

## Article

# Tackling Pediatric Obesity: Overcoming Challenges and Implementing Effective Management Practices

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**A B S T R A C T**

Obesity is described as an excess of adipose tissue accumulating in a body. Obesity can occur at any age, including pediatrics. In addition to the related health problems, obesity in children can increase the risk of developing chronic diseases. This literature review was carried out using search engines PubMed, Elsevier and Google Scholar, limiting the last 5 years to articles from 2019 to 2024. The main intervention to overcome pediatric obesity is dietary intervention, but a combination with other interventions such as physical activity, behavioral adjustments, and parental support may be more effective. With early intervention, pediatric obesity can be managed well.

## I. INTRODUCTION

Obesity is described as an excess of adipose tissue accumulating in a body. Usually used to identify obesity is the body mass index (BMI). It is computed by dividing a person's kilogramme weight by the square of their height in metres. BMI provides established reference values for comparison, fast computation, and shows a clear link with body fat. Obese children aged 2–20 have a BMI above the 95th percentile. The condition of being overweight in this age range is described as a condition when an individual has a BMI right at the 85th percentile or above but is still below the 95th percentile. Obesity in children under two years old is calculated using a weight-for-length measurement falling at or over the 97.7th percentile for their sex (Lee & Kim, 2021).

In addition to the related health problems, obesity in children can increase the risk of developing chronic diseases such as type 2 diabetes, cardiovascular disease, and cancer, which are non-communicable diseases with high prevalence rates throughout the world. Over the past 2–3 decades, there has been a significant rise in the occurrence of childhood obesity across all parts of the world. This increase has had the most severe consequences in low- to middle-income nations, where there is a simultaneous problem of both undernutrition and obesity. Though everyone is aware of this public health concern, no country has successfully stopped the rise in child obesity. According to USA's simulation models, adults will have a three-fold increased risk of obesity in the next five to ten years and obesity rates will keep rising. Although numerous articles discuss the extent of the problem and suggest measures to reduce and prevent this long-lasting illness, pediatric obesity remains a prominent priority for the World Health Organization (WHO). Its impact has expanded and deteriorated throughout the COVID-19 pandemic (Chung et al., 2023). Ng found an increase in the incidence of obesity in children and adolescents in a 2014 study using populations in developing countries. The increase was 4.8% for the male population and 5% for the female population. The incidence rates in Asia are as follows: 12% in Indonesia, 11% in Thailand, 7% in Malaysia, 5% in the Philippines, 3% in Myanmar, 2% in Laos, and 2% in Cambodia. The 2013 RISKESDAS figures show that, at the national level, children aged 5–12 years in Indonesia had an 18.8% overweight rate, which is still notable. This covers 8.8% as obese and 10.8% of youngsters categorized as overweight. The condition's frequency in Indonesia has risen to 21.8% based on the 2018 Riskesdas statistics. Individuals aged 5–12 years exhibit the largest occurrence, with a rate of 18.8%. In addition, children who are obese experience social embarrassment as their peers mock them and show reluctance to form friendships with them (Suryamulyawan & Arimbawa, 2019; Seo & Ellina, 2022).

Given their inclination to linger in maturity, being overweight and obese raises serious issues for children and adolescents. Children who are consistently fat run a higher risk of having several serious medical problems including diabetes, heart disease, stroke, and others. The main reason behind obesity is environmental. While genetic factors are believed to contribute, they are insufficient to account for the rise in the prevalence of overweight and obesity. Environmental influences mostly exert their influence by disrupting the equilibrium between diet and eating behavior. This primarily pertains to lifestyle modifications that result in a predominantly inactive way of life. Obesity in children is a crucial public health problem that requires immediate treatment because it has a big impact on children's lives in the future (Akbar, 2020).

Based on the explanation previously explained, the author aims to conduct a literature review to “dig deeper” into current problems and effective management solutions to overcome pediatric obesity. This literature review aims to provide a comprehensive understanding for all health professionals and relevant members of the public.

## II. METHODS

The approach used in creating this journal is a systematic literature review with an analytical stage of summarizing a topic from many library sources to thereby enhance knowledge about the

subjects under discussion. Then the author presents the results of this literature review using tables to make it easier for readers to obtain information. The author used Google Scholar, Elsevier, and PubMed to obtain related literature results. The author used several keywords in the literature search such as obesity, children, intervention, and weight loss. The literature contained in this review consists of publications from the last 5 years (2019-2024). The articles we included in this review were only articles with human samples, specifically children and/or adolescents under 18 years old. Within the framework of treatments aimed at addressing pediatric obesity, numerous publications with a total of 15 references were finally chosen. Interventions for treating pediatric obesity are categorized and explained in three levels in this literature review: dietary Interventions, physical activity interventions, and family involvement intervention.

