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The obesity treatment in adolescents inside their family environment

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Abstract

Obesity in adolescence is emerging as a serious health problem since the rates of obese adolescents are rapidly increasing. In this important issue, the factors primarily responsible for obesity relate to the diet and physical fitness of young people, in addition to biochemical/genetic factors that contribute to the development of obesity. Incorrect dietary choices and, in general, the adoption of an unhealthy lifestyle start very early, with the family playing a pivotal role. The already high number of obese adolescents has a negative impact on their lives and society in general. One category of measures/interventions that could be taken to prevent childhood obesity is related to the family environment. Therefore, this thesis will study the existing literature in order to understand what obesity is, the factors that contribute to its occurrence and the ways in which the family can influence the behavior of adolescents and be a means of treating obesity (behavior, diet, physical activity, sleep, etc.). A review of the literature was conducted, using authoritative health databases (PubMed and Scopus), to identify published articles on family interventions that contribute to the treatment of adolescent obesity. The systematic review showed that the family holds considerable influence over its members, which, when dysfunctional, can lead to the acquisition of excess weight in its members. Intervention programs within the family environment showed a positive effect on weight loss in adolescents. The involvement of all the family members in these programs (parents and teenagers), not just teenagers, had even more positive results. Intervention programs targeting the family are able to change the daily habits of family members, resulting in adolescents acquiring healthy eating habits and increasing their physical activity, leading to the loss and/or maintenance of normal weight.

Keywords: Obesity; Overweight; Adolescents; Family; Prevention interventions; Behavioral therapy; Parenting; Youth

1. Introduction

Childhood obesity remains a widespread public health problem. The World Health Organization (WHO) defines obesity as a condition of abnormal excess fat in adipose tissue at levels that increase the risk of morbidity and impair health. In recent decades, there has been an increase in the pediatric and adolescent population with excess weight or obesity. Obesity is a major global health challenge of the 21st century. Its implications are not limited to Western countries; it has reached epidemic proportions in less developed countries as well. The prevalence of obesity among the pediatric population, aged 2 to 18 years, has increased rapidly, with more than 100 million children considered obese in 2015. The term "globesity" effectively expresses the implications of this phenomenon and indicates the extensive studies that need to be carried out at the population level[1-3].

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Although the mechanism of obesity development has not been fully described, obesity occurs when energy intake exceeds energy consumption. However, many factors co-influence the development of obesity, such as genetic background, environmental factors, lifestyle preferences and the cultural environment in which a child or adolescent develops[4]. There is growing evidence that the family plays an important role in the development of obesity, when it is not related to genetic or pathological causes, as the family is responsible for both the acquisition of a healthy lifestyle and potentially being a poor role model[5].

More specifically, factors associated with obesity include single-gene (mendelian) inheritance, which may involve mutations, or the involvement of multiple genes, with the number and type of mutations exacerbating the obesity phenotype[6,7]. Nowadays, the food industry promotes a diet high in protein and saturated fat and low in complex carbohydrates. Consequently, in the modern era, people can easily turn to fast food and systematically consume large quantities of unhealthy, poor-quality food while simultaneously reducing physical activity[8].

The spread of obesity is emerging as one of the most important public health problems facing the modern world. It should also be stressed that adult obesity is more common than malnutrition globally. According to the WHO (2016), obesity has tripled globally since 1975. In 2016, over 1.9 billion people (39%) aged 18 years and over were overweight, of which over 650 million (13%) were obese. In 2020, 39 million children under 5 years of age were recorded as being overweight or obese. Over 340 million children and adolescents aged 5 to 19 years were overweight or obese in 2016.

Adolescent obesity is largely influenced by diet, making it a significant concern. The adolescent period is crucial for obesity development due to hormonal changes as the body transitions from childhood to adulthood, rendering it susceptible to excessive fat intake without a balanced lifestyle. One category of measures to prevent adolescent obesity involves interventions within the family environment. Therefore, this review aims to explore the existing literature to understand how family dynamics can influence adolescent behavior and serve as a means of addressing obesity.

