

Childhood obesity protocol: a Nigerian adaptation

OO Jarrett, AO Oluleye and AM Ogunbode

From time immemorial, protocols and algorithms have been useful tools designed to help in the clinical management of patients. These charts can be used for evaluation and diagnosis such as the one designed by World Health Organization (WHO) for early infant diagnosis of human immunodeficiency virus (HIV),¹ or for therapeutic reasons like the simple colourful chart for the management of paediatric choking developed by the Resuscitation Council of the United Kingdom.² Algorithms are also helpful in emergencies when life-saving decisions have to be made quickly. There are algorithms for Paediatric Basic and Advanced Life Support (PALS)³ and for the management of diabetic ketoacidosis (DKA), dehydration in gastroenteritis, neonatal jaundice, seizures, burns, bites and poisoning. In chronic conditions, algorithms are also important and after a systematic review in which key questions were used, it was documented that management pathways helped to improve the outcome of clinical management in children with chronic cough.⁴

In communicable diseases such as HIV, gastroenteritis or malaria, algorithms or protocols are useful. Manak et al,⁵ in 2015, carried out a multi-centre study in Nigeria among 3187 consenting volunteers and used the reference laboratory algorithm in addition to their own algorithm for their study on HIV-1/2 rapid test kits. Basse et al,⁶ in 2015, also proposed a national HIV testing algorithm which comprised three serial algorithms with four test kits as at 2007. Algorithms are simple to use flow charts that are also employed in the management of Non Communicable Diseases such as diabetes mellitus, hypertension and obesity.

Obesity is an important public health problem associated with risk of complications in childhood and increased morbidity and mortality throughout adult life.⁷⁻⁹ It is the most prevalent nutritional disorder among children and adolescents in the United States.¹⁰ Obesity is not only a problem of developed countries, but is also becoming

a potential health problem in developing countries.¹¹⁻¹² Obesity results from imbalance between caloric intake and expenditure, and there is also considerable evidence to suggest that weight is a heritable trait.^{13,14} Hence, the aetiology of obesity is multifactorial, reflecting the interplay between genetics, environmental influences and developmental processes.¹⁰