### III. RESULT

Like in adults, the primary causes of obesity in pediatrics are personal ones including behavior, rarely does genetics play a role. Behavioral factors such as dietary patterns, physical exercise, inactivity, drug use, and other exposures could be included. According to research, children that are obese are children who consume too much high-calorie food to exceed the daily limit and who have low levels of physical activity (Marcdante & Kliegman, 2019). Nowadays, parents are often indifferent to their children's nutritional limits. In fact, many parents are found to give their children too much freedom regarding food. Until the end, the child ate more than their nutritional needs because they ate too much fast food. Parents should be responsible for what their children eat (Fahira, 2023).

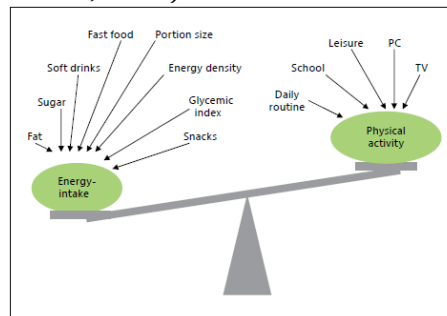
In a study of 6,500 children, researchers identified two main eating patterns, namely a diet high in calories, fat and sweet foods, a lack of fiber, fruit and vegetables, and a diet low in fat but high in free sugars. Obesity in children is caused by high levels of fat and sugar, not just one macronutrient. Especially in developing countries, access to low-cost vegetable oils, animal products, and simple carbohydrates has helped drive obesity rates in children (Freemark, 2018).

Children who consume low nutrient, high calorie, salty, and processed meals (snacking) may find themselves choosing processed foods more frequently than is advised by doctor or nutritionist. Snack eating varies throughout Europe. Rates in northern countries are lower while in southern and Asian areas are greater. Fast food consumption fuels childhood obesity particularly in young females (Verduci et al., 2022). According to a past study, excessive sugar intake might cause a rise in weight, which can result in obesity or overweight. Other studies of a sample of Indonesian schoolchildren found that popular snack items include fruit syrup, flavored drinks, chocolate, papeda, fried foods, "otak-otak," sausages, "pentol," syrup, sauce, and toppings. Daily snack consumption by youngsters increases their likelihood of being overweight or obese compared to weekly or monthly snack consumption (Seo & Ellina, 2022).

Physical activity is the main variable factor influencing the balance of total energy consumption. Children and teenagers that participate in moderate to vigorous physical activity have apparently shown lower body mass index. With sedentary habits increasing BMI, WHO's physical activity recommendations succeeded in preventing rapid weight gain in 419 European children over five years (Verduci et al., 2022). Lack of physical exercise in the majority of research findings states that it can determine the incidence of obesity in children. Many daily activities have changed dramatically during the COVID-19 outbreak that occurred several years ago. It also included child-oriented activities. Along with reduced parental control over children's daily activities and health behavior, especially for children who are at risk of gaining weight or obesity, inappropriate computer uses, and a sedentary lifestyle also increased during the quarantine period (Vandoni et al., 2021).

Weight control during the development phase relies on a child's total energy intake and expenditure, largely attained by physical activity (figure 1). Children have to carefully balance

their energy intake and expenditure if they are to remain at a good weight and guarantee appropriate development (Kiess *et al.*, 2015).



**Figure 1. The illustration of diet and energy expenditure that may affect childhood obesity.**

In Western countries, overweight has an inverse socio-economic gradient. In fact, low economic groups have a high prevalence of obesity. Relative deprivation or one's place in a hierarchy determines overweight. It is not limited to the most underprivileged of a society; rather, the gradient in overweight spans entire society. The gradient indicates that overweight is not solely an issue in one (i.e., the lowest socioeconomic level (SES)) group since all social groups have very different rates. But growth of the low-SES group is mostly responsible for the observed rise in the frequency of overweight during the past thirty years. The SES gradient also implies that overweight is an epiphenomenon reflecting difficulties in our communities as a whole, i.e. the different quality of arrangements across groups in our societies. (Kiess *et al.*, 2015).

