Journal of Medical Sciences

ISSN 1682-4474

science alert

ANSInet
an open access publisher
http://ansinet.com

Research Paper

JMS (ISSN 1682-4474) is an International, peer-reviewed scientific journal that publishes original article in experimental & clinical medicine and related disciplines such as molecular biology, biochemistry, genetics, biophysics, bio-and medical technology. JMS is issued four times per year on paper and in electronic format.

For further information about this article or if you need reprints, please contact:

Dr. Abdulaziz M. Al-Othman
Clinical Nutrition,
College of Applied Medical Sciences,
King Saud University,
P.O. Box 10219, Riyadh 11433
Saudi Arabia

Tel: +9661 435 5010/510
Fax: +966 43550101/386

J. Med. Sci., 6 (1): 12-17
January-March, 2006

Comparative Study Between Young Children of Different Societies to Evaluate the Impact of Feeding Style on the Nutritional Status

[1]Abdulaziz M. Al-Othman, [2]John J. Reilly and [3]Neville R Belton

There were three Parental Feeing Styles (PFS) identified. This study was aimed to find differences between these three styles. One hundred and seventy seven Saudi children from Riyadh, Saudi Arabia and 30 British children from Edinburgh, UK, aged 6 to 36 months were selected randomly from baby clinic files of primary care centres. Anthropometric measurements, blood samples, food frequency questionnaire and four food weighed intake were used to collect data. This study presents, for the first time, measurements of PFS in contemporary children from the two countries, but there was no evidence found for any impact of PFS on nutrient intake, nutritional status, or growth of children.

Key words: Infants, children, food intake, Saudi Arabia, UK, PFS, feeding style, parenting

[1]College of Applied Medical Sciences,
King Saud University, Riyadh, Saudi Arabia
[2]Department of Human Nutrition, Yorkhill Hospitals,
Yorkhill, Glasgow, UK
[3]Department of Child Life and Health,
University of Edinburgh, Edinburgh, UK

ANSInet
Asian Network for Scientific Information

INTRODUCTION

There are differences both historically and cross-culturally in what are normal and acceptable practices of parents in control of their childs feeding[1]. At least three child-feeding patterns can be identified: Highly controlling, laissez-faire and responsive parenting[2]. Parental Feeding Styles (PFS) of children may have an important role on their health and nutrition status[3,4], independent of access to health services or food security. Some of these practices have been recognised in the literature[5,6] and the influence of parents (especially mothers) attitudes on childrens eating patterns have been studied[7,8] and research has been carried out to test the influences of parents feeding practices on children adiposity[9,10]. However, all of major publications conclude that there is a need for more research. It is clear that PFS varies substantially between and within nations and no simple prediction about its effects can be made[11-13]. There are no community-based studies showing the impact of PFS on healthy children in the UK or in Saudi Arabia at present. This study was designed to test the hypothesis that PFS is associated with energy and iron intake and on growth in broadly representative samples or children from Saudi Arabia and Scotland.

MATERIALS AND METHODS

Children from Riyadh, Saudi Arabia: Ethical permission was obtained from the Ministry of Health, Riyadh, Saudi Arabia and a written parental consent was obtained. Saudi children aged 6 to 36 months were selected randomly from baby clinic files of primary care centres in Riyadh representing all demographic areas of the city. Children were chosen randomly. Children with poor health conditions or mothers with health or social difficulties were excluded, so the sample consisted of healthy mothers and young children.

Children from Edinburgh, UK: Ethical approval was obtained from the Lothian Paediatric/Reproductive Medicine, Research Ethics Committee and written parental consent was obtained. Details of these children were provided from the Lothian Child Health Register, including date of birth and address for each child. Children from 3 Health Centres were chosen randomly then sent to the co-operating GPs for approval and for checking if any were not suitable to be approached.

Measurements and procedure: Anthropometric measurements were carried out in the clinics in the Riyadh group and at home for Edinburgh group; these included weight to 0.1 kg, length or height to 0.1 cm, by using standard methods. Mothers were also asked to complete a weighed food intake. A detailed demonstration of weighing and completing the record was provided. Four days weighed intake, three weekdays and one weekend day were chosen after reviewing the possible methods[14]. UWE Model NKS-2000 electronic scales were chosen for the food weighed intake for their reliability, accuracy, portability, working by means of dry batteries and ease of use in surveys. Scales were checked for accuracy three times during the study. Plastic bowls dishes and suitable measuring cups were provided. Each set was tested for accuracy.

