REVIEW ARTICLE

Childhood obesity and Overweight in Sudan: Time to act.

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Obesity and overweight are established risk factors for adult cardiovascular disease (1). Worldwide the snowballing epidemic of childhood and adolescent obesity is being reported and is expected to have an adverse future effect on adult morbidity and mortality not to mention the negative impact on adult cardiology services (2,3). Even in underdeveloped countries obesity is currently the most common nutritional problem among children (4). Sudan is not an exception and many reports confirm increasing obesity in Sudanese children and adolescents (5). In the face of an approaching epidemic of childhood obesity, the medical and health professionals, and indeed the whole community, face the grave challenge of how to prevent today's normal weight children becoming tomorrow's obese adults. The purpose of this review is to discuss childhood and adolescent obesity, its complex relation to adult obesity and the broad lines of obesity prevention in the young. The review is also meant to serve as a wakeup call for all to give the problem of pre-adulthood obesity its due importance.

Definition of obesity and overweight:

The body mass index (BMI, defined as the body weight in kilograms divided by the body height in meters squared) is used to define normal weight, overweight and obese body status. In adults the normal BMI = 18-25, >25-<30 is overweight and 30 or more is obese. The same classification is applicable in late adolescence. However in early and late childhood, because the BMI keeps changing with age, percentiles for body weight and height are used to define normal weight (>5th-<85th percentile), overweight (85th-95th percentile) and obese (>95th percentile) (6).

The BMI in adults is strongly determined by the BMI in earlier life stages. Through a process known as obesity tracking (i.e. persistence of obesity), children and adolescents who are overweight or obese are more likely than not to maintain similar body weight status as adults (7). A child at the 50th percentile for the BMI has a predicted adult BMI of 24 compared to a child with a BMI at the 90th percentile whose adult BMI is predicted to be in the 90th percentile. Fifty percent of overweight children grow into obese adults (8 ,9).

Risk factors for pre-adulthood obesity

It is only logical to think of adult BMI as being the cumulative outcome of body changes that occurred in early life. Certain risk factors in prenatal life, infancy, childhood and adolescence are known to be very important in causing overweight or obesity in children and adults. Prenatally, maternal smoking during pregnancy is associated with increased obesity risk at 7 years of age (10). Deviations from the normal birth weight in either way carry the

risk of future increased BMI and cardiovascular disease. Increased birth weight is a risk factor for obesity and an important determinant of the BMI in later life (11). Babies born with low birth weight who later attain high BMI are also at risk of adult cardiovascular disease. During infancy rapid weight gain is also a risk factors for childhood obesity (12). On the other hand breast feeding by mothers who did not smoke during pregnancy was found to be protective against childhood and adolescent obesity (13). Among other childhood risk factors known to predispose to obesity is increased size of one parent; the risk is higher if both parents are obese (10). Reduced number of sleep hours (less than 10.5 hours) in children aged 30 months was found to be associated with obesity in later ages (10). Lack of physical activity during childhood as well as the number of hours spent watching television is both associated with the risk of childhood obesity (14). Physical inactivity and consumption of high calorie diets, particularly sugar sweetened drinks, are among the top ranking causes for childhood obesity (15). The odds ratio of becoming an obese child was reported to be increased 1.6 times for each additional can or glass of sugar sweetened drink consumed every day.

Cardiovascular complications of overweight and obesity:

The cardiovascular system is one of several body systems adversely affected by obesity and overweight. However, only the cardiovascular complications will be reviewed in this article.

Obese and overweight children and adolescents who continue to maintain high BMI in adulthood have a high risk for serious cardiovascular complications. Atherosclerosis and dyslipidemia, with high levels of triglycerides and low levels of high density lipoproteins as well as high low density lipoproteins, may first start in obese children and adolescents and then persist in adults causing significant cardiovascular morbidity and mortality (8,16) . It is noteworthy that atherosclerotic fatty streaks in the coronary arteries were reported in obese children as young as 15 years 17 and acute myocardial infarction and death were documented in children as young as 4 years of age with very high serum levels of low density lipoproteins due to homozygous familial hypercholesterolemia (17).

Other important obesity-related cardiovascular complications in adults that may have their roots during childhood and adolescence, include hypertension, increased left ventricular mass, left ventricular hypertrophy and the metabolic syndrome (18,19,20,21)

Type 2 diabetes mellitus, previously mainly an adult disease, is becoming increasingly prevalent in obese children and adolescents. In the United States, largely because of the obesity epidemic, the numbers of adolescents with type 2 diabetes now far exceed those with type 1 (6). In adults type 2 diabetes mellitus is considered to carry the same risk as coronary artery disease (6). Its major adverse cardiovascular effects make it one of the most serious complications of the looming childhood obesity epidemic.

