Childhood obesity: A literature review

https://doi.org/10.56238/sevened2023.007-084

José Antônio de Albuquerque Neto
Graduating in Medicine
Alto Vale do Rio do Peixe University (UNIARP) - SC

Nathallia Martins Marton Moraes
Undergraduate student in Medicine
Alto Vale do Rio do Peixe University (UNIARP) - SC

Líncon Bordignon Somensi
Doctor
Alto Vale do Rio do Peixe University (UNIARP) - SC
ORCID: https://orcid.org/0000-0002-8435-7124

Alesandra Perazzoli de Souza
Master of Science in Nursing
Alto Vale do Rio do Peixe University (UNIARP) - SC
ORCID: https://orcid.org/0000-0001-6115-1388

Ana Paula Gonçalves Pinculini
Specialist in Auditing and Mechanisms and Regulation in
Health; Specialist in Chronic Non-Communicable Diseases
Alto Vale do Rio do Peixe University (UNIARP) - SC
ORCID: https://0000-0002-6720-0811

ABSTRACT
Obesity is a chronic non-communicable disease of multifactorial cause, considered a major public health problem worldwide. Excess weight has become the factor of greatest concern in child development, due to changes in eating habits, considering that this is one of the main precipitating causes for the emergence of chronic non-communicable diseases in adulthood. The quality of life of obese children is also impaired, as in the social sphere, by prejudice, and also hinders school learning. Genetic predisposition is, without a doubt, a considerable risk factor for the onset of obesity, due to the ease of access to industrialized products, long hours of exposure to screens, and a sedentary lifestyle. The diagnosis is made based on the collection of anthropometric data, which will be classified into Percentile. Treatment is based on lifestyle changes and medications.

Keywords: Obesity, Childhood obesity, Chronic Diseases, Sedentary lifestyle.

1 INTRODUCTION

1.1 CHILDHOOD OBESITY: AN EPIDEMIC FOR BRAZILIAN PUBLIC HEALTH

1.1.1 Obesity

Obesity is a chronic non-communicable disease, considered a major public health problem worldwide. It is defined by the World Health Organization as the accumulation of excessive adipose tissue, which negatively influences the life of the individual, which can lead to the development of numerous diseases and early death. It is a multifactorial pathology that includes psychosocial, metabolic, nutritional and genetic aspects (GARRIDO; MOTTA, 2021).

There are quantitative methods capable of classifying the individual's weight, among them is the calculation of the Body Mass Index, which is a measure used to identify if the weight is within the ideal. It is known that values between 25 and 25.9 kg/m² indicate overweight, above that, it is already considered obesity and, greater than 40 km/m², it means morbid obesity (MINISTRY OF HEALTH, 2020). In addition, there are other methods that are based on the measurement of central and localized

fat, called waist circumference, and also on the waist-to-hip ratio (SAADATI; SABOUR; MANSOURNIA; MEHRABI; SAEED; NAZARI, 2021).

1.2 CHILDHOOD OBESITY

Faced with the intense process of changes in eating habits, society faces a significant increase in obesity, which has impacted adults as well as children (ALMEIDA; RANGE; COAST; ALLEYS; MARTINELLI; LEAL, 2019). In this scenario, overweight has become the factor of greatest concern in child development, since it is one of the main precipitating causes for the development of chronic non-communicable diseases in adulthood (PEREYRA; GOMEZ; JARAMILLO; FERREIRA, 2021).

According to Silva, Almeida and Costa (2021), breastfeeding during the first six months of life is essential for the health of infants during childhood and also in adulthood. Wagner, Rossi, Hinnig, Alves, Retondario and Vasconcelos (2021), in their study, corroborate the above, in which it shows that breast milk has a better hormonal response when compared to other types, which also influences the better process of adaptation to the diet when the breastfeeding period ends. In addition, it describes that children who were breastfed in less than six months of life, had a lower amount of a hormone adiponectin, which is secreted by adipose tissue and is closely related to obesity and type 2 diabetes mellitus.