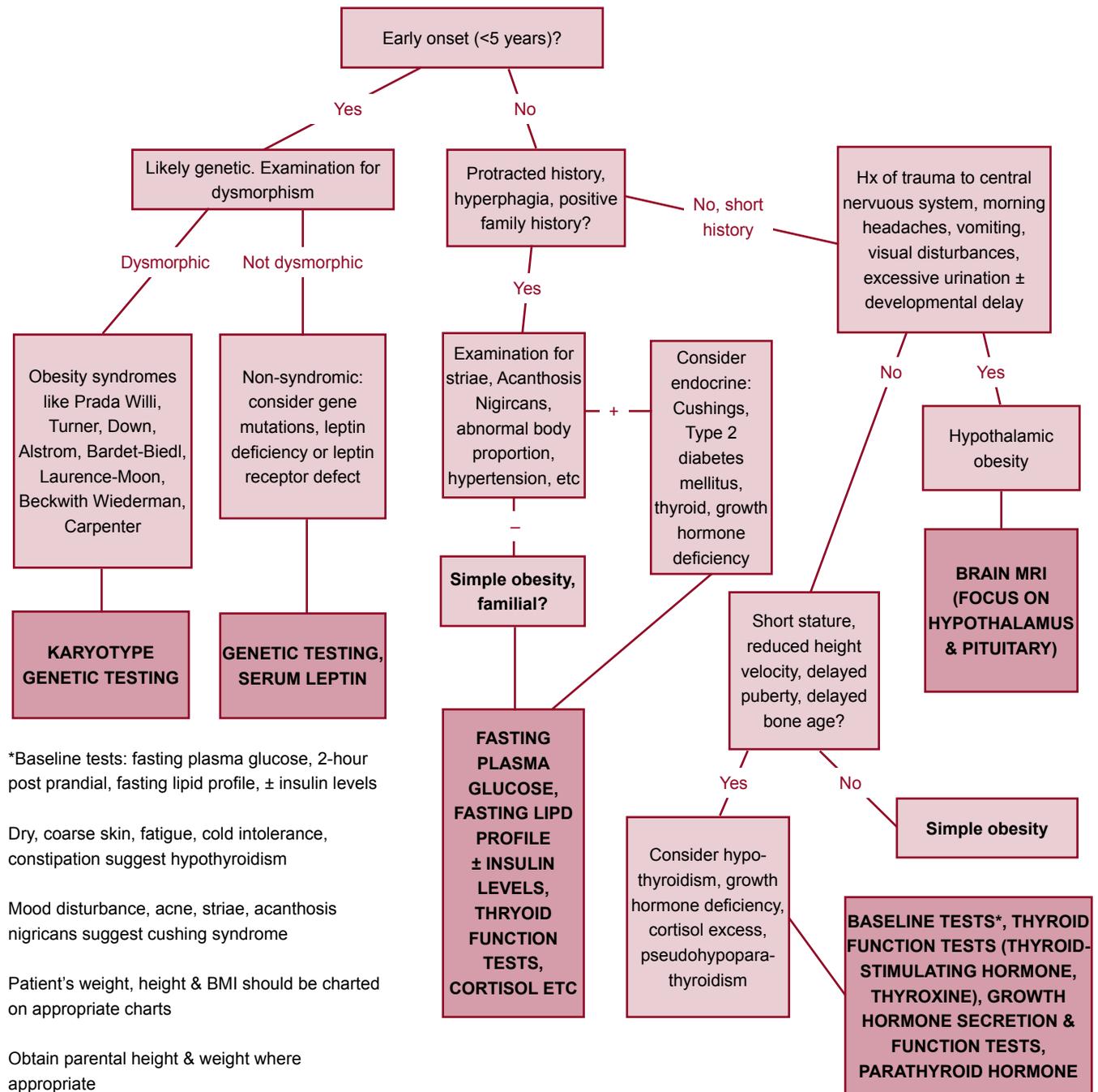
Childhood obesity and associated metabolic co-morbidities are a major global health concern.¹⁵ Complications of obesity develop during childhood and adolescence and persist into adulthood.^{7,8} In recent times, the number of cases of type 2 diabetes mellitus (T2DM) in children and adolescents has paralleled the increase in the worldwide prevalence of obesity.¹⁶ T2DM now represents 8 to 45% of newly diagnosed cases of diabetes mellitus in children and adolescents in the US.¹⁷ Ninety-five percent (95%) of these children are overweight and 83% obese according to the International Obesity task force guidelines.¹⁷ Overweight and obesity, which predisposes to a state of insulin resistance by reducing the post-prandial first-phase insulin response thus causing diabetes, ultimately, also increases the occurrence of other complications.¹⁶ Immediate co-morbidities include hypertension, hyperlipidaemia and non-alcoholic fatty liver disease.¹⁸ Other complications include cholecystitis, slipped epiphysis, obstructive sleep apnoea and polycystic ovarian syndrome.¹⁹

Evaluation of children or adolescents with obesity begins with review of the growth charts for weight, height and BMI trajectories, consideration of possible medical causes of obesity and detailed exploration of family eating, nutritional and activity patterns. A detailed history helps to discover co-morbid conditions, family history of obesity or obesity-related disorders; physical examination may give important pointers to aetiology and laboratory investigations would eliminate or confirm differential diagnoses. The evaluation often poses a difficult task to doctors and other health professionals bearing in mind the various possible etiologies. In this article we present a simple to follow Nigerian adaptation of an algorithm for the management of childhood obesity (see Figure 1).

The algorithm

An algorithm designed for doctors especially Paediatric Endocrinologists helps navigate their evaluation of children and adolescents with obesity, thereby limiting extensive investigations, streamlining aetiological

OO Jarrett OO (MBBS, FMCPaed, FESPE) and AO Oluleye (AO MBBS), Department of Paediatrics, University College Hospital, Ibadan, Nigeria. AM Ogunbode AM (MBBS, DTM&H (Liverpool), FWACP (Fam Med), MSc. Epid) Department of Family Medicine, University College Hospital, Ibadan, Nigeria.
Correspondence to: Dr Olumide Olatokunbo Jarrett.
Tel: +2348037203717.
Email: tokunbojarret@yahoo.com



considerations, leading to appropriate treatment and a better outcome. Many protocols and algorithms have been designed and published.²⁰⁻²³ However most of these protocols are quite extensive, heavily detailed and require in-depth study to understand their implementation. Also, in a resource-constrained environment where access to funding to carry out a mirage of investigations are non-existent, this easy to follow and simple to administer chart is a welcome development.