2. Material and methods

To address the above questions, a comprehensive review of the existing literature was conducted using authoritative health databases such as PubMed and ScienceDirect. The search targeted published articles on family interventions contributing to the treatment of adolescent obesity, utilizing keywords including “obesity”, “adolescents”, “family”, and “prevention interventions”. Articles were assessed for inclusion based on specific criteria: they had to be in Greek or English language, published from 2002 onwards to ensure relevance, and individuals in the age between 12 and 18 years were involved. Additionally, the included studies needed to focus on interventions provided by or involving the family. Exclusion criteria comprised duplicate articles, all types of reviews and meta-analysis, and case studies. The quality of the literature review was evaluated following the PRISMA method - PRISMA proposal, involving assessments based on title, abstract and, content.

3. Results

This review aims to study existing literature on the role of the family in treating adolescent obesity, mapping, and summarizing findings. A total of 11.671 articles were identified using specified keywords through search engines. This substantial number reflects the widespread interest in the obesity issue. After excluding 2.623 duplicate articles, the remaining were evaluated primarily based on title and abstract, resulting in a comprehensive selection process. Selected articles published between 2002 and 2022, focused on original interventions to prevent and/or treat adolescent obesity. These studies encompassed diverse populations from various regions, including the USA, Canada, Indonesia, Brazil, and Greece. Key characteristics of these studies are summarized in Table 1. Figure 1 outlines the article evaluation process, where articles were carefully scrutinized, particularly regarding age range and intervention settings.

3.1. Publication features

In this review, 13 articles met the inclusion criteria for family intervention against adolescent obesity. Most studies provided detailed descriptions of the protocol, participant characteristics and study specifics, except for three articles that did not specify the participant’s gender. Most interventions (61.5%) were conducted in the USA, with others conducted in Greece (15.4%), Canada (7.7%), Indonesia (7.7%) and Brazil (7.7%). Most interventions were carried out over several months, with some including follow-up materials. The interventions involved face-to-face meetings and interviews, with some utilizing technological tools. Given the central role of the family in these interventions, parents were actively involved at all stages of the research.

3.2. Sample characteristics

Table 1 Characteristics of the studies included in this review

Study	Sample size	Sample's age range	Gender of participants (% girls)	Nationality	Publication date
Agung *et al.*	19	10 -18	-	Indonesia	2022
Carbert *et al.*	172	11 – 16	55,2%	Canada	2019
Crossman *et al.*	6378	13 – 17	-	USA	2006
Germann *et al.*	228	11 – 15	57%	USA	2007
Haines *et al.*	6382	14 – 24	59%	USA	2016
Kosti *et al.*	2008	12 – 17	49,2%	Greece	2008
Lohman *et al.*	1011	10 – 15	52%	USA	2009
Moxley *et al.*	884	5 – 17	49,7%	USA	2019
Papadaki *et al.*	525	12 – 18	60,2%	Greece	2014
Rutkowski *et al.*	94	12 – 15	40,4%	USA	2011
Sgambato *et al.*	2743	10 -13	48%	Brazil	2019
Sothern *et al.*	93	13 – 17	-	USA	2002
White *et al.*	57	11 - 15	100%	USA	2004