Some research reveals that local shops in low-income countries sometimes sell very few healthy food products. Consumers often cannot buy healthy food because it is quite expensive for them. Meanwhile, on the other hand, supermarkets and other retail stores sometimes bargain with private grocery stores to sell unhealthy products. The nutritional content of food products may influence the availability and choice of consumers in purchasing these products. (Fernández-Gaxiola *et al.*, 2022).

Low incomes often translate into poor access to health facilities as well as to wholesome food and/or beverages. Low-income households could not be able to afford gym subscriptions, workout gear, or good food. Perhaps they are too busy to cook their own nutritious meals. (Istianah *et al.*, 2020; Reifegerste & Wiedicke, 2021).

There is a specialty among children who are very fat, overweight, and also obese, they can experience suffering apart from physical problems, namely psychological problems because they often feel low self-esteem and depression related to their body condition. Negative personal attitudes and ideas about obesity lead to weight stigma, which can lead to social exclusion, marginalization, and mental health consequences. The children mentioned above can experience bad stigma regarding their body condition by everyone around them without exception. (Haqq *et al.*, 2021).

In a study of male and female teens who are obese, Shahzadi & Rasheed, 2024 correlated self-esteem. The aspect that was studied correlated positively. Another finding of this study demonstrates gender differences in body image and self-esteem in teens. Girls have a better average body image; therefore, their self-esteem decreases less. Therefore, the researcher recommends expanding through media about awareness of proper body image to protect and improve obese children's mental and physical health.

**Table 1. Dietary Interventions Literacy Study**

| <b>Research</b>                                                                                                                          | <b>Goals</b>                                                                                                                                                                              | <b>Sample</b>                                                                                                                                            | <b>Result</b>                                                                                                                                                                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| “Penerapan Piring Makan Model T dan Edukasi Aktivitas Fisik pada Keluarga dengan Remaja Obesitas” (Cahyaningtyas & Huriah, 2023).        | This study intends to investigate how well the T-style plate and physical activity education handle the adolescent obesity issue.                                                         | A case study was conducted on a family with obese family members in Gedongkiwo Village, Mantrijero Kemantren, Yogyakarta City.                           | With the client's weight prior to the intervention at 117 kg and following the intervention at 116.4 kg, the case study indicated weight loss following three times treatments.                                  |
| “Efektifitas Juice Semangka Dan Senam Kebugaran Terhadap Penurunan Berat Badan Pada Anak Obesitas” (Priyo & Priyanto, 2020).             | The study intends to find the variations in efficacy between having fitness activities in weight loss in obese students at Sawitan State Elementary School and drinking watermelon juice. | There were 24 respondents’ total. 12 respondents were treated with watermelon juice consumption and 12 respondents were treated with fitness activities. | The dependent T test on watermelon juice consumption and exercise revealed P value 0.261, indicating that there is no appreciable difference of influence between the two therapies.                             |
| “Susu Kacang Tanah Efektif Menurunkan Berat Badan dan Kadar Glukosa Darah Remaja Putri Overweight” (Putriningtyas <i>et al.</i> , 2019). | This was a quasy experiment with one group pre-post-test design, aiming at analyzing the effect of peanut milk on body weight and blood glucose level in overweight female teenagers.     | The samples were 16 adolescents.                                                                                                                         | Before and after the intervention, the body weight and blood glucose level dropped by 0.69 and 0.94 mg/dl respectively; body weight changed for 14 days before and after the peanut milk intervention (p=0.016). |
| “Hubungan Antara Diet Serat Pada Buah Dan Sayur Dengan Kejadian Obesitas Pada Anak Usia Prasekolah Di Kota Denpasar” (Pratiwi, 2022).    | Find out the correlation between a fiber diet of fruit and vegetables and the incidence of obesity in preschool-age children.                                                             | 8 kindergartens in Denpasar City. 84 children were selected to be the samples.                                                                           | The bivariate analysis produced a p value = 0.007, meaning that obese children from non-obese children consume significantly different amounts of fiber (fruits and vegetables only).                            |
| “Intervensi Diary DOREMI Pada Remaja Obesitas Di SMAN 4 Palangka                                                                         | Find out how DOREMI Diary counseling helps obese teenagers in                                                                                                                             | Using purposive sampling, the researcher gathered fifteen responders.                                                                                    | Of teenagers aged 13 to 15, 53.3% were obese; of those, 73.3% were male. Counseling with                                                                                                                         |

| Research                           | Goals                       | Sample | Result                                                                                                                                                      |
|------------------------------------|-----------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Raya” (Dewi <i>et al.</i> , 2021). | SMA Negeri 4 Palangka Raya. | 4      | DOREMI Diary had effects on diet ( $p = 0.046$ ), body weight ( $p = 0.017$ ), energy intake ( $p = 0.000$ ), and not on physical activity ( $p = 0.065$ ). |