Two semi-quantitative food frequency questionnaires included all food which was likely to be eaten by the children in each country: Saudi Arabia and the UK, were used, leaving spaces to add food not included in the questionnaire. These were completed by all mothers.

Compeat 5 (Nutrition Systems Ltd., London) was used for analysis of nutrient intake from the food intake records. Analysed data was exported to SPSS (v. 11) for analysis. We calculated BMI and weight and height Standard Deviation Score (SDS) relative to UK 1990 reference data[15].

Nutrient intake and nutrition status outcome measures: Energy and iron intake were measured as a mean daily amount for each child from the 4 day weighed intake, expressed in absolute terms (kcal day^{-1}) and per kilogram body weight (kg b. $wt.^{-1}$). Nutritional status was defined as BMI SD score and height SD score. Growth was assessed as height, length SD score. We used the UK anthropometric data for both samples in the absence of Saudi population data. Iron intake was assessed by using the actual food intake from the 4 days weighed food intake.

Definition of parental feeding style: There are currently no validated methods which are agreed for optimal assessment of PFS. We asked mothers a simple question if their children did not eat the meal, would you usually give him/her something else, spending sometime coaxing him to eat or give him the meal your self, or leave him until he becomes hungry. This was designed to elicit whether or not parents (in almost all cases, mothers) fed children in one or the three distinct styles identified by previous literature: Responsive, Controlling, Laissez-faire. The questionnaire was available from the corresponding author.

RESULTS

Characteristics of subjects: The statistical analysis aimed to test the hypothesis that PFS was associated with child energy and iron intake, or nutritional status. A total of 204 and 271 families did not consent to participate or dropped out from the study in Riyadh and Edinburgh, respectively. This left a sample of 189 in Riyadh and 50 in Edinburgh.

Haematological parameters: Table 1 shows mean, median and SD for Hb, MCV and serum ferritin for both Riyadh group and Edinburgh group. Total mean of Hb, MCV and SF were 11.8, 73.6 and 23.4, respectively for Riyadh group and 12.3, 78.3 and 18.4, respectively for Edinburgh group. There were no significant differences between the three feeding styles.

Parental feeding style: In the Riyadh sample, 187 families completed all measurements. These consisted of 77/187 (41%) Responsive feeders, 71/187 (38%) Controlling feeders and 39/187 (21%) Laissez-faire feeders. In the Riyadh sample the three groups defined by PFS did not differ significantly for child age gender, parental education, or parental income (ANOVA and Chi-squared tests $p>0.05$) (Table 2).

In the Edinburgh sample, numbers of children in each category of PFS were relatively small, but of the 50 families 20 (40%) were Responsive feeders, 23 (46%) Controlling feeders and 7 (14%) Laissez-faire feeders. Sample sizes precluded any great confidence in the analysis in this group, but there were no clear differences between the three groups for child age, gender, or family social class (Table 3).

Relationship between parental feeding style and nutrient intake: For both the Riyadh and Edinburgh samples we found no significant differences between the three categories of PFS and energy intake when expressed either in absolute terms (kcal day^{-1}) or per kilogram body weight (kg^{-1} b. wt.) (Table 3). We found no evidence in both samples of differences between the three categories of PFS for iron intake (ANOVA, $p>0.05$), whether expressed in absolute terms (mg day^{-1}) or per unit body weight (mg kg^{-1} day^{-1}).

Relationship between parental feeding style and growth and nutritional status: For both the Riyadh and Edinburgh samples we found no association (ANOVA, $p>0.05$) between PFS categories and BMI SDS, height SDS, or weight SDS. We also found no association between PFS categories and iron status (Table 4).