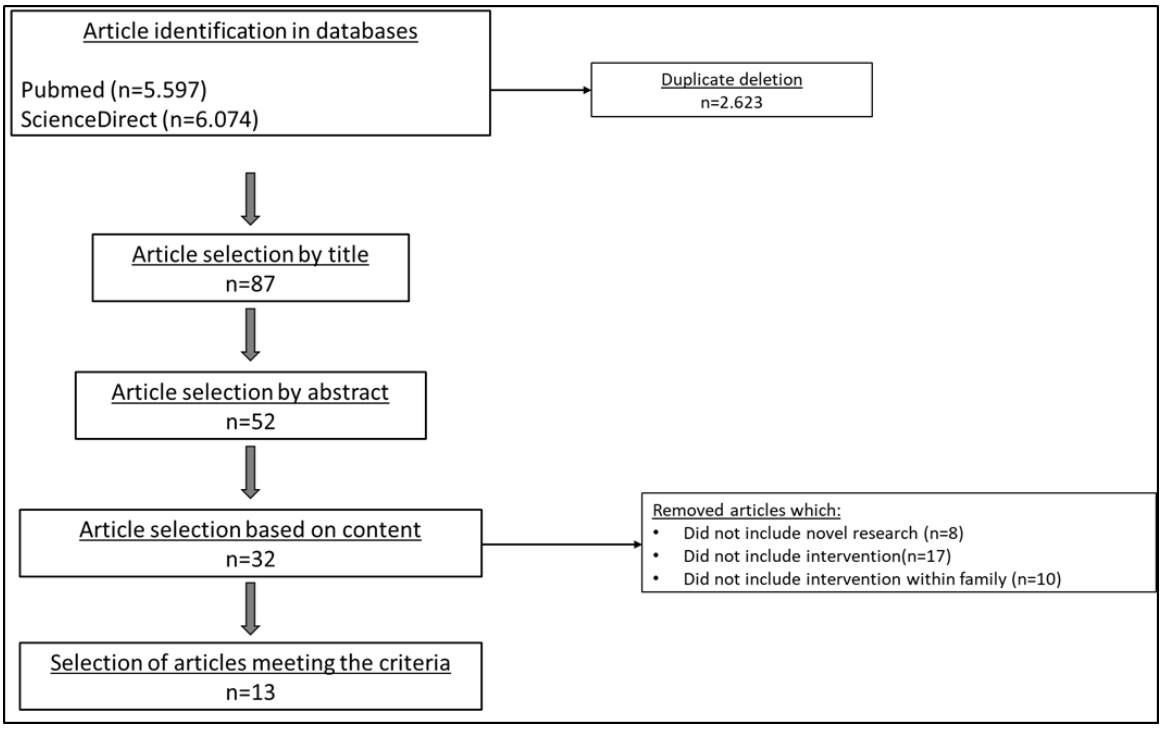


Figure 1 PRISMA flowchart for identifying relevant articles related to the addressing adolescent obesity in the family environment

The individual characteristics of the sample are presented in Table 1. All interventions included adolescents aged 12 to 18 years, with some studies covering a broader age range (e.g., 5 to 17 years) to encompass the adolescent group. Sample sizes varied significantly, ranging from 19 to 6382 participants. Most studies reported similar proportions of boys and

girls. Economic and social status were considered in most studies, reflected in the parents' educational level, economic status, and place (e.g., urban areas). These studies aimed to correlate interventions through family interaction, but typically only one parent (mother or father) was interviewed, either in a parent-child dyad or individually. Siblings, if any, were generally not considered.

3.3. Intervention characteristics

Most interventions included in this review were conducted in the USA, with the remainder in Greece, Canada, Indonesia and Brazil. The duration of these interventions ranged from a few weeks to several months, with some conducting follow-up interviews in the second year to study the long-term impact. The intervention studies typically involved the initial use of questionnaires and/or interviews, measurement of certain biometric factors (e.g., BMI), implementation of the intervention, and finally, re-administration of questionnaires and/or interviews, along with the measurement of new biometric factors at the end of the intervention.

4. Discussion

Interventions within the family environment are particularly important as they highlight the need to understand family dynamics in addressing adolescent obesity. The literature review reveals limited research on family interventions in adolescents, as most studies focus on younger children.