Suggested steps for prevention of childhood obesity and overweight:

Obesity and overweight are difficult to treat and prevent even in countries where

health and medical facilities are far better than those in Sudan. This should not be a reason for inactivity or for adopting a passive stand as one may notice in many underdeveloped countries where officials appear to be oblivious to the grave health consequences of pre-adulthood obesity and even the simplest prevention measures are not enforced. However, it is important to stress the fact that the obesity problem is far more complex than any potential solutions that health and medical professionals alone may offer. If the current generations of children and adolescents are to be saved from falling in the trap of obesity, making the whole community aware of the problem and its seriousness should be high in the agenda. The following suggestions for obesity prevention during childhood and adolescence are in line with the internationally accepted plans to fight obesity.

Dissemination of knowledge about the magnitude and the dangers of obesity are central to any preventive strategy. Health and medical professionals especially pediatricians, cardiologists, physicians and dietitians, should spear-head efforts to increase public and individual awareness of the serious health risks of obesity and how to fight it. Public media including radio and television lay press, the internet and mobile phones offer platforms to reach millions of parents as well as children throughout the country and deliver the necessary messages.

Children and adolescents are obvious primary targets for any prevention campaigns but parents and guardians as well as teaching staff and students in schools and universities are equally important to address. The food and drinks industries throughout the country have to play a positive role in promoting health foods and drinks rather than the current "junk" foods which are loaded with sugars, fats, salt and calories. Writing food constituents on food packages as well as the approximate calorie content of food menus not only help individual consumers to choose appropriate food items, but also helps spreading the concept of watching one's diet. Government officials, legislators and the press are indispensable in any planning to fight obesity in children and adolescents.

Health professionals should stress the fact that adult BMI is largely determined by a number of factors that start in early life and continue into adulthood. A normal BMI will be quite difficult to attain during adulthood unless positive interventions are made to keep body weight in the normal range during childhood and adolescence. Efforts for maintaining the appropriate body weight for height should start shortly after birth. Breast-feeding constitutes an early positive intervention and, as already mentioned, it is associated with a lower risk of obesity during childhood and adolescence. Unfortunately the percentage of mothers who sustain breast-feeding for the first 6 months after birth in Sudan appears to be falling (Ref). With thousands of working mothers in this country, promoting breast feeding is going to be an uphill battle in the presence of the current working environments and employment conditions which are not conducive to breast feeding.

After the age of 6 months genuine efforts must be made to set infants and young children along the right path regarding the

type of foods and drinks to be consumed as well as the portion size. Parents and guardians need to be enlightened on the importance of adopting the culture of homemade foods and a meal for the whole family, including children, while avoiding regular or frequent consumption of fast foods and sweetened drinks. Consumption of high fibre foods (daily 5 grams+ age in years) including wholemeal bread and 5 daily portions of vegetables and fruits should be the daily norm for the family. Unsweetened fruit juices should be used from early infancy through childhood rather than sweetened and high energy drinks. Nursery and school teachers and administrators must also be equally involved in the efforts to prevent obesity and overweight in infants and children. Under ideal circumstances, low fat milk can be used from 2 years of age to replace full cream milk. However in Sudan the milk industry is not yet providing low fat milk as an option to the consumer. That deficit needs to be corrected.

Regular weighing would obviously show if anti- obesity efforts are paying off. A gain of 1 kg per 2 cm gain in height in children aged 3-4 years is reported to predict normal weight at 8-9 years of age (73). The concept of linking children's gain in weight to that in height is physiologically sound and tends to preserve the ratio between the BMI determinants from an early life stage.

Stressing the importance of daily physical activity including school physical training and limiting the daily screen time to no more than 2 hours constitute the second leg for this plan. The habit of consuming high energy foods and sweetened drinks while watching television or mobile phone screens is potentially damaging to children's health and should be strongly discouraged.

Adolescents can be quite difficult to enrol in any anti-obesity plan. However being at the door steps of adulthood, they form a particularly important age group in the efforts to prevent adult obesity. Generally the same plans on diet and physical activity as for younger children apply. However special emphasis needs to be laid on co-operation by school teachers and on the food industry. The effect of peers on individual adolescent's eating habits should not be forgotten and peer groups need to be recruited for obesity prevention campaigns.

The obesity wave currently sweeping the world has helped to focus great attention on pre- adulthood environmental and genetic determinants of overweight and obesity which are now amongst the most researched topics in the literature. The lessons to be learned are, however, already clear. The various stages of life are a continuum and its final stages during adulthood, are strongly shaped by events that occur much earlier.

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