**Table 2. Physical Activity Interventions Literacy Study**

| Research                                                                                                                                                                        | Goals                                                                                                                                                                                                                                                           | Sample                                                                         | Result                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| “Hubungan Aktivitas Fisik dengan Kejadian Obesitas pada Remaja di SMA Swasta Cerdas Bangsa, Kecamatan Deli Tua, Kabupaten Deli Serdang, Medan” (Sembiring <i>et al.</i> , 2022) | The study sought to find the link between obesity in teenagers at Smart Bangsa Private High School, Deli Tua District, Deli Serdang Regency, Medan, physical activity.                                                                                          | There were 115 people in all, grades 10, 11, and 12 combined.                  | Low physical activity in 47 participants (40.9%) and obesity in 31 participants (27.0%) according to univariate result. Physical activity and obesity in teenagers have a p-value of 0.021 according to bivariate findings. |
| “Hubungan Kompetensi Ibu, Aktivitas Fisik, dan Konsumsi Junk Food Dengan Kejadian Obesitas pada Balita” (Molintao <i>et al.</i> , 2019).                                        | The aim of this study is to investigate the correlation between mother competency, physical activity, and junk food consumption with the obesity incidence in children under five in the work area of the Bahu Health Center, Malalayang District, Manado City. | The number of samples in this study was 98 toddlers.                           | The results showed that the value of physical activity with obesity was 0.016.                                                                                                                                              |
| “Hubungan Asupan Energi Makanan dan Aktivitas Fisik dengan Kejadian Obesitas pada Anak Sekolah Dasar di Kota Manado” (Maki <i>et al.</i> , 2019).                               | Looking for the relationship between food energy intake and physical activity with the incidence of obesity in elementary school                                                                                                                                | The sample in this study was students in grades IV and V in elementary school. | Based on the results of research conducted, show that elementary school-age students with obesity do more very light physical activity at 50.6%, while children who are not                                                 |

| Research                                                                                                                                                        | Goals                                                                                                                                                          | Sample                          | Result                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                 | children in Manado City.                                                                                                                                       |                                 | obese do more very heavy physical activity at 69.3%. The results of bivariate analysis showed that there was no effect of light activity on the incidence of obesity ( $p > 0.05$ ).                            |
| “Hubungan Aktivitas Fisik Dengan Risiko Obesitas Pada Anak Usia Sekolah Di Sdn Grogol 02 Depok” (Azzahra & Anggraini, 2022).                                    | This study intends to examine the association between physical activity and the risk of obesity in school-aged children at SDN Grogol 02 Depok.                | The sample was 193 respondents. | The results of this study show that there is a significant relationship between physical activity and the risk of obesity ( $p$ -value = 0.0001).                                                               |
| “Hubungan Aktivitas Fisik Dengan Kejadian Obesitas Pada Anak Sekolah Dasar Negeri 113 Banjarsari Kota Bandung Tahun 2019-2020” (Fadhilah <i>et al.</i> , 2021). | The purpose of this study is to find the correlation between physical activity and obesity incidence in Elementary School 113 Banjarsari in Grade 4–6 Bandung. | 158 students.                   | With a $p$ -value of 0.001 and an odds ratio of 0.318, statistical tests revealed a noteworthy link between physical activity and obesity incidence among State Elementary School 113 Banjarsari, Bandung City. |

**Table 3. Family Involvement Intervention Literacy Study**

| Research                                                                                                                                                              | Goals                                                                                                                                                                                                           | Sample                                                                                                                          | Result                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| “Hubungan Pengetahuan Gizi dan Pola Asuh Keluarga dengan Status Gizi Anak Prasekolah di TK Negeri Pembina 1 Kota Tangerang Selatan 2018” (Rinowanda & Pristya, 2019). | This research aims to determine the relationship between nutritional knowledge and family parenting patterns with the nutritional status of preschool children and this research uses a cross-sectional design. | The population studied was all children aged 5-6 years at TK Negeri Pembina 1 with a sample of 61 taken through total sampling. | In this study, there was a significant relationship between maternal education ( $p=0.002$ ), maternal employment ( $p=0.008$ ), parental income ( $p=0.005$ ), maternal knowledge about nutrition ( $p=0.010$ ), family parenting patterns ( $p=0.030$ ), children's feeding |