The algorithm is applicable on the premise that an appropriate diagnosis of obesity has been made based on international standards.²⁴ Obesity among children and

adolescents less than 19 years old is defined by a body mass index (BMI) above the 95th percentile for age and sex.^{20,25,26} The algorithm is not supposed to replace previous protocols but is an add-on. It is a chart that is colourful and simple to follow. It starts with history of onset, family history of obesity, history of trauma or previous central nervous system insult and duration of obesity progression. In terms of examination: interpretation of anthropometry and presence or absence of dysmorphism would further differentiate these patients into different categories. The type of skin changes identified may also suggest the possible aetiology of the obesity.

The algorithm helps to limit the list of investigations required. Not all patients, for instance, will need to have genetic testing nor will all need a brain Magnetic Resonance Imaging (MRI) scan. The algorithm also ensures that not only are we considering the aetiology of obesity, but also evaluating for possible complications of obesity that may be present, hence the inclusion of some baseline investigations in the chart.

Discussion

In the absence of a clear organic aetiology such as genetic causes, preventing the development of obesity in childhood and adolescence is more likely to reduce long term complications than treating obesity in adults.²⁷ Prevention is cost-effective and should begin in early childhood by instilling healthy patterns of exercise and diet.²⁸ It is important to identify young children who are predisposed to obesity and identify interventions that prevent the development of obesity in this group of children. This requires the combined effort of parents, primary care providers, paediatric health care providers and community/federal level programmes.

Efforts should begin with promotion of exclusive breastfeeding for 6 months and encouraging mothers to continue breast feeding for at least a year.²⁹ Weaning diet at 6 months should consist of cereals, fruits and vegetables. Parents should avoid giving their children sugary beverages in the first year of life. For solid foods, emphasis should be on lean meats, poultry, fish, grains and vegetables.

Health care providers should chart and monitor weight and BMI percentiles at any hospital visit as this will help in early identification of any deviation from normal, thus enabling intervention before the child becomes obese. Doctors and nurses should also encourage parents to ensure 30 minutes of physical activity per day for each child.

The government can help by ensuring access to more natural food options such as fruit, vegetables and grains, and incentivise producers to promote such consumption.

Communities can also mobilise with small group awareness raising over exercise and healthier food options.

Author declaration

The authors confirm that they have no competing interests to declare; that no animals were used in the research, and that informed consent was not required from patients.