Table 1: Hb, MCV and SF values for the three feeding styles

		Riyadh groups				Edinburgh groups			
Parental feeding styles		No. of children	Hb (g dL)$^{-1}$	MCV (fL)	SF (µg L)$^{-1}$	No. of children	Hb (g dL)$^{-1}$	MCV (fL)	SF (µg L)$^{-1}$
Responsive feeders	Mean	n = 72	11.8	74.7	24.7	n = 14	11.9	77.8	16.4
	Median	% of Total n = 41	11.8	75.1	16.0	% of Total n = 47	12.0	77.0	16.0
	SD		1.1	6.1	34.1		1.2	3.6	12.3
Controlling feeders	Mean	n = 68	11.8	73.5	23.4	n = 12	12.9	78.8	22.6
	Median	% of Total n = 38	12.0	73.5	18.0	% of Total n = 40	13.2	78.0	16.5
	SD		1.1	6.0	17.2		0.8	2.3	14.0
Laissez-faire feeders	Mean	n = 37	11.7	72.0	20.6	n = 4	12.1	78.7	12.5
	Median	% of Total n = 21	11.7	72.0	17.0	% of Total n = 13	11.9	78.6	12.5
	SD		1.2	5.8	15.8		0.7	3.0	7.8
Total	Mean	n = 177	11.8	73.6	23.4	n = 30	12.3	78.3	18.4
	Median		11.8	73.9	17.0		12.3	77.8	16.0
	SD		1.2	6.0	25.5		1.1	3.0	12.7

Table 2: Parental feeding styles in relation to age, gender, parental education and parental income (Riyadh Study)

		Age in months				Sex		Mothers occupation			Fathers occupation			Mothers education			Fathers education		
Parental Feeding styles		Up to 12	13-24	25 or more	Mean	Boy	Girl	House Wife or un-employed	Medium level	High level	Low class	Medium class	High class	Not educated	Low medium	High	Not educated	Low medium	High
Responsive	n	10	57	10	18.0	40	37	60	8	9	1	36	40	6	56	14	0	40	37
feeders	%	13	74	13		52	48	78	10	12	1	47	52	8	74	18	0	52	48
Controlling	n	29	30	12	16.0	36	35	58	4	9	3	34	34	5	45	20	3	37	30
feeders	%	41	42	17		51	49	82	6	13	4	48	48	7	64	29	4.2	52	42
Laissez- Faire	n	13	20	6	16.2	19	20	32	3	4	0	22	17	6	26	7	2	20	17
feeders	%	33	51	15		49	51	82	8	10	0	56	44	15	67	18	5.1	51	44
Total	n	52	107	28	16.8	95	92	150	15	22	4	92	91	17	127	41	5	97	84
	%	28	57	15		51	49	80	8	12	2	49	49	9	69	22	2.7	52	45

No significant differences for any variable between the three feeding categories (ANOVA, $p<0.05$), Hb = haemoglobin, MCV = Mean cell volume, SF = Serum ferritin

Table 3: Energy and iron intakes for the three feeding style categories in both sample

		Riyadh group			Edinburgh group		
Parental feeding styles		No. of children	Energy intake (kcal kg^{-1} b. wt.)	Iron intake kg^{-1} b. wt.	No. of children	Energy intake (kcal kg^{-1} b. wt.)	Iron intake kg^{-1} b. wt.
Responsive feeders	Mean	n = 76	82.3	0.48	n = 20	83.84	0.50
	Median	% of Total n = 42	78.2	0.42	% of Total n = 40	81.57	0.42
	SD		22.7	0.26		22.31	0.28
Controlling feeders	Mean	n = 68	88.7	0.57	n = 23	69.97	0.41
	Median	% of Total n = 37	88.2	0.48	% of Total n = 46	71.78	0.38
	SD		27.4	0.34		15.14	0.16
Laissez-faire	Mean	n = 39	81.2	0.56	n = 7	79.07	0.34
feeders	Median	% of Total n = 21	82.8	0.47	% of Total n = 14	78.16	0.37
	SD		24.5	0.31		25.61	0.16
Total	Mean	n = 183	84.4	0.53	n = 50	76.80	0.43
	Median		83.3	0.44		76.86	0.38
	SD		25.0	0.31		20.47	0.22

No significant differences for any variable between the three feeding categories (ANOVA, $p<0.05$)

