Streamlining Various Definitions of Childhood Obesity

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Obesity has become a universal problem among children. Childhood obesity may be connected to grave psychological, physical and social consequences. First lady of United States, **Her Excellency, Michelle Obama** declared childhood obesity an epidemic for her country. Obesity develops when there exists a discrepancy between intake and output of energy, disturbing the original steady state and formation of a fresh steady state at a higher level, resulting in increased body-fat storage. In a 2011 work, the author described steady state as a situation employing transfer of energy at a uniform rate (energy-transfer perspective). This is a condition in which probability of occupation is not same in different states; however, it does not vary with time (probability-of-occupation perspective). The delicate balance between tissue synthesis (gain of height) and fat storage (obesity), if mathematically modeled, may prevent obesity. According to Poskitt (1995), representing ECOG, lack of childhood-obesity definition has been a matter of concern for the group. In 2000 she mentioned that the concept of relative *BMI* had been generally accepted despite considerable imprecision in defining obesity. In 2001 she stated that *BMI* could not be considered as offering the 'best' definition, although it might be 'useful' and 'practical' for epidemiological, clinical and population-research purposes. She, further, added that work on definition was essential and needed continuing reassessment. Cole *et al.* (2000) defined childhood obesity based on pooled-international data and linked to adult-obesity-cutoff point of *BMI* to be 30 kg/m^2. Flegal *et al.* (2010) divided *BMI*-for-age categories into three ranges**:** 'normal', 'intermediate' and 'high'. The first one *most unlikely*, whereas the last one *most likely*, to have high adiposity. Rolland-Cachera *et al.* (2011), on behalf of ECOG, defined three main cutoffs of *BMI*, constituting four ranges**:** 'thin', 'normal', 'overweight' and 'obese'. Zhao and Grant (2011) observed that obesity might be defined as excess of body fat. Al-Gindan *et al.* (2015) are of the opinion that most national-survey analyses equating *BMI* in excess of 30 kg/m^2 with 'obesity' lead to survey-data misinterpretation. The author is of the opinion that 'overweight' (classified based on measurement of 'net mass' — mass obtained without any clothing) needs to be distinguished from 'overfat' (classified based on measurement of skinfolds as well as waist and hip circumferences). One needs a definition based, solely, on measurement of mass, not measurement of fat, which is difficult to obtain in a reproducible manner. Staring from this year, mass can be recorded to least count of 0.005 *kg* in SF Growth-and-Imaging Laboratory. Kamal and Razzaq (2014) investigated reproducibility of mass measurement to least count of 0.01 *kg*. The author defines childhood obesity as the condition in which a youngster is required to shed off net mass at the end of 6-*month* period as compared to current mass based on 'Growth-and-Obesity Vector-Roadmap' recommendations. In a forthcoming paper, 'In Search of a Definition of Childhood Obesity', the author intends to compare '*BMI*-based-optimal mass' with 'height-percentile-based-optimal mass' and give mathematical relationship for losing net mass within 6 *months*.

Already known on this topic

Childhood obesity a serious public health concern

Obesity a complex disease that involves interactions between environmental and genetic factors

The true prevalence of childhood obesity difficult to empirically quantify as there is currently no internationally-accepted definition

BMI still the most popular method of classifying fatness and thinness

Various definitions obesity proposed included relative *BMI*, cutoff point as 30 kg/m^2 (adult *BMI*), *BMI* ranges (below 85th percentile**:** normal, 85th to 95th percentile**:** intermediate, equal to or above 95th percentile**:** high)

SF Growth-and-Imaging Laboratory contributions

2004 Optimal mass (mention of name; formal definition in 2011)

2011 Statuses (pertaining-to-mass) and (pertaining-to-height)

2012 Estimated-adult *BMI*

2013-2016 1st- to 4th-generation solutions of childhood obesity

2014 Energy-channelization I-III, which included puberty-induced energy-channelization

2014 Pseudo-gain of mass and height

2014 Use of height- and mass-percentile trajectories instead of growth (height) velocity and rate of mass gain/loss

2014 CDC Growth Tables extended to include percentiles in the range 0.01th to 99.99th (to handle extreme cases)

2015 Month-wise targets (next 6 *months*) to shed-off mass

2016 Mass and height measurements to least counts of 0.005 *kg* and 0.005 *cm*, respectively, accompanied by manual, version 9.1

This work adds

Definition of childhood obesity — A child is considered obese if the incumbent is required to lose net mass (weight) within the next 6 *months*

The next step

Mathematical relationship among percentiles of mass, height, mid-parental height and army-cutoff height that warrants losing net mass (weight) within the next 6 *months*

Investigation of suitability of *BMI* use as childhood-obesity indicator

5th-generation solution of childhood obesity

September 4, 2013	1st-Generation Sol. http://www.ngds-ku.org/Presentations/Roadmap.pdf
September 4, 2014	2nd-Generation Sol. http://www.ngds-ku.org/Presentations/Enhanced.pdf
June 1, 2015	3rd-Generation Sol. http://www.ngds-ku.org/Papers/J38.pdf
February 13, 2016	4th-Generation Sol. http://www.ngds-ku.org/Presentations/Vector.pdf
January 1, 2017	5th-Generation Sol. http://www.ngds-ku.org/Papers/J45.pdf (expected)

Solutions of childhood-obesity problem proposed in SF-Growth-and-Imaging Laboratory, University of Karachi

Keywords: Body-mass index (*BMI*), estimated-adult *BMI*, optimal mass, Growth-and-Obesity Vector-Roadmap, ECOG (European Childhood Obesity Group)

Web address of this document: http://www.ngds-ku.org/Presentations/Childhood-Obesity-Definitions.pdf
HTML version: http://www.ngds-ku.org/pub/confabstB.htm#C131:

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