Previous studies indicate that obesity was more prevalent in urban areas and those with higher purchasing power due to industrialization and easy access to processed foods. On the other hand, the panorama has now changed, in which rural and low-income areas also have a high predominance of the aforementioned disease (ALMEIDA *et al.*, 2019). Therefore, Pereyra *et al.* (2021) states that there are several causes that imply the appearance of puerile overweight, such as ceasing exclusive breastfeeding before six months of age and early inclusion of milk formula and solid foods in the infant's diet. These factors may be related to low quality and even non-adherence to prenatal care (ALMEIDA *et al.*, 2019). There are also alterations during pregnancy, such as the presence of gestational diabetes mellitus and smoking, as well as environmental factors, such as low psychosocial and family educational level.

Thus, it is known that the family's eating habits directly influence children's excess weight. Factors such as the consumption of ultra-processed foods, the inclusion of industrialized beverages, such as soda and ready-to-drink juices, and a sedentary lifestyle, influence the increase in obesity. In addition, there is a scenario in which there is a decrease in the consumption of natural products such as fruits, vegetables and greens, which, when added together, further increase the prevalence (HENRIQUES; BRULANDY; DAYS; O'DWYER, 2020). In addition, at this stage, children tend to copy their parents' behavior, so it is believed that the family's eating habits contribute to the formation of the child's eating habits (LAGARES *et al.*, 2021).

Silva *et al.* (2021) in their study corroborates what was stated by Lagares *et al.* (2021), in which he explains that nutritional behavior, during the child growth phase, is subject to external influences, due to the fact that there are other people responsible for preparing meals. In this sense, it is understood that there is a need to act in a preventive way during early childhood (PEREYRA *et al.*, 2021). It is believed that the intervention carried out during the childhood period and, especially, during the pre-pubertal phase, can reduce this increase, impacting on beneficial changes in the growth phase, and on the adoption of healthy habits, culminating in the reduction of chronic diseases in adult life (RITO *et al.*, 2019).

In the psychological sphere, the quality of life of obese children is directly impaired, especially in the social sphere, since there is still a lot of prejudice, and it also implies school learning (BAGGIO *et al.*, 2021). In this sense, parents find themselves in a delicate situation, in which they feel the need to refer their children for psychological care and follow-up, given the concern that this will become a psychiatric problem, such as depression and anxiety.

As previously mentioned, childhood obesity can lead to the onset of chronic diseases such as hypertension, type 2 diabetes mellitus, hepatic steatosis, cardiovascular changes, mental suffering, in addition to influencing the emergence of complications during adult life. Freitas, Silveira, Santana, D'Ângelo, Haikal, Monteiro-Junior (2020) corroborate the above and state in their study that there is a high probability of obese children becoming adults with a BMI greater than or equal to 30.0 and 34.9 km/m², in addition to having a higher chance of developing complications. Thus, this scenario culminates in the overload of the public health system, both in terms of volume of patients and in the increase in expenses, making it essential to invest in resources for the prevention of obesity, especially with regard to primary care, in order to relieve specialized secondary and tertiary care services (BAGGIO *et al.*, 2021).

1.3 EPIDEMIOLOGY

According to the Ministry of Health (BRASIL, 2020), women have a higher prevalence of the disease, a fact that increases with age, in addition to the fact that, between 2006 and 2019, there was an increase in the incidence of obesity, with an increase of 72% in this time interval.

The Brazilian Association for the Study of Obesity and Metabolic Syndrome (ABESO, 2019) corroborates the above, which states that 20.7% of people are women, and 18.7% are men. It adds that, in Brazil in 2019, there were 19.8% of obese people, and 55.4% were overweight.

1.4 BODY WEIGHT REGULATION

It is known that body weight is regulated by several systems that act concomitantly, the main ones being the Central Nervous System, through the action of the hypothalamus, considered the center of weight regulation, the gastrointestinal tract and adipose tissues.

The hypothalamus is responsible for emitting chemical and nervous signals, and for receiving those from the periphery, acting to regulate hunger and basal energy expenditure. In this place, there are two complexes that act in a complementary and antagonistic way, called catabolic and anabolic pathways. The first is stimulated by leptin, which is a peptide produced by fat cells, which acts on the hypothalamus, responsible for satiety and increased metabolism, resulting in a decrease in food intake. The second, on the other hand, is stimulated by ghrelin, a hormone produced by the cells of the stomach and intestine, associated with hunger, that is, it is an appetite stimulant, it acts to reduce appetite. This pathway is inhibited by leptin (YAGAN; TAS; AYYILDIZ; KARAKAHYA; NOYAN, 2017).

