

The first stage in the dietary approach is to understand the child's way of life, physical activity level, the actual food habits and the level of food intakes as exactly as possible in terms of quality and quantity, meal by meal, snacks, candies, drank during day and night. The methodology of 24h recall is applied during the consultation, completed by an FFQ, taking into account vitamins and minerals supplementations. This evaluation gives the opportunity to demonstrate possible 'over' consumptions as well as low intakes in some nutrients, inducing possibly specific nutritional deficiencies. The intakes are estimated as 'over' consumption or 'under' consumption by comparing with nutritional recommendations for the age, taking into account the physical activity level, and are not evaluated by comparing with dietary intakes of non-obese children of same age and sex.

As usually observed in the literature, energy intakes are frequently higher compared with recommended dietary allowances, taking into account a very low level of physical

activity. Among our patients, we observed an over consumption of proteins, fat, saturated fatty acids, sucrose and sodium. We also frequently observed very low intakes in some nutrients in spite of hyper caloric diet. High consumption of fruit juice or sodas to the detriment of milk causes calcium deficiency. Avoiding vegetables, fruits, high fibre breads and cereals induce very low fibre consumption. The frequent high-fat diet is mostly characterized by an over consumption of saturated fatty acids while insufficient intakes of poly-unsaturated fatty acids, inducing a poor fat balance. It is also frequently observed that the parents avoid giving vitamin D supplementation, considering that vitamins in general increase obesity. The plasma 25-hydroxyvitamin D is below the normal range in about 35% of our patients. Dietary habits and food intakes evaluation, including vitamins and minerals supplements, are necessary to elaborate feasible nutritional recommendations in order to correct over nutrition as well as nutrient deficiencies.

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Sleep loss and weight gain

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Epidemiology: Sleep disordered breathing (SDB) has a prevalence of 2% in the general paediatric population and is mostly caused by adenotonsillar hypertrophy. In children with obesity SDB is diagnosed in 13–59%.

Metabolic consequences: SDB in obese children is an independent risk factor for the metabolic syndrome. The severity of the sleep disorder is associated with the degree of metabolic deregulation. Possible links are systemic inflammation and oxidative stress. In SDB, increased concentrations of C-reactive protein and interleukin-6 and a decrease in interleukin-10 levels is observed. This inflammatory response is linked to the severity of SDB. Evidence for a role of oxidative stress is provided by an ongoing study of our group, showing higher uric acid concentrations, a parameter for oxidative stress,

in obese children with SDB. Both the increased inflammatory response and the elevated uric acid levels disappear when SDB is treated with Aden tonsillectomy or weight loss.

Future research: First of all, the mechanisms by which these metabolic consequences develop are still unclear. It is known that adipose tissue actively secretes adipokines. These molecules contribute to the pathogenesis of insulin resistance and other metabolic disorders. Therefore future studies focus on the effects of hypoxia on fat tissue and the excretion of such adipokines. Secondly, prospective studies are designed to evaluate the effects of the two therapeutic modalities for SDB in obese children: weight loss by diet plus physical activity and adenotonsillectomy.

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Psychological subtypes in obese children

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