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PROCEEDINGS OF THE NUTRITION SOCIETY

ABSTRACTS OF COMMUNICATIONS

A Scientific Meeting was held at the University of Nottingham on Monday–Thursday, 12–15 July 1993, when the following papers were presented. These papers arrived too late for inclusion in Volume 52 no. 3.

Energy balance and physical activity in primary school children. By J.A. PAYNE[1], A.C. PAYNE[2] and N.R. BELTON[1], [1]Department of Child Life and Health, University of Edinburgh, Edinburgh EH9 1UW and [2]Department of Physiotherapy, Queen Margaret College, Edinburgh EH12 8TS

A previous study of the relationship between diet and growth in 153 pre-school children, aged 2-5 years, found a weak relationship between energy intake and body mass, suggesting that energy balance may be closely related to level of physical activity (Payne & Belton, 1992). The present study examines mean daily energy intake (EI), total daily energy expenditure (TDEE) and patterns of physical activity in a sub-set of twenty-four children (ten boys, fourteen girls) from our previous study, now aged 5-8 years.

EI was assessed by the 7d weighed intake method (Payne & Belton, 1992) and analysed using COMP-EAT 4 (Lifeline Nutritional Services Ltd., London), with the addition of parents recipes and manufacturers nutritional data. TDEE was assessed by the minute-by-minute heart-rate method (HR method; Spurr et al.1988), adapted for use with young children. This involves a calibration procedure to relate an individual's heart-rate (fHR) to O_2 uptake (VO_2), thus energy expenditure, in three resting positions (lying, sitting, standing) and at three levels of physical activity on a modified bicycle ergometer. VO_2 was estimated using a ventilated hood system (Deltatrac Metabolic Monitor; Datex, Finland). Minute-by-Minute fHR was measured during calibration and during the waking hours of the day (usually 3 or 4d, n 18) using Polar Sports Testers (PE4000; Polar Electro, Finland). A critical heart-rate (CHR) differentiating periods of rest from activity was defined as the mid-point between the mean fHR standing and mean fHR at the lowest level of activity. Energy expenditure below CHR was determined from the average resting energy expenditure and above CHR from the regression of fHR with energy expenditure (from VO_2) during activity. Overnight energy expenditure was estimated from standard equations for basal metabolic rate (Schofield, 1985).

A highly significant relationship was found between EI and TDEE (r 0.78; $P < 0.001$ (Pearson correlation)).

	n	Mean	SD	Minimum	Maximum
EI (kJ/d	24	6623	1146	5443	11196
TDEE (kJ/d)	24	6899	1117	5335	10405
BMR:TDEE	24	0.6	0.07	0.50	0.74

The HR method also allows an examination of patterns of physical activity. Concern has been expressed about the duration of fHR episodes above 140 beats/min (bpm; 70% maximum fHR) and the implications that this may have for cardiopulmonary fitness (Armstrong et al. 1990). The present study found considerable variation in time spent at high levels of activity above 140 bpm (HPA). No significant correlation was found between TDEE and HPA. However, a weak positive relationship was found between CHR and HPA (r 0.37; $P=0.008$) and a significant negative relationship between CHR and TDEE (r -0.40; $P=0.05$). Furthermore, no relationship was found between oxygen pulse (VO_2/beat at CHR and 140 bpm) and HPA. These results suggest that HPA associated with the maintenance of cardiopulmonary fitness in adults may not be an ideal measure of cardiopulmonary fitness in young children.

Armstrong, N., Balding, J., Gentle, P. and Kirkby, B. (1990) British Medical Journal **301**, 203-205.
Payne, J.A. & Belton, N.R. (1992) Journal of Human Nutrition and Dietetics **5**, 287-298.
Schofield, W.N. (1985) Human Nutrition: Clinical Nutrition **39c**, Suppl. 1., 5-41
Spurr, G.B., Prentice, A.M., Murgatroyd, P.R., Goldberg, G.R., Reina, J.C. and Christman, N.T. (1988) American Journal of Clinical Nutrition **48**, 552-229

Breakfast trends emerging from the Irish National Nutrition Survey. By J.SOMMERVILLE and M.O'REGAN. Department of Statistics, University of Dublin, Trinity College, Dublin 2, Republic of Ireland.

Considerable research has been carried out in the past 10 years to examine the effect which eating breakfast has on nutritional status. Breakfast can play a vital role in supplying key nutrients which may not be compensated for at other meals if breakfast is skipped (Steele et al 1952).

In the present study the breakfast habits of the Irish population were extracted from the Irish National Nutrition Survey of 1990.People (n=1213) from 8-80 years were surveyed using a 7d diet history in conjunction with a photographic atlas (Lee & Cunningham,1990).The population data were categorized as breakfast skippers, cereal eaters or non-cereal eaters and the nutritional status of each group was examined (Sommerville & O'Reagan,1993). For the Purpose of this study the cereal-eating group was sub-divided into four fibre categories, high-fibre, medium-fibre, and low-fibre cereal eaters. The fourth group, mixed fibre, ate several types of cereal.

Of the breakfast cereal eating population 3% eat high-fibre cereals, 28% medium-fibre cereals,12% mixed-fibre cereals and the majority (60%) who eat cereals eat a low-fibre cereal. Statistical comparisons were made between the medium and low-fibre groups for each age category.The comparisons which achieved statistical significance are shown below.