When ingested in excess, calories from food are stored in adipocytes as triglycerides. The higher the caloric output, the more these cells will hypertrophy and, as a regulatory mechanism, negative feedback occurs, since only a certain amount of fat can be stored. From the moment adipocytes reach this storage threshold, pre-adipocyte recruitment occurs (GOLDMAN; AUSIELLO, 2012).

1.5 PATHOPHYSIOLOGY

Obesity occurs when caloric intake exceeds your metabolic expenditure. As it is a multifactorial chronic disease, environmental, psychological, and behavioral aspects also contribute to its onset. As previously explained, the body's metabolic regulation occurs in a balanced way, with agonist and antagonist systems that work mutually.

With excess calories ingested, the body initiates the energy storage mechanism in the form of triglycerides in adipocytes, culminating in fat accumulation. In addition, there is an imbalance between ghrelin and leptin, in which, in overweight or obese people, there is an excess of ghrelin and a leptin deficiency, that is, the individual does not feel satiety, despite eating, and is continuously hungry, even maintaining intake (GOLDMAN; AUSIELLO, 2012).

1.6 RISK FACTORS FOR THE EMERGENCE OF CHILDHOOD OBESITY AND THE IMPACT OF FAMILY EATING HABITS ON CHILDREN'S LIVES

Genetic predisposition is undoubtedly a considerable risk factor for the development of obesity, but the emergence of cases associated with this pathology cannot be explained by heredity alone. We can list other factors considered important that contribute to a greater energy intake by the pediatric population, which is the ease of access that these children have to food and food institutions, eating

associated with a sedentary lifestyle, infants increasingly deciding on their own diet, exaggeration of foods offered at each meal and support for physical activity (MAHAN; RAYMOND, 2018).

It is important to note that 95% of people who develop obesity are due to nutritional causes, which can be termed as simple or exogenous. Exogenous causes are closely related to sociocultural factors, a lifestyle that combines a lack of physical activity with inadequate nutritional habits. The remaining 5% of people are affected by the so-called endogenous obesity, that is, the one that is related to hormonal changes that the individual presents (ROCHA, 2013).

For Mahan and Raymond (2018), the influence of the family in the generation of good eating habits in children is not restricted only to the food selection that adults will promote. The habit of having meals with the whole family gathered around a table contributes a lot to the consolidation of a healthier lifestyle. Infants who have the habit of having meals with their family members tend to consume less soft drinks and fried foods, and on the other hand, there is an increase in the intake of fruits and vegetables, thus resulting in a positive influence on the nutrition of these children, perhaps avoiding overweight.

1.7 COMPLICATIONS OF CHILDHOOD OBESITY

According to Rocha (2013), in recent years there has been a significant increase in the number of overweight and obese children and adolescents. The importance of a professional team evaluating these infants on a routine basis is necessary. The increase in the number of children affected by obesity disturbs health professionals as it increases the risk of them becoming overweight adults with several associated morbid conditions.

The addition of foods with a significant caloric content associated with the encouragement of physical activity contributes to the establishment of obesity and overweight in society in general, especially in the pediatric population, which will be exposed to anticipated complications such as type 2 diabetes mellitus, dyslipidemia, systemic arterial hypertension, obstructive sleep apnea, and even some types of cancer (CHAVES; FREIRE; SNOWS; OLIVE TREE; FREIRE, 2019).

It is observed that the lack of sun exposure or increased use of sunscreen causes a low concentration of vitamin D in overweight children, and that this causes the appearance of systemic inflammatory mediators reducing insulin sensitivity pathways, aggravating or causing the development of type 2 diabetes mellitus, thus requiring vitamin D dosage control and supplementation if necessary in overweight children (MAHAN; RAYMOND; 2018).

According to Mahan and Raymond (2018), excess weight in children can lead to psychosocial problems and also increases the favoring of the emergence of chronic diseases that will affect the life of this infant until adulthood. When we talk about psychosocial problems, we highlight several

situations that can affect the child, such as discrimination, depression, diminished self-esteem and low socialization.