Table 4: BMI and SDS for weight, height and BMI for the three feeding styles

		Riyadh group				Edinburgh group			
Parental feeding styles		BMI	SDS for weight	SDS for height	SDS for BMI	BMI	SDS for weight	SDS for height	SDS for BMI
Responsive feeders	Mean	17.2	-0.12	-0.25	0.01	17.6	0.12	-0.28	0.40
	Median	16.6	-0.11	0.09	0.05	17.5	-0.07	-0.55	0.36
	SD	2.3	1.11	1.58	1.51	1.3	0.90	1.09	0.79
Controlling feeders	Mean	16.9	-0.23	0.00	-0.37	17.9	0.55	-0.11	0.78
	Median	16.9	-0.20	-0.12	-0.17	17.5	0.36	-0.16	0.71
	SD	2.2	1.24	1.63	1.80	2.1	0.98	1.19	1.10
Laissez-faire feeders	Mean	17.7	0.07	-0.21	0.23	17.5	0.63	0.22	0.60
	Median	17.4	0.14	-0.14	0.48	17.5	0.68	0.03	0.68
	SD	2.4	1.13	1.55	1.57	1.3	0.55	0.67	0.79
Total	Mean	17.2	-0.12	-0.15	-0.09	17.7	0.39	-0.13	0.61
	Median	16.9	-0.11	-0.06	-0.02	17.5	0.38	-0.15	0.50
	SD	2.3	1.16	1.59	1.64	1.7	0.91	1.08	0.94

No significant differences for any variable between the three feeding categories (ANOVA, $p<0.05$), BMI = Body Mass Index, SDS = Standard Division Score

DISCUSSION

In both Saudi Arabia and the UK, problems related to energy intake/status and iron intake/status remain fairly common in early childhood[16-21] and the present study was intended to test whether differences in PFS were associated with differences in nutritional mediators of poor nutritional outcome such as inadequate energy intake. The present study found no evidence that parental feeding style was associated with nutritional outcomes as defined by energy and iron intake, height for age, or body mass index. We also found broadly similar prevalence of the three feeding categories between the two samples (form Saudi Arabia and the UK), through the small size of Edinburgh sample indicates a need for cautious interpretation and further research.

Previous research in this area has suggested a possible role for PFS in mediating adverse nutritional outcome in early childhood[22], but has also emphasised the need for more research and the complexity of the problem. It is clear that there are wide varieties in PFS both within and between nations[12,23]. In the present study, the three groups characterised as Controlling, Responsive and Laissez-faire feeders, probably represented real differences in parental behaviour, but were well matched for other potential confounding variables such as demographics, or age and sex of the child. Our tentative conclusion is that the effects of PFS at least in these samples were relatively small. Randomised controlled trials (RCTs) might be the ideal method for determining the impact of PFS on childhood under and overnutrition[23], but other study designs (as in the present study) must be used to establish and refine the hypotheses and to collect basic information on the parental feeding styles within populations. At present, there is a death of such information[12,13] and present study represents the first attempt to investigate the problem in young children in the UK and Saudi Arabia.

A brief discussion of the strength and weakness of the present study is appropriate. We used a simple questionnaire to establish/characterise PFS. This was not ideal, but no simple, validated, method exist for questionation of PFS and a number of different methods are in use[12,22-24]. In addition, there is no gold standard so

it is unclear how methods of assessment should be validated. The present study was cross-sectional and for the Edinburgh sample at least, fairly small. Present study was larger than some others in this area[9,24-26], but further research with larger samples is required. The main strength of the present study were: the relatively large sample from Riyadh; the broadly representative nature of the sample (a good deal of previous research has focused on small, highly selected, samples); the use of the most accurate or the available methods for assessment of food and nutrient intake (weighed intake method[27]); use of valid and objective measures of growth and nutritional status (height, weight and BMI SD scores).

In conclusion, we present for the first time, measurements of PFS in contemporary children from Saudi Arabia and the UK. These indicate marked differences in PFS between families, but no evidence for any impact of PFS on nutrient intake, nutritional status, or growth.

