CHILD GROWTH FOUNDATION SEMINAR ON THE EPIDEMIC OF OBESITY IN CHILDHOOD – RCP LONDON, JULY 29TH AND 30TH 2000.

Main aims of seminar To ascertain the facts underlying the reported epidemic of obesity in childhood and review its significance; to determine whether there is evidence to support screening or monitoring of all children to identify obesity; and to establish whether there are any public health measures which should be implemented or supported by the health professions and, specifically, by the relevant working parties.

Background

It is well established that adult obesity is a major problem across the world. Several lines of evidence suggest a significant increase in the body mass index (BMI) of children in the developed world over the past decade, to the extent that the term "epidemic" of obesity is increasingly being used. Some evidence suggests that a social class gradient may be emerging with obesity being more common in lower social groups.

Until recently, short stature was the main focus of growth monitoring in child health but it is becoming obvious that obesity is much more common than pathological causes of short stature and that the social and emotional impact of obesity in terms of childhood unhappiness is greater than that of short stature. This observation has prompted a re-examination of the aims of growth monitoring in paediatrics.

There are in addition significant adverse metabolic consequences of obesity in childhood. Children are now presenting with type II diabetes associated with obesity. This is distinct from the familiar type 1 diabetes in children and the rare dominantly inherited maturity onset diabetes of the young (MODY) which begins in childhood.

A significant number of obese children will become obese adults. It is difficult to determine exactly what proportion, since studies differ in age of entry and length of follow-up, and definitions of obesity also differ. Furthermore the recent dramatic changes in the epidemiology of obesity suggest that past evidence may not now be relevant. A significant proportion (between one third and two thirds) of obese children will go on to be obese adults. The probability of tracking (obese child becoming obese adult) increases with the age of the child, the degree of overweight and having obese parent(s). One third of obese adults were obese as children. The earlier onset of obesity increases the risk of adverse effects.

Obesity in adult life is associated with adverse metabolic, social and emotional effects. In adults, the so called 'metabolic syndrome' is linked to insulin resistance and is strongly associated with cardiovascular mortality. Insulin resistance is associated with visceral (intra-abdominal) fat rather than with subcutaneous fat. The Bogalusa Heart Study showed that very overweight children were more likely to have elevated blood pressure and dyslipidaemia. There is evidence from the *EarlyBird* study that a statistically highly significant relationship between BMI and insulin resistance already exists in pre-school children of four years old

Obesity in adult life is associated with:

- Hyperinsulinaemia (which drives the metabolic syndrome)
- hyperlipidemia
- type 2 diabetes
- child/adult social status
- adult obesity
- increased cardiovascular mortality
- arthritis – low back pain – and other mechanical disorders
- type 2 diabetes as adult
- certain types of cancer – uterine and breast cancers and colo rectal cancer
- asthma (associated)
- gall stones
- sleep apnoea
- female infertility – this is associated with obesity and polycystic ovaries as part of metabolic syndrome. Weight reduction helps these women to conceive.

Addressing the problem of obesity in childhood has the potential to make a significant impact on the prevalence of obesity in adult life and its adverse consequences.

Aetiology

1. Obesity results from an interaction of genes and health behaviours around food intake and levels of physical activity. Weight gain results when energy intake exceeds energy utilisation. The relative importance of changes in physical activity and changes in dietary habits in the genesis of the population trend in obesity is not known, but both decreased physical activity and diets poor in fruit and vegetables and high fat foods between them lead to an increased risk of obesity.

2. Genes are likely to exert an important influence on variation within the population distribution of fatness, but secular changes in the population distribution itself must be determined by environmental factors. The concept of the 'thrifty' genotype may help to explain how genes which may have emerged selectively during the course of evolution could both code for insulin resistance as a survival trait in times of famine and adversely maximise the efficiency of fat deposition in times of plenty[1].