1.8 ESTABLISHING THE DIAGNOSIS OF CHILDHOOD OBESITY

The diagnosis of childhood obesity can be achieved through anamnesis, data on the child's nutrition, physical data of the child such as weight, height, Body Mass Index (BMI) and abdominal circumference. Complementary tests may be requested to deepen the research on the causes of obesity and to better investigate data on body composition, as well as to evaluate the most frequent complications related to childhood obesity, such as non-fatty liver disease, dyslipidemia, type 2 diabetes mellitus, arterial hypertension, polycystic ovary syndrome and obstructive sleep apnea syndrome (WEFFORT; OLIVE TREE; REGISTRAR, 2019).

According to Weffort *et al.* (2019), after obtaining anthropometric measurements, the child's nutritional status should be classified by BMI. BMI values can be represented in percentiles and z-scores, and are related to the sex and age of the child (0 to 19 years). Children between 0 and 5 years of age with obesity have a BMI between the percentiles above 99.9 or a z-score above +3. Infants over 5 years of age to 19 years of age are classified as obese when their BMI is between the 97th and 99th percentiles, or a z-score between +2 and +3. Figure 1 shows the relationship between BMI, percentiles, z-score, and age.

Figure 1 - Classification of nutritional status according to BMI/AGE by percentile and Z-score.

Percentil	Escore-z	0 – 5 anos incompletos	5 - 20 anos incompletos
> 85 e ≤ 97	> +1 e ≤ +2	Risco Sobrepeso	Sobrepeso
> 97 e ≤ 99,9	> +2 e ≤ +3	Sobrepeso	Obesidade
> 99,9	> +3	Obesidade	Obesidade grave

Fonte: CENBRAP (2020).

1.9 LIFESTYLE CHANGES IN THE TREATMENT OF CHILDHOOD OBESITY

Infants who have a Body Mass Index (BMI) with the 85th percentile or higher than this value, with complications due to overweight, as well as those who have a BMI with the 95th percentile or higher need a more careful evaluation under the genetic, psychological and endocrinological aspects inherent to it, as well as we must be aware of the aggravations that arise after the onset of obesity as hypertension, type 2 diabetes mellitus, dyslipidemias, sleep apnea and orthopedic problems. It is worth noting that the presence of a professional specialized in pediatric obesity is necessary when such complications mentioned above in relation to morbidity are severe, thus seeking to make a careful

assessment of the child's health status, proposing changes in the child's lifestyle to improve their prognosis in the face of this disease (MAHAN; RAYMOND; 2018).

For Mahan and Raymond (2018), the essential pillar of the treatment of excess weight in infants is not only to achieve an ideal BMI, but also the implementation of physical exercises in a precise way and a healthy nutritional habit. The treatment changes according to the child's age, up to 7 years of age we have one type of conduct, and after 7 years of age we observe another form of procedure. In infants up to 7 years of age, without complications secondary to obesity, the main goal is to maintain body mass until the child grows in stature, causing a decrease in BMI. However, if they worsen or BMI greater than the 95th percentile, the decision is to lose body mass. A similar approach applies to children over 7 years of age, where we observed that if they have a BMI with a percentile between 85 and 95, the maintenance of body mass is present, and if they exceed the BMI 95th percentile or present complications secondary to obesity, it is recommended that they lose 450g per month of body mass.

1.10 PHARMACOLOGICAL APPROACHES TO CHILDHOOD OBESITY

According to Weffort *et al.* (2019) The therapeutic approach should be instituted in an individualized and gradual manner, always in partnership with the patient's family, leaving aside rigid and restrictive dietary plans. The nutritional plan should advocate a balanced diet, providing all the necessary nutrients for the child to develop in a healthy way, not forgetting the importance of choosing foods already present and the child's eating habits. The role of the family is pertinent in the whole process of changing the child's nutritional behavior, because acting with patience, discipline and determination will provide modifications in the concepts related to food already instituted in the child. In addition to nutritional education, a sedentary lifestyle must also be fought. It should be encouraged that the child should exercise preferably outdoors by taking walks or bike rides, and apply effective control over the time spent in front of the TV, video games and computer.