| Research                                                                                                                                                                    | Goals                                                                                                                                                                                        | Sample                                                                            | Result                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                             |                                                                                                                                                                                              |                                                                                   | behavior (p=0.016) with children's nutritional status.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| “Hubungan Tingkat Pengetahuan dengan Pola Makan Aktivitas Fisik dan Peran Serta Orang Tua pada Anak Obesitas di SD Saraswati 5 Denpasar” (Meilasanti <i>et al.</i> , 2019). | This study aims to observe the association between children's dietary pattern, physical activity, and the role of parents with childhood obesity in Saraswati 5 Denpasar elementary schools. | 64 children were obese                                                            | Knowledge level was associated with children's dietary pattern (p=0,050) and knowledge level was associated with the role of parents (p=0,036) also knowledge level was associated with physical activity (p=0,031).                                                                                                                                                                                                                                                                                                                                                                                     |
| “Hubungan Pola Asuh Orang Tua Terhadap Obesitas Pada Anak Di Kecamatan Maritengngae Kabupaten Sidrap” (Pratiwi & Hamdiah, 2019).                                            | Analyzing the relationship between parenting patterns and obesity in children                                                                                                                | Sample of this research were all parents that had kids below 9 years (37 people). | The chi-square test's findings reveal a value of 0.000, indicating a link between obesity and parenting practices in terms of food intake. Data study for fast food consumption patterns on obesity revealed a value of 0.002, so indicating a link between fast food consumption patterns and obesity. On obesity, however, basic health care parenting patterns with weighing and exclusive nursing showed finding of 0.250 and 0.869, implying there was no link between parenting patterns providing basic health care with weighing and exclusive nursing. The chi-square test findings of the data |

| Research                                                                                          | Goals                                                                                                                                                       | Sample                                                                                        | Result                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                   |                                                                                                                                                             |                                                                                               | analysis of physical health parenting patterns on obesity revealed 0.869, thereby indicating no correlation between physical health parenting patterns and obesity.                                                                                                                                                                                                                                                                          |
| “Body Image dan Peran Keluarga Remaja Status Gizi Lebih di Kota Malang” (Febriani, 2019).         | To analyze the role of the family in causing over nutritional status and the body image of adolescents with over nutritional status                         | Respondents were 111 overweight and obese teenagers in 10 public high schools in Malang City. | The findings of the study reveal that most of the family roles involve significant pocket money and high socioeconomic level of respondents, working mothers and unfavorable body image in teenagers with greater nutritional status. Teenagers' nutritional situation is influenced by their family's involvement ( $t=5.072$ , $p=0.000$ ). Teenagers' body image is more influenced by nutritional conditions ( $t=25.812$ , $p=0.000$ ). |
| “Sikap Orang Tua dengan Kejadian Obesitas pada Anak Usia 6-12 Tahun” (Heri <i>et al.</i> , 2021). | This study aims to determine the relationship between parent's attitudes and the incidence of obesity in children aged 6-12 years at SD Negeri 1 Banyuasri. | 50 elementary school children.                                                                | The findings of the study reveal that most of the family roles involve significant pocket money and high socioeconomic level of respondents, working mothers and unfavorable body image in teenagers with greater nutritional                                                                                                                                                                                                                |

| Research | Goals | Sample | Result                                                                                                                                                                                               |
|----------|-------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          |       |        | status. Teenagers' nutritional situation is influenced by their family's involvement (t= 5.072, p= 0.000). Teenagers' body image is more influenced by nutritional conditions (t= 25.812, p= 0.000). |

#### IV. DISCUSSION

One of the main global health problems nowadays is pediatric obesity. Childhood and adolescent obesity prevention is crucial. To lessen the effects of obesity on their physical, psychological, and social growth, however, efficient treatments for those already afflicted are required. To provide a long-lasting effect, obesity control calls for a coordinated approach to treatment. Obesity treatment's fundamental idea is to concentrate on behavioral changes that affect body weight and adiposity such as nutrition and physical activity among others (Van Diepen et al., 2017). Tables 1, 2, and 3 are different forms of interventions meant for addressing pediatric obesity.

#### V. CONCLUSION

Dealing with pediatric obesity calls for a combined strategy including family support, food pattern, physical activity, and behavioral adjustments. Early intervention is essential to avoid long-term health issues and raise affected children's quality of life. Overcoming obstacles and applying sound management techniques can help us to greatly slow down this epidemic.

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