REFERENCES

1. Dettwyler, K.A., 1992. Infant feeding practices and growth. Ann. Rev. Anthropol., 21: 171-204.
2. Birch, L.L. and J.A. Fisher, 1995. Appetite and eating behavior in children. Pediatr. Clin. North Am., 42: 931-953.
3. Anonymous, 1995. The World Health Oraganization's infant-feeding recommendations. Bull. WHO., 73: 165-174.
4. Brown, K.H. and S. Sharma, 1999. Complementary feeding of infants and young children. Indian Pediatr., 36: 547-554.
5. Nik-Khooy, H.S., 2002. Eating patterns and prevalence of obesity among Arabs living in Ahwaz, Iran. Saudi Med. J., 23: 111-112.
6. Fisher, J.O. and L.L. Birch, 1999. Restricting access to foods and children's eating. Appetite, 32: 405-419.
7. Agras, S., L. Hammer and F. McNicholas, 1999. A prospective study of the influence of eating-disordered mothers on their children. Intl. J. Eat. Disord., 25: 253-262.
8. Wright, P., 1988. Learning experiences in feeding behaviour during infancy. J. Psychosom. Res., 32: 613-619.
9. Spruijt-Metz, D., C.H. Lindquist, L.L. Birch, J.O. Fisher and M.I. Goran, 2002. Relation between mothers' child-feeding practices and children's adiposity. Am. J. Clin. Nutr., 75: 581-586.
10. Wright, P., 1981. Development of feeding behaviour in early infancy: Implications for obesity. Health Bull., 39: 197-205.
11. Rudolph, C.D. and D.T. Link, 2002. Feeding disorders in infants and children. Pediatr. Clin. North Am., 49: 97-112.
12. Ruel, M.T. and P. Menon, 2002. Child feeding practices are associated with child nutritional status in Latin America: Innovative uses of the demographic and health surveys. J. Nutr., 132: 1180-1187.
13. Engle, P.L., M. Bentley and G. Pelto, 2000. The role of care in nutrition programmes: Current research and a research agenda. Proc. Nutr. Soc., 59: 25-35.
14. Margaret, E.C. and W.A. Van Staveren, 1988. Manual on Methodology for Food Consumption Studies. London: Oxford University Press, pp: 1-259
15. Reilly, J.J., C. Montgomery, D. Jackson, J. MacRitchie and J. Armstrong, 2001. Energy intake by multiple pass 24 h recall and total energy expenditure: A comparison in a representative sample of 3-4-year-olds. Br. J. Nutr., 86: 601-605.
16. Al-Othman, A.M., N.R. Belton and T.R. Kirk, 1998. Iron intake in young children in relation to body weight and energy intake. Proc. Nutr. Soc., 58: 41A.
17. Thane, C.W., C.M. Walmsley, C.J. Bates, A. Prentice and T.J. Cole, 2000. Risk factors for poor iron status in British toddlers: Further analysis of data from the National Diet and Nutrition Survey of children aged 1.5-4.5 years. Public Health Nutr., 3: 433-440.
18. Lawson, M.S., M. Thomas and A. Hardiman, 1998. Iron status of Asian children aged 2 years living in England. Arch. Dis. Child., 78: 420-426.
19. Duggan, M.B. and L. Harbottle, 1996. The growth and nutritional status of healthy Asian children aged 4-40 months living in Sheffield. Br. J. Nutr., 76: 183-197.
20. Emond, A.M., N. Hawkins, C. Pennock and J. Golding, 1996. Haemoglobin and ferritin concentrations in infants at 8 months of age. Arch. Dis. Child., 74: 36-39.
21. Whitehead, R.G., 1995. Lowered energy intake and dietary macronutrient balance: Potential consequences for micronutrient status. Nutr. Rev., 53: S2-S8.
22. Birch, L.L. and J.A. Fisher, 1998. Development of eating behaviors among children and adolescents. Pediatrics, 101: 539-549.
23. Engle, P.L., G. Pelto and P. Bentley, 2000. Care for nutrition and development. J. Ind. Med. Assoc., 98: 530-535.
24. Birch, L.L. and J.O. Fisher, 2000. Mothers' child-feeding practices influence daughters' eating and weight. Am. J. Clin. Nutr., 71: 1054-1061.

25. Carper, J.L., F.J. Orlet and L.L. Birch, 2000. Young girls' emerging dietary restraint and disinhibition are related to parental control in child feeding. Appetite, 35: 121-129.
26. Johnson, S.L. and L.L. Birch, 1994. Parents' and children's adiposity and eating style. Pediatrics, 94: 653-661.
27. Hill, R.J. and P.S. Davies, 2001. The validity of self-reported energy intake as determined using the doubly labelled water technique. Br. J. Nutr., 85: 415-430.