Drugs prescribed for weight loss act on the central nervous system and need to be used in association with changes in eating habits and lifestyle, as well as regular physical exercise. It should be made clear that in Brazil there are currently no drugs approved for pediatric use. However, the therapeutic prescription can be used in infants who have severe obesity with comorbidities such as depression, associated binge eating. Among the drugs that we can use, we have two groups, the anti-obesity drugs represented by sibutramine, orlistat and liraglutide, and the drugs with indirect action on obesity portrayed by topiramate, ritalin and SSRIs (WEFFORT *et al.*, 2019).

1.11 INDICATIONS FOR BARIATRIC SURGERY IN CHILDHOOD OBESITY

In 2013, the Ministry of Health issued an ordinance allowing bariatric surgery in adolescents aged 16 and over, based on some criteria, such as BMI greater than 40 or BMI between 35-40 with the

presence of comorbidities such as associated dyslipidemia and diabetes, patients who have failed dietary and pharmacological treatment for at least two years, and patients who already have consolidation of the growth epiphyses as approval criteria for the surgical procedure (MASSABKI; SEWAYBRICKER; NAKAMURA; MENDES; BARROS FILHO; ANTONIO; ZAMBON, 2016).

In Brazil, four bariatric surgery techniques are approved, namely gastric *bypass*, adjustable gastric band, sleeve gastrectomy and *duodenal swicth*, and we also have the intragastric balloon, which is not considered a surgical procedure. The first two procedures mentioned above are the most frequently performed, gastric *bypass* can present well-defined postoperative complications ranging from an infection of the surgical wound, local bleeding, anastomotic leakage, incisional hernia and even a pulmonary embolism, and the gastric band presents in addition to the risk of infections and mechanical complications (GODOY; MAGALHÃES NETO; SANTANA; BELT; SILVA, 2015).

Some long-term complications related to gastric bypass may arise such as deficiency of calcium, vitamin d, iron, folate, vitamin b1, b6 and b12 that will certainly require supplementation by patients. Dumping can also occur after the ingestion of sweets, manifesting itself with nausea, vomiting and diarrhea. The end of the surgery is not related to the end of the treatment, but to the beginning of a period where the patient must undergo transformations in his lifestyle in relation to his way of eating and the insertion of physical activity, always being accompanied by a multidisciplinary team that will support him throughout this process. Therefore, the ethical aspects of the indication of surgery must be preserved, and the psychologist is a key player in the entire process, in order to support the patient in decision making, assist in relation to fears related to the procedure itself as well as in changing the desired lifestyle. Family support is also important throughout the treatment process, from the signing of the consent form for the surgical procedure in the case of pediatric patients, as well as in the support of changes in lifestyle habits in the short and long term that will be required of patients. (GODOY *et al.*, 2015).

REFERENCES

ABESO - Associação Brasileira para o Estudo da Obesidade e da Síndrome Metabólica. Mapa da obesidade, 2019. Disponível em: https://abeso.org.br/ obesidade-e-sindrome-metabolica/mapa-da-obesidade/. Acesso em: 22 out. 2022.

ALMEIDA, A. H. do V.; GAMA, S. G. N. da; COSTA, M. C. O.; VIELLAS, E. F.; MARTINELLI, K. G.; LEAL, M. do C. Desigualdades econômicas e raciais na assistência pré-natal de grávidas adolescentes, Brasil, 2011-2012. Revista Brasileira de Saúde Materno Infantil, Recife, v. 19, n. 1, p. 53-62, jan./mar. 2019. Disponível em: https://www.scielo.br/j/rbsmi/a/Tq5cCrtjhPyd64fwD3r5vnz/?format= pdf&lang=pt. Acesso em: 22 out. 2022.

BAGGIO, M. A.; ALVES, K. R.; CAVALHEIRO, R. F.; MATIAS, L. de; HIRANO, A. R.; MACHINESKI, G. G.; CALDEIRA, S. Obesidade infantil na percepção de crianças, familiares e profissionais de saúde e educação. Texto & contexto enfermagem, Florianópolis, v. 30, n. :e20190331, p. 1-13, 2021. Disponível em: https://doi.org/10.1590/1980-265X-TCE-2019-0331. Acesso em: 30 ago. 2022.