3. There is a very small number of grossly obese children with specific syndromes and single gene causes of obesity.

4. Health behaviours can only be understood within a social context. For individuals, this social context is profoundly influenced by their socio-economic position.

5. There has been a general shift towards lower levels of physical activity in school, work and leisure in adults and children. This reflects not only a decrease in

[1] There is evidence for both the 'thrifty genotype' and the 'thrifty phenotype' hypotheses, supported respectively by the geneticists and the environmentalists. (Neel JV. Diabetes mellitus: a 'thrifty' genotype rendered detrimental by 'progress'? Am J Hum Genet 1962; 14: 353-62)

vigorous activity but also an increase in sedentary behaviour. At an individual level the relationship between sedentary behaviour and obesity is particularly clear. Computer games and TV viewing have been associated with a very low metabolic rate, below basal in some cases, presumably due to the deep relaxation induced by these activities.

6. There is little clear evidence of an increase in energy intake across our society. What evidence there is seems to suggest a *decrease* in food energy intake, but there are problems in the methodologies of data collection on the subject with 'under reporting' of food intake associated with increase snacking/grazing food intake behaviours etc. Energy intake may not have declined sufficiently to meet the needs of a sedentary lifestyle.

7. There has been an increase in the consumption of more high fat foods, possibly linked to the enormous rise in pre-prepared foods eaten. The recent NDNS of young people showed that some subgroups of young people eat a rather poor diet containing too much saturated fat and too little fruit and vegetables. These factors have not yet been analysed with respect to weight status.

Measuring and tracking obesity

The cheapest, easiest and most widely used measurement is the body mass index or BMI, which is given by mass in kg/height in metres squared. This index is used in the majority of reports. BMI is an independent risk factor for adult morbidity and there is evidence of an association between child BMI and adolescent morbidity.

The suggested British BMI reference cut-offs are: BMI equal or greater than 91st centile – overweight; BMI equal to or greater than 98th – obese. These measures are derived from the 1990 nine-centile charts and since a fixed baseline is needed from which to monitor changes, these figures should be used for the foreseeable future irrespective of changing trends in growth and weight. The International Task Force on Obesity pooled data from six growth studies and derived cut off points linked to the adult cut offs of 25 and 30 kg/m2 at age 18.

Visceral fat is thought to be more important than subcutaneous fat in terms of adverse outcomes. There is no readily available means of measuring either total fat or these two components outside the research setting. The BMI correlates with total body fat but does not distinguish between muscle and fat. It is possible that in less fit children muscle mass is replaced by fat mass. Body proportions affect BMI.

Over the short term, weight varies more than height. Taking into account the imprecision in measuring height and variability in weight, the BMI would also vary over a series of short term measurements. However, the actual extent of short term variability in childhood does not appear to be known and no data were found regarding the extent to which estimates of BMI might change over successive measurements within a short time period, if the measurements are collected as part of routine care by a range of staff. Over longer periods in childhood, successive height measurements show a high correlation but BMI less so.

Another index of obesity could be useful alongside BMI. Skinfold thicknesses, mid arm circumference or waist measurement might be helpful. They would have to be applied by a large number of staff but the inter-observer error is said to be acceptable for these measures. Their relevance and use in routine child health care needs further research. The age of adiposity rebound was not thought to be useful for routine work.

Screening

Screening is not about responding to concerned parents or children, or about monitoring children already identified as having a problem or a high risk. For these children, the best possible clinical care is assumed, notwithstanding the difficulty of managing the condition. There is a suggestion that there is a lack of good treatment facilities for obese children in many areas and that many individual clinicians may be less than whole-hearted in their approach.

Screening means the application of a simple procedure or test to a population of people who have not presented themselves for medical care, to separate out a group with a high probability of having or developing a disease from those with a low probability. A problem with most screening programmes is that either the cut off will be so stringent that only children with visible and obvious problems will be identified, or so low that many children without any serious problem will unnecessarily be referred. The criteria currently applied to the appraisal of current and proposed new screening programmes are set out in the appendix.

