



Research Protocol

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Obesity: A Concise Review and Key Points

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Introduction

Obesity is associated with significant morbidity in the pediatric population [1]. The COVID-19 pandemic had significant impact on individual's lifestyle. Therefore, obesity rates may increase even more in our current times [2]. There is a need to consider this problem and therefore we want to provide a concise summary about obesity for the general pediatrician. This review is a summary of key points in obesity diagnosis, risk factors, complications, prevention, and treatment.

Keywords: Obesity; Pediatric; Childhood; Adolescent; Morbidity; Review

Definition and Epidemiology

Obesity is defined in the less than 2 years of age by weight to recumbent length \geq 97.7th percentile of the WHO growth chart. In the 2 years of age and older, obesity is diagnosed by BMI \geq 95th percentile [3] (Table 1). The prevalence of obesity as estimated by the most recent CDC report in June 2019 varies by age group as follows 13.9% in the 2-5 years, 18.4% in the 6-11 years and 20.6% in the 12-19 years age groups. Moreover, obesity rates are affected by gender, ethnicity, and socioeconomic class, with the highest prevalence in low-middle income group and Non-Hispanics black and Hispanics.

Morbidity

A meta-analysis by Llewellyn et al showed that there is a significant and positive association between childhood BMI increase and prediction of adulthood morbidities [4]. For a one standard deviation increase in BMI in obese children who are 12 years and older, the odds ratio (OR) for DM2 is 1.7 (95% CI 1.3-2.22), CHD OR is 1.3 (95% CI 1.16-1.47), stroke OR 1.06 (95% CI 1.04-1.09), HTN OR 1.29 (95% CI 1.19-1.4). In addition, childhood obesity poses increased risks during childhood for developing depression and low self-

esteem [5], OSA [4], as well as fatty liver disease, galls stones and GERD [6].

Prevention and Treatment

To avoid the morbidities associated with obesity, prevention is essential. The general pediatrician has a key role in promoting education to prevent and treat childhood obesity. Education includes family centered approach (child and all involved care givers), school and community. Lifestyle includes increasing physical activity to improve metabolism (Table 1) and improving dietary practices such as decreasing fast food, limiting or eliminating sweetened and flavored drinks, avoidance of fatty food, portion control, structured meal plan for the day instead of grazing, increase fibers and vegetable intake, as well as having a structured meal time and avoiding eating while watching television. Pharmacotherapy should be reserved for patients who failed lifestyle interventions and have associated morbidities [1]. Recently, a randomized study by Kelly et al. showed promising results in the 12-18 year-old obese patients [7]. The data demonstrated that Liraglutide in addition to life style modification resulted in significant reduction in BMI

compared to life style modification alone [7]. For extreme obesity cases in adolescents who reached Tanner 4-5 and final adult height, who did not respond to formal and strict lifestyle changes and have confirmation of stable psychologic status of self and family with

adequate adherence to follow up, bariatric surgery can be an option [1]. In addition, attention should be paid to recognizing diseases associated with obesity as this can have a substantial impact on treatment options (Figure 1).

Table 1: Summary of key points of Childhood obesity.

Diagnosis	Risk Factors [3]	Complications [4]	Prevention	Treatment [1]
<2 years, Weight: Recumbent length \geq 97.7 th percentile of WHO growth chart	Lifestyle	HTN	Education †	Lifestyle changes
\geq 2 years,	Eating habits	DM2	Physical activity ††	Diet control
Overweight [3]: BMI \geq 85 th to <95 th percentile of CDC chart	PA	OSA	Limit screen time	Increase PA
Obesity [3]: BMI \geq 95 th percentile	Environment	CHD	Sleep hygiene	Psychotherapy ‡
Severe obesity [8]: BMI \geq 120% of the 95 th percentile or BMI > 35 Kg/m ² .	Socioeconomic factors	Stroke	Breastfeeding	Pharmacotherapy Ψ
	Genetic	Fatty liver		Bariatric surgery
	Endocrine	Gall stones		
		GERD		
		Cancer Φ		

Φ Hepatocellular carcinoma, renal cell carcinoma, colorectal carcinomas, urothelial carcinomas

† Education: assessment of family stressors, involving the entire family in the plan, school-based education

†† 20 to 60 minutes of vigorous physical activity \geq 5 days/week

‡ Psychotherapy: counseling for patients and family social and psychological problems

Ψ FDA approved: Lorcaserin, Liraglutide, Phentermine plus topiramate, Bupropion plus naltrexone, Orlistat, Metformin

PA: Physical Activity, HTN: Hypertension, DM2: Diabetes Mellitus Type 2, OSA: Obstructive Sleep Apnea, CHD: Coronary Heart Disease, GERD: Gastroesophageal Reflux Disease

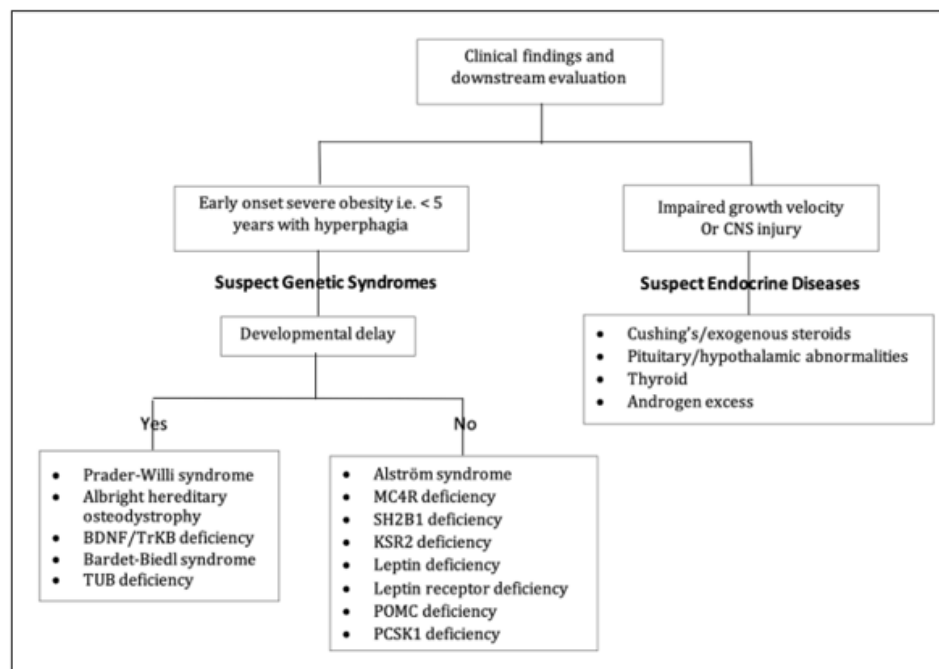


Figure 1: Flowchart of a simplified approach to obesity syndromes.

Conclusion

In summary, obesity presents a growing challenge in the pediatric population. It is essential that clinicians be able to appropriately diagnose and educate families to prevent immediate

obesity consequences in childhood and the long-term morbidities in adulthood.

Acknowledgement

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Conflict of Interest

No conflict of interest.

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