BRASIL. Ministério da Saúde. Excesso de peso e obesidade. 2020. Disponível em: https://aps.saude.gov.br/ape/promocaosaude/excesso. Acesso em: 22 out. 2022.

CENBRAP. Obesidade infantil: Diagnóstimo e tratamento farmacológico. 2020. Disponível em: https://www.cenbrap.edu.br/Blog/obesidade-infantil-tratamento-farmacologico. Acesso em: 27 set. 2022

CHAVES, P. B.; FREIRE, A. L. L. de F.; NEVES, D. C. de O.; OLIVEIRA, K. S. de; FREIRE, M. L. de F. Fatores de risco relacionados à obesidade em escolares atendidos em um ambulatório de pediatria. Revista Eletrônica Acervo Saúde, São Paulo, v. 11, n. 6, p. 1-9, fev. 2019. Disponível em: https://doi.org/10.25248/reas.e321.2019. Acesso em: 27 set. 2022.

FREITAS, A. S.; SILVEIRA, M. F.; SANTANA, J. J. F. de; D'ÂNGELO, M. F. S. V.; HAIKAL, D. S.; MONTEIRO-JUNIOR, R. S. Novos parâmetros de referência do índice de massa corpórea para crianças de seis a dez anos. Revista Paulista de Pediatria, São Paulo, v. 39, n. e2019129, p. 1-9, 2020. Disponível em: https://www.scielo.br/j/rpp/a/WxYrhmP6Tr6kRk3t55t9KmB/?format=pdf&lang=pt Acesso em: 29 ago. 2022

GARRIDO, P. B.; MOTTA, I. F. de. Psicanálise no tratamento multidisciplinar e cirúrgico da obesidade mórbida: Estudo de caso. Revista Latinoamericana de Psicopatologia Fundamental, São Paulo, v. 24, n. 4, p. 638-658, dez. 2021. Disponível em: https://doi.org/10.1590/1415-4714.2021v24n4p638.8. Acesso em: 29 ago. 2022

GODOY, C. M. de A.; MAGALHÃES NETO, G. E. J. de; SANTANA, M. F.; CORREIA, S. F. B. de M.; SILVA, J. J. da. Análise bioética nas indicações de cirurgia bariátrica em crianças e adolescentes. Revista Bioética, Brasília, v. 23, n. 1, p. 61-69, jan./abr. 2015. Disponível em: https://doi.org/10.1590/1983-80422015231046. Acesso em: 29 out. 2022.

GOLDMAN, L.; AUSIELLO, D. Cecil Medicina Interna. 24. ed. Saunders: Elsevier, 2012.

HENRIQUES, P.; BRULANDY, L.; DIAS, P. C.; O'DWYER, G. Ideias em disputa sobre as atribuições do estado na prevenção econtrole da obesidade infantil. Cadernos de Saúde Pública, Rio de Janeiro, v. 36, n. 11, p. 1-12, 2020. Disponível em: https://doi.org/10.1590/0102-311X00016920. Acesso em: 30 ago. 2022.

LAGARES, E. B.; SOUSA, P. H. A.; RESENDE, K. A.; SANTOS, L. C.; SILVA, L. H. R.; BELO, V. S.; ROMANO, M. C. C. Excess weight in children living in rural areas related to the nutritional profile and to matern habits. Nursing Research and Education, Londres, v. 39, n. 1, fev. 2021. Disponível em: https://doi.org/10.17533/udea.iee.v39n1e03. Acesso em: 09 set. 2022.

MAHAN, L. K.; RAYMOND, J. L. Krause: Alimentos, nutrição e dietoterapia. 14. ed. Elsevier: MK, 2018.

MASSABKI, L. H. P.; SEWAYBRICKER, L. E.; NAKAMURA, K. H.; MENDES, R. T.; BARROS FILHO, A. de A.; ANTONIO, M. A. R. de G. M.; ZAMBON, M. P. Cirurgia bariátrica: É razoável antes dos 16 anos de idade? Revista do Colégio Brasileiro de Cirurgiões, Rio de Janeiro, v. 43, n. 5, p. 360-367, 2016. Disponível em: https://doi.org/10.1590/0100-69912016005009. Acesso em: 29 out. 2022.