Sex	Females				Males			
Age	<18 Years		>18 Years		<18 Years		<18 Years	
Cereal Fibre	Med	Low	Med	Low	Med	Low	Med	Low
n	51	159	64	103	55	151	37	92
Energy(kJ)	8786	8786	7949	7949	11715	1129	12552	11297
Fibre(g)	19a	15	20	16	25a	17	25	17
Fe	13	12	12a	10	15	15	16	14

a = P<0.001 (A significant difference between the medium and low-fibre cereal groups).

Fibre values recorded are Southgate values. In females <18 years daily fibre intakes are low,particularly in females consuming low-fibre cereals,who consume only half the recommended intake of 30 g fibre daily.In females >18 years in addition to a poor fibre intake in the low-fibre cereal group, the Fe intake is significantly lower than that of the medium-fibre group. Similarly, with males of all ages, a significant difference was recorded between the low-fibre cereal group (P<0.001)and the medium-fibre cereal group for daily fibre intake.

In conclusion, the majority of Irish people who eat cereal at breakfast eat a low-fibre cereal.Women consuming low-fibre cereals have a lower daily Fe intake than those consuming medium-fibre cereals.Males and females in all age groups who eat low fibre cereals at breakfast have a low total dietary fibre intake.

Chao,E. & Smit Vanderkooy,P.(1989). Journal of the Canadian Dietetic Association 50, 225-228.

Lee,P. & Cunningham,K.(1990). National Nutrition Survey. Irish Nutrition & Dietitic Institute, Dublin, Republic of Ireland.

Morgan,K.J. Zabik, ME. & Stampley,GL.(1986). Journal of the American College of Nutrition 5, 551-563.

Sommerville,J. & O'Reagan, M.(1993). Journal of Human Nutrition and Dietetics. 6,223 - 228.

Steele, BF. Clayton, MM.& Tucker, RE.(1952). Journal of the American Dietetic Association 28, 1054-1057

Assessment of haematological status in early pregnancy. By E. A. CAHILL[1], S. F. DALY[2], P. M. MATHIAS[1] and M. J. TURNER[2], [1]Dublin Institute of Technology , Kevin Street and [2]Coombe Lying-In Hospital , Dublin , Republic of Ireland

Recent dietary surveys have identified inadequate intakes of iron and folate among Irish women. Recommendations have been made to establish the true incidence of clinical deficiency particularly with respect to Fe by using biochemical markers of nutritional status. At present there are no available data on the dietary habits and nutrient intakes of pregnant women in Ireland.

In the present study eighty women were recruited at their booking visit (7 - 15 weeks gestation) when attending for routine ante natal care at the Coombe Lying-In Hospital. 50 % were primiparous and 50 % were multiparous. The mean age of subjects was 27.2 (range 18-40) years and all socio-economic groups were represented. Maternal food intake was assessed using the dietary history method and food atlas to estimate portion size as used in the National Nutrition Survey in 1990.

Haematological status was assessed by measurement of haemoglobin (Hb), mean cell volume, serum Fe, total iron binding capacity, serum ferritin and erythrocyte folate. The nutrient content of food intakes was determined using Dietplan 5 computer program based on the 5th edition of McCance & Widdowson's The composition of Foods. This database was modified to take account of Irish bread composition (Downey, 1988) and some local dishes were also added to the database.

The mean Hb was 12.2 g/dl (9.6-14 g/dl). The mean serum ferritin was 34.5 ug/l (4-123 ug/l). Using a Hb value of < 10.5 g/dl to diagnose anaemia during pregnancy, 6.25 % of subjects were Fe deficient. Based on serum ferritin of < 12 ug/l, 23.75 % were Fe deficient. Serum ferritin level is required to document Fe depletion and deficiency during pregnancy (Kelly, 1977). The mean erythrocyte folate was 371 ug/l (132-650 ug/l); 2.5 % had levels below 150 ug/l indicating deficiency.

The mean daily energy intake was 9.2 MJ (5.8-14 MJ) with a dietary Fe intake of 11.2 mg (5.9-17.5 mg). This is equivalent to 8.21 mg/10MJ. 86.25 % of subjects were found to have intakes below the Irish Recommended Dietary Allowance (RDA) of 14mg. The UK Reference Nutrient Intake (RNI) is 14.8 mg. Mean folate intake was 251 ug/d (130-526 ug) with 85 % of subjects having intakes below the Irish RDA of 300 ug. A recent study has shown accelerated folate catabolism in pregnancy and has suggested that the recently published RNI of 300 ug/d would appear to be too low.(Mc Partlin et al, 1993).

These results indicate that in this group of women attending a Dublin Maternity Hospital, dietary intakes of Fe and folate are below the current RDA's for both the pregnant and non-pregnant state. Biochemical assessment of Fe status confirm a high prevalence (23.75 %) of clinical deficiency. Many Irish women may therefore be commencing their pregnancy with sub optimal nutritional stores and given the increased nutrient demands of pregnancy are potentially a nutritionally vulnerable group.

This work is part of a larger study on maternal nutrition in pregnancy.

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Mc Partlin, J., Halligan, A., Scott, J.M., Darling, M . & Weir, D.G. (1993) Lancet, 341:148-49.
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