletzko 2006; Demmelmair et al. 2006), but there is little research on identifying the extent to which research conclusions and policy statements enter information provided to parents. The

purpose of this study, conducted in five member states of the European Union (Finland, Germany, Hungary, Spain, and United Kingdom), is to determine the incorporation of information on the association between early diet and lifelong health, particularly concerning obesity, in leaflets and parenting magazine articles about infant feeding.

2 Material and Methods

2.1 Assessing Infant Feeding Leaflets

Between July and October 2005 a standardized web-based research procedure for assessing stand alone leaflets on infant nutrition referring to feeding of healthy infants aged Obesity Related Programming Statements in Materials on Infant Feeding 177 0–12 months was conducted in the five participating countries. Websites from national and regional government bodies, professional associations, special interest groups and the retailing and manufacturing industries were visited to locate materials covering the area of infant feeding using the key words: nutrition, diet, breastfeeding, bottle feeding, formula feeding, weaning, complementary feeding, infant feeding, and baby. Stand alone materials were either collected electronically or printed. Leaflets published after 2000 targeting parents were included. Materials targeting pregnancy, older children and health professionals or focusing on legal and practical aspects were excluded.

2.2 Assessing Articles and Notes in Parenting Magazines

The most popular monthly parenting magazine for each country was selected based on annual average circulation per issue figures. All 12 issues from 2005 were screened for articles and notes on infant feeding, i.e. about feeding of and nutrition for babies aged 0–12 months. Most popular was defined by the annual average circulation per issue.

2.3 Selection of Programming Statements

Materials were screened for statements on nutrition related programming in relation to milk and complementary feeding. As it was not expected to come across the term “programming” itself, all statements on regular feeding of a healthy infants resulting in certain health outcomes have been considered as relevant. Statements on non-nutritive or toxicological substances, non-nutrition related behaviour (e.g. smoking), as well as nutrient absorption and supplementation (e.g. of folic acid), non-metabolism related outcomes, and adverse health effects due to a special diet or severe malnutrition were excluded from the database.

Each statement was further characterized concerning the duration of health effect (not mentioned, short-term perspective, i.e. duration of effect less than 5 years, medium-term perspective, i.e. duration of effect from 5 to 15 years, and long-term perspective, i.e. duration of effect more than 15 years). The programming related feeding behaviour was coded as milk-feeding, complementary feeding, either period, or general statements on infant feeding. Milk-feeding was further divided into breastfeeding in general, exclusive breastfeeding without further specification, exclusive breastfeeding for 6 months, and formula feeding. It was noted whether a scientific reference was cited with the health outcome or not.

A final total of 638 valid programming statements, for example “breastfeeding helps to prevent obesity later in life”, remained for analysis and were classified into 15 health outcome categories. All analyses were carried out with the software package SPSS (SPSS, 13.0, Chicago, IL, USA).

3 Results

In total, 130 leaflets published between 2000 and 2005 have been reviewed for analysis (Finland = 8, Germany = 14, Hungary = 38, Spain = 34, UK = 36). In summary, 76% of the leaflets contained programming statements, with considerable variation between the countries, ranging from 94% of the Spanish to 61% of the UK leaflets. The pattern of density of statements differed as well: in Germany there was an average of 9.6 statements per leaflet down to 1.1 statements per Finnish leaflet. About 20% of programming statements were based on a given reference. The 60 reviewed magazine issues contained 161 nutrition related articles and notes. In summary, 41% of the magazine contributions contained programming statements, with considerable variation between the countries ranging from 82% of the Spanish to 25% of the Finnish articles and notes. There was a country specific pattern concerning statements citing references, where Hungary, Spain, and the UK did not cite any references with the articles and notes, whereas 13% of the Finnish and 2% of the German magazine contributions referred to scientific literature.