In the context of obesity, screening would mean the application of some simple measure to identify children who are either overweight / obese now, or at risk of becoming so in the future. Ideally it would also identify those whose obesity was likely to present the greatest risk to health.

The BMI charts could be used to identify obese or overweight children and the ITFO cut offs would be acceptable. The three main reasons for rejecting this approach at present were as follows:

1. The most important reason was that screening criteria include availability of a proven intervention which justifies early case finding. While there is no reason for nihilism, no one could claim at present that there are reliably effective treatments for obesity. Even highly motivated children have great difficulty in losing weight and maintenance of current weight is often the more realistic target. There is little reason to think that good treatment outcomes could be obtained with less motivated children who had not presented clinically and would therefore be the targets of screening.

2. If screening were to be undertaken by a single BMI estimation, it would be important to determine the optimum age for doing this. Conversely, if more than one measurement is to be done, it would be important to decide what degree of BMI centile crossing would be regarded as significant. The parallel experience with the height monitoring debate shows that empirical data are needed to answer this question. If data about skinfold thickness, waist circumference or parental obesity are to be added in to refine the process, then a simple method of using these data must be devised and tested.

3. Thirdly, the current screening criteria require that other approaches be considered, and there was strong support for public health approaches to obesity rather than individual population screening.

Interventions

1. Interventions could be considered on four levels:

   i) The treatment of individuals who identify themselves as obese and request help.

   ii) Seeking individuals who are at risk, perhaps those who are overweight rather than obese, and offering interventions. This might simply be a case finding exercise or alternatively it could include a formal screening process.

   iii) Offering interventions to whole communities (e.g. schools) which attempt to change the health behaviours of individuals within those communities. This might be addressed by interventions which actually aim at the individual or by changing local circumstances - perhaps by providing cheap vegetables in poor areas. An example of this latter approach was a partnership between supermarkets and public health physicians in Spain, which lead to supermarkets using healthy foods as "loss leaders" in poorer areas.

   iv) Attempting to make structural changes in society which may affect the social context in which health behaviours develop. This could include a wide range of approaches as listed below.

Intervention research in obesity This is a remarkably poorly researched area with few high quality studies of interventions at either an individual or a community level. Two updated systematic reviews of the evidence will appear in the next issue of the Cochrane library.

(i) For *individual obese children* there is some evidence about which interventions are likely to be more effective; particularly those with a component of attempts to reduce sedentary behaviour. The studies are small, many are of poor methodological quality and few are long term. This has obvious implications both for validity and for applicability (because small studies, even if valid, are likely to be conducted in very particular sub-sections of the population and their results may well not be easily applied to other groups.)

This does not justify an attitude of therapeutic nihilism in the management of individual children. In the clinical situation it is appropriate to use the available evidence to design interventions with the best possible chance of working. Two important components in interventions are involvement of the whole family and all caregivers, and behavioural change that includes both physical activity and healthy eating. Physical activity does not just mean sport but also includes reducing sedentary

pursuits and using the opportunities for activity of all daily activities (such as going up stairs). The use of drugs in children is a matter for specialist advice at present.

Identification of obese parents as a family-based preventive measure in the primary care setting might be worthwhile but there is no evidence at present.

(ii) Screening was not supported for the reasons set out above. Data on the use of the various available measures and on how screening might perform and improve health outcomes would be needed to reverse this view.

(iii) At a community level the evidence is incomplete. There are some promising sounding interventions for schools and for groups of school age children. Healthy Schools initiatives which address many aspects of everyday life rather than targeting just one or two issues look promising but their impact in obesity is yet to be established. Initiatives reviewed included summer camps; school programmes addressing healthy eating, physical activity and TV viewing; the Healthy Schools programme; the Liverpool approach which includes many of these elements. A review of published studies suggests modest but measurable benefits. Generalising these findings might be undertaken through the DfE and HDA.