MINISTÉRIO DA SAÚDE. Secretaria de Ciência, Tecnologia, Inovação e Insumos Estratégicos. Portaria SCTIE/MS nº 53, de 11 de novembro de 2020. Aprova o Protocolo Clínico e Diretrizes Terapêuticas de Sobrepeso e Obesidade em Adultos. Brasília, 2020. Disponível em: https://www.gov.br/ conitec/pt-br/midias/protocolos/ 20201113_pcdt_sobrepeso_e_obesidade_em_ adultos_29_10_2020_final.pdf. Acesso em: 27 set. 2022.

PEREYRA, I.; GÓMEZ, A.; JARAMILLO, K.; FERREIRA, A. Peso ao nascer, ganho ponderal e obesidade em crianças no Uruguai: Estudo prospectivo desde o nascimento. Revista Paulista de Pediatria, São Paulo, v. 39, n. e2019088, p. 1-8, 2021. Disponível em: https://doi.org/10.1590/1984-0462/2021/39/2019088. Acesso em: 09 set. 2022.

RITO, A. I. *et al*. Association between Characteristics at birth, breastfeeding and obesity in 22 countries: The WHO european childhood obesity surveillance initiative – COSI 2015/2017.Obesity Facts, [s. l.], v. 12, n. 2, p. 226-243, abr. 2019. Disponível em: https://pubmed.ncbi.nlm.nih.gov/31030194/. Acesso em: 27 set. 2022.

ROCHA, L. M. Obesidade infantil: Uma revisão bibliográfica. 2013. 49 f. Trabalho de Conclusão de Curso (Especialização em Atenção Básica em Saúde da Família) – Universidade Federal de Minas Gerais, Belo Horizonte, 2013. Disponível em: https://www.nescon.medicina.ufmg.br/biblioteca/imagem/6400.pdf. Acesso em: 27 set. 2022.

SAADATI, H. M.; SABOUR, S.; MANSOURNIA, M. A.; MEHRABI, Y.; SAEED, S.; NAZARI, H. The Direct Effect of Body Mass Index on Cardiovascular Outcomes among Participants Without Central Obesity by Targeted Maximum Likelihood Estimation. Arquivos Brasileiros de Cargiologia, São Paulo, v. 116, n. 5, p. 879-886, 2021. Disponível em: https://www.scielo.br/j/abc/a/VBPZd8vMmxsZFXrhHy4 BqXp/?lang=en&format=pdf. Acesso em: 27 set. 2022.

SILVA, G.; ALMEIDA, S. de S.; COSTA, T. M. B. Family influenceon the nutritional status and eating habits of six to nine year-old children. Revista de Nutrição, Campinas, v. 34, 2021. Disponível em: https://doi.org/10.1590/1678-9865202134e200165. Acesso em: 29 ago. 2022.

WAGNER, K. J. P; ROSSI, C. E.; HINNIG, P. de F.; ALVES, M. de A.; RETONDARIO, A.; VASCONCELOS, F. de A. G. de. Associação entre aleitamento materno e sobrepeso/obesidade em escolares de 7-14 anos. Revista Paulista de Pediatria, São Paulo, v. 39, n. e2019088, p. 1-12, 2021. Disponível em: https://doi.org/10.1590/1984-0462/2021/39/2020076. Acesso em: 09 set. 2022.

WEFFORT, V. R. S.; OLIVEIRA, F. L. C.; ESCRIVÃO, M. A. M. S. Diagnóstico. *In:* WEFFORT, V. R. S. (org.). Manual de Orientação, Obesidade na Infância e Adolescência. 3. ed. São Paulo: SBP. 2019. cap. 4, p. 30-36.

YAGAN, O.; TAS, N.; AYYILDIZ, S. N.; KARAKAHYA, M.; NOYAN, T. Comparison of the Effects of Continuous Versus Intermittent enteral feeding on plasma leptin and ghrelin levels in intensive care units. Revista de Nutrição, Campinas, v. 30, n. 4, p. 409-419, jul./ago. 2017. Disponível em: https://doi.org/10.1590/1678-98652017000400001. Acesso em: 21 out. 2022.