Table 1 shows the order of the six most frequently mentioned health outcome categories per country. Allergy was the most frequent programming related health outcome in the UK (25.7%), Hungary (23.5%), and Germany (22.2%), whereas it was risk of infection in Spain (21.2%) and growth and development in Finland (18.4%). Obesity was mentioned in 8.5% (54/638) of the statements, thus in the cross-country comparison the fourth most frequent health outcome. The majority of statements (68.2%, $n = 435$) did not refer to the duration of the programming related health effects, a further 18.2% ($n = 122$) referred to short and 5.1% ($n = 33$) to medium-term duration. In total, only 8% of the statements referred to a long-term duration of programming effects, thus considering a lifelong approach. Among the obesity concerning statements a temporal prognosis was given in 39%, with 6% referring to short- (<5 years), 13% to medium- (5–15 years) and 20% to long-term (>15 years) duration of effects. So obesity related statements were focused more than average on the intrinsic long-term perspective of programming compared to other surveyed health-outcomes. The major programming related behaviour concerned breast-feeding (47% all over, Hungary and Spain even 100%) compared to formula and complementary feeding with meaningful differences concerning the recommended duration: in Hungary and Spain the predominant advice was exclusive breast-feeding for 6 months, in Germany exclusive breast-feeding for 4–6 months and for Finland and the UK breast-feeding without further specification. The preventive aspect of breastfeeding towards later obesity was consistently included in the statements.

Table 1 Frequency of health outcomes associated with nutritional programming

Health outcome categories	UK		Finland		Germany		Hungary		Spain		All countries	
	n	%	n	%	n	%	n	%	n	%	n	%
Allergy	46	25.7	4	10.5	44	22.2	28	23.5	10	9.6	132	20.7
Risk of infection	41	22.9	3	7.9	13	6.6	20	16.8	22	21.2	99	15.5
Growth and development	10	5.6	7	18.4	34	17.2	9	7.6	13	12.5	73	11.4
Obesity	11	6.1	5	13.2	18	9.1	9	7.6	11	10.6	54	8.5
Risk of disease in general	19	10.6	3	7.9	10	5.1	9	7.6	10	9.6	51	8.0
Mental development	9	5.0	1	2.6	12	6.1	9	7.6	8	7.7	39	6.1
Other health outcomes	43	24.1	15	39.5	67	33.7	35	29.3	30	28.8	190	29.8

4 Discussion

The aim of this review was to survey to what extent the concept of early nutrition programming is being communicated to parents in written information. The focus was on leaflets, because of their important role as a source of advice for parents (DoH 2002). Magazines were included as they have also been recognized as having a practical impact on parental decision making (Foss and Southwell 2006). The frequency of cited health outcomes showed a strong focus on diseases with onset close to the feeding period: the well-established associations between breastfeeding and infections (Howie et al. 1990; Golding et al. 1997) and breastfeeding or introduction of certain foods and allergies (Marini et al. 1996; Oddy et al. 2002) were responsible for 36.2% of all health outcomes. Obesity, which has already reached pandemic proportions in Europe (WHO 2003) was at least ranked fourth (8.5%) and particularly emphasized in Finland (13.2%) and Spain (10.6%). Childhood obesity has short- and medium-term medical and psychosocial consequences in childhood and adolescence, as well as long-term effects that extend well into adulthood (Dietz 1998). This was reflected in the statements including references to the long-term duration of the health effects. It was a gratifying finding that breastfeeding was constantly recommended as preventive. Particularly in industrialized countries, promoting prolonged breast-feeding may help in decreasing the prevalence of obesity in childhood (von Kries et al. 1999; Arenz et al. 2004). Although the underlying mechanisms remain to be elucidated, these findings emphasize the importance of early nutritional influences in addition to genetic disposition and current lifestyle.

To make informed choices and implement health improving feeding behaviour parents need to be able to acquire knowledge based on current scientific thinking. Therefore further emphasis should be placed on the dissemination of practical, achievable and realistic advice that clearly explains the possible long-term health benefits of appropriate feeding behaviour (Raats et al. 2005). The concept of early nutritional programming embodies great potential for the improvement of health and quality of life for future generations, which needs to be further communicated to parents.

5 Conclusions

In summary, statements relating to the programming of later obesity have been partially integrated into feeding information in five European countries, with the long-term perspective taken into account to a greater extent than for other health outcomes assessed in this survey. The five European countries included in the survey have slightly different breastfeeding recommendations, but consistently refer to the preventive potential of breastfeeding in general. This is important as obesity and its resulting morbidity are of increasing public health concern in developed countries.

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