Adverse consequences are particularly important where, as a result of the poor methodological quality of the evidence, we remain uncertain about the likelihood of positive effects. Public health interventions are attractive because of the potential for major benefits but for the same reason they can cause significant harms. (The classic example of harm is the public health advice on prone sleeping position to prevent cot death). There is concern about an increase in anorexia and other eating disorders as a result of increased focus on obesity. In the USA the rise in obesity mirrors the rise in anorexia but this may reflect the increasing importance to individuals of having an attractive body in the contemporary scene, rather than being a direct result of anti-obesity initiatives. These concerns are not an excuse for nihilism, merely a requirement for very careful weighing and monitoring of potential consequences.

(iv) Political and societal changes Obesity is associated with other adverse outcomes which are themselves the target of various public health campaigns and voluntary sector schemes, aimed for example at cardiovascular disease. Any actions aimed at obesity will need to ensure that they work with these other initiatives. Possible routes include: better labelling of food (especially with fat content, since high fat is a major contributor to obesity); changes in approach to food packaging or advertising; more education on healthy eating associated with more readily available healthy foods in communities and schools; easier access to physical activity including sports, cycle paths, safer roads so that children can play outside (slower speed limits), more play areas, cheaper access to sports facilities.

Monitoring the epidemic and the impact of any interventions

The BMI is the obvious way to monitor the situation over time. Detailed high quality data are collected in a number of surveys and individual research studies. However, it is currently agreed that the height and weight of all children should be measured at school entry, at age 5. This offers an opportunity to calculate the BMI routinely on all children and to monitor changes over time. This recommendation was agreed.

However, the BMI should not currently be regarded as a screening tool for the individual child for the reasons set out above. The temptation to do this could be avoided by calculating the BMI only when data were entered on computer, rather than with the child present. Links to the postcode would also allow easy determination of any social class trend.

It is not clear that the age of 5 would in other respects be the optimum age to assess BMI either clinically or for epidemiological purposes; but in the absence of any compelling case no alternative proposals were considered.

National studies and surveys provide data on large samples of children that monitor trends for the population as a whole. A second measurement for *all* children might however be justified a few years later, at age 8 or 11 for example, if the measurements could be linked. The benefits would include the ability to assess the impact of healthy schools programmes and other public health campaigns. Again, currently this would not be a clinical case-finding exercise. This is not a recommendation for routine practice, but a proposal for possible research and development.

SUMMARY Obesity is now a major health problem in childhood. Better clinical services for obese children, monitoring of the progress of the epidemic and public health approaches such as healthy schools are realistic goals. Advocacy for more far-reaching social and legislative changes is also needed, but any such campaign will need careful planning and substantial funding.

ACTIONS

1. Since one of the issues considered was the question of identifying obesity by measuring all children routinely, the data and opinions from this seminar may be presented to the children's sub-group of the National Screening Committee. **Action DE**
2. The next edition of "Health for all Children" will discuss obesity and will set out the evidence summarised here. It will stress the importance of addressing the problem but will not recommend formal screening. **Action DH**
3. The evidence summarised here will be forwarded to Professor Brent Taylor of the Child Health Informatics Consortium suggesting that BMI at school entry should be added to the core data set for children. **Action DH**
4. More work is needed on both the value and the interpretation of subsequent BMI measurements since they would need additional data collection to that already agreed; the additional cost would also need to be assessed. **Action DE and NSC**
5. A further discussion should be convened by RCPCH to consider the options for intervention and advocacy at public health level. **Action DH, DE, CGF and RCPCH**
6. Discussion between Linda Voss, Jean Mulligan, Tim Cole, Peter Betts, and DH on various issues of BMI **Action DH**

Summary prepared by David Hall on 11.9.00, with extensive use of material prepared by Stuart Logan and Aidan Macfarlane, additional comments / commentary from David Elliman, P Betts, Tim Cole, T Wilkin and L Voss and other seminar members. Revised on 06.01.01 after feedback from members of seminar.

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