References

- World Health Organisation (WHO) Annex 5. Algorithm for early infant diagnosis. 2013. http://www.who.int/hiv/pub/guidelines/arv2013/annexes/WHO_CG_annex_5.
- Resuscitation Council UK. Guidelines 2015. Paediatric choking. http://www.clinicalguidelines.scot.nhs.uk/media/1855/g2015_paediatric_choking_treatment.
- Paediatric Advanced Life Support guidelines. ANZCOR Guideline 12.1 – Introduction to Paediatric Advanced Life Support. 2017. <https://www.nzrc.org.nz/assets/Guidelines/Paed-ALS/All-Paed-ALS-guidelines-June-2017>.
- Chang AB, Oppenheimer JJ, Weinberger MM, et al. on behalf of the CHEST Expert Cough Panel. Use of management pathways or algorithms in children with chronic cough: CHEST Guideline and Expert Panel Report. *Chest* 2017; 151(4): 875-883.
- Manak MM, Njoku OS, Shutt A, et al. Evaluation of the performance of two HIV-1/2 rapid tests in high and low prevalence populations in Nigeria. *J. Clin. Microbiol.* 2015; 53: 3501-35061
- Bassey O, Bond K, Adedeji A, et al. Evaluation of nine HIV rapid test kits to develop a national HIV testing algorithm in Nigeria. *Afr J Lab Med* 2015; 4(1). <http://dx.doi.org/10.4102/ajlm.v4i1.224>.
- World Health Organization (WHO). Obesity and Overweight Fact Sheet No 311.2012. Geneva, Switzerland: WHO.
- Novac O, Matasaru S, Tataru S, et al. The assessment of weight excess complications for children and school teenagers. *Rev: Med Chir Soc Nat Las.* 2009; 113: 740-744.
- World Health Organisation (WHO). Obesity: preventing and managing the global epidemic: Report of a WHO consultation. Geneva 2000. (Technical report series No 894).
- Ogden CL, Yanovski SZ, Carroll MD, Flegal KM. The epidemiology of obesity. *Gastroenterology* 2007; 132: 2087-2102
- Ford ES, Mokdad AH. Epidemiology of obesity in the western hemisphere. *J Clin Endocrinol Metab* 2008; 93: S1-S8.
- Malecke T, Tenders E, Mazur A. Childhood obesity: a pandemic of the twenty-first century. *Int J Obes* 2006; 30: S1-S53.
- Agarwal R, Bills J, Light R. Diagnosing obesity by body mass index in chronic kidney disease: an explanation for the 'obesity paradox?' *Hypertension* 2010; 56: 893-900.
- Barsh GS, Schwartz MW. Genetic approaches to studying energy balance, perception and integration. *Nat Rev Genet* 2002; 3: 589-600.
- Margolis-Gil M, Yackobovitz-Gavon M, Phillip M, Shalitin S. Which predictors differentiate between obese children and adolescent with cardiometabolic complications and those with metabolically healthy obesity (MHO). *Pediatrics Diabetes* 2018; doi: 10.1111/pedi.12694.
- Calero BML, Varela-Aguilar JM. Infant–juvenile type 2 diabetes. *Rev Clin Esp* 2018; doi: 10.1016/j.rce.2018.03.020.
- Butler G. Diabetes Mellitus. In Butler G, Kirk J (Eds) *Paediatric Endocrinology and Diabetes*. Oxford University Press Inc, New York 2011: 115-189.
- Ogunbode AM, Ladipo MMA, Ajayi IO, Fatiregun AA. Obesity: An emerging disease. *Nig J Clinical Pract* 2011; 14: 390-394.
- Williamson DF. Descriptive epidemiology of body weight and weight change in US adults. *Ann Intern Med* 1993; 119: 646-649.
- Barlow SE. Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity: Summary Report. *Pediatrics* 2007; 120: S164-S92.
- Expert Panel on Integrated Guidelines for Cardiovascular Health and Risk Reduction in Children and Adolescents: Summary Report. *Pediatrics* 2011; 128 (5): S231-234.
- Gee S, Rogers V, Liu L, McGrath J. Expert Committee Recommendations on the Assessment, Prevention and Treatment of Child and Adolescent Overweight and Obesity. An Implementation Guide from the National Initiative for Children's Healthcare Quality's Childhood Obesity Action Network. 2007.
- Rao, G. Childhood Obesity: highlights of AMA Expert Committee Recommendations. *American Family Physician.* 2008; 78: 56-63.
- Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults: the evidence report. Bethesda USA: National Heart, Lung and Blood Institute, 1998: NIH 98 – 4083.
- Cote AT, Harris KC, Panagiotopoulos C, Sandor GG, Devlin AM. Childhood obesity and cardiovascular dysfunction. *J Am Coll Cardiol* 2013; 62:1309-1319.
- Whitlock EP, Williams SB, Gold R, Smith PR, Shipman SA. Screening and interventions for childhood overweight: a summary of evidence for the US Preventive Services Task Force. *Pediatrics.* 2010; 116:125-144.
- Fall CHD, Endocrine programming and fetal and early-life origins of adult disease. In: Brook GDC, Clayton PE, Brown RS (Eds). *Clinical Pediatric Endocrinology*. Blackwell Publishing USA. 2005: 411-412.
- Channel S, Everitt H, Birtwistle J, Stevenson B. Obesity In: Simon C et al. (EDS). *Oxford Handbook of General Practice*. 1st edition. Oxford University Press 2002: 166-167.
- Gartner LM, Morton J, Lawrence RA et al. Breastfeeding and the use of human milk. *Pediatrics* 2005; 115: 496-506.