Parents play a crucial role in combating adolescent obesity, as the family environment significantly influences the development of obesity from childhood to adulthood. Parental obesity increases the risk of children carrying excess weight into adolescence and early adulthood. Notably, the influence of parental behavior shows gender-specific patterns. For adolescent girls, high parental education, parental concern, and high self-esteem reduce the risk of weight gain in early adulthood. Conversely, boys whose parents are perceived as intrusive or controlling about their diet during adolescence have an increased risk of obesity in adulthood[9]. Various family stressors, such as a mother's work imbalance, can contribute to adolescent obesity. A study published in 2009 found that adolescents aged 10-15 who experienced individual stressors, like poor academic performance, tended to be overweight or obese[10]. The family institution significantly impacts members' behavior and habits. In 2011, Rutkowski *et al.* noted that parents, who exercised individually negatively influenced their children's weight, whereas parents who engaged in physical activity with their children had a positive impact on preventing or treating adolescent obesity[11]. Luepker (1999) also found that relaxed parents who shared physical activities with their children served as better role models[12]. Subsequent studies support the notion of family influence on healthy lifestyle acquisition. A 2016 study concluded that adolescents from families with strong, quality relationships between parents and children are less likely to develop obesity or unhealthy eating behaviors. This study also highlighted a positive father-son relationship and the beneficial effect of both parents and daughters[13]. In 2019, Carbert *et al.* found that the dietary quality of parents influenced the dietary habits of overweight or obese adolescents, considering family functioning. Parental attitudes towards nutrition and exercise, and the overall family context, synergistically promoted healthy habits in adolescents[14]. However, it must be noted that many parents and adolescents have limited knowledge about the influence of a healthy lifestyle and effective parenting skills on overall health[21].

Studies on adolescent obesity and the family's impact have also been conducted at the national level. Kosti *et al.* observed that overweight or obese adolescents were more than twice as likely to have obese parents. They also showed that normal-weight children and parents had healthier habits compared to their overweight counterparts, while children of normal weight with obese parents made unhealthy choices[15]. Another study indicated that children from well-structured families in peripheral areas followed the Mediterranean diet, whereas children from urban areas with less structured families did not follow this diet and exhibited poor habits such as a sedentary lifestyle and excessive TV watching[16]. Despite the adverse effects of TV and the Internet in the acquisition of extra weight, a study published in 2004 highlighted that the Internet may be an efficient means to transmit healthy lifestyle information. This could advocate for behavior change among adolescents and their parents with the overall goal of weight loss[22].

Numerous studies demonstrate that the family is crucial in promoting a healthy lifestyle or contributing to obesity development. Therefore, family-level interventions to prevent and/or treat adolescent obesity hold significant potential. The literature review revealed limited research on family interventions related to adolescent obesity. Intervention programs providing psychological, nutritional and sports support to parents and adolescents resulted in BMI reduction for the later[17], while self-control education for both parents and adolescents had positive effects. Adolescents who systematically self-monitored lost more weight than those who did not, and this effect was more pronounced when their parents also self-monitored[18].

In 2018, findings from a program by the ProActive Kids Foundation designed for early intervention in childhood and adolescent obesity were presented. This three-tiered approach involved educating parents, guardians, children and adolescents to implement lifestyle changes to prevent or treat obesity. An 8-week intervention, which included education on mental health, nutrition, and physical activity, resulted in reduced weight, fat percentage and body mass index-BMI [19]. In contrast, another 2018 intervention sought to evaluate the effectiveness of a combined school and home-based program against adolescent obesity. Teachers educated students on healthy eating and physical activity, with some students receiving additional support at home. This program lasted a full school year. Results showed that while adolescents in both groups developed better eating habits and increased physical activity, there was a slight increase in BMI, indicating that the behavioral intervention failed to reduce obesity[20]

5. Conclusion

In conclusion, adolescent obesity is a serious global health problem that continues to grow at an alarming rate. Despite efforts, little progress has been made to slow the problem. According to the WHO, obesity during adolescence can affect immediate and future health as well as quality of life. It is widely accepted that the family environment is one of the most important contributing factors. Therefore, educating families on the importance of prevention and early treatment is essential. Given the wide-ranging effects of obesity on adolescents' physical and psychological health, comprehensive and well-thought-out interventions are crucial. Education and screening of all family members can produce significant results and primary prevention through informing young parents can help reduce the incidence of obesity.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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