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Trick to Reduce the Incidence of Childhood Obesity in Society

Trik Atasi Kejadian Obesitas pada Anak di Masyarakat

Abstract

The Incidence of childhood obesity in Indonesia has been increasing every year, and densely populated area has become the biggest contributor. A concrete innovation program is needed to solve this problem. The purpose of this research is to find out the effective obesity intervention program in society. A literature review by taking some references and resources on PubMed Central, BMC, BMJ, Science Direct, and Plos One was used as the method of this research. The researcher used PICO to find a suitable article based on inclusion criteria. The results of this research appear 10 article findings, with 100% discussing the importance of a healthy diet by evaluating an anthropometry assessment and using additional assessment to assist the program effectiveness; 80% discussed physical activity on children; and the discussion on undergoing challenges found when the program was implemented were 60% internal challenges and 80% external challenges from all articles.

Conclusion: Intervention in obesity programs is more effective when a healthy diet and physical activity for children are combined. Parents are the leading role in solving childhood obesity, and society becomes the main support to suppress the Incidence of childhood obesity.

Key Word: Childhood Obesity, Society Healthy Diet; Physical Activity; and Challenges

Introduction

Obesity has a negative impact on nutritional lifestyles in the modern era and has become one of the most critical public health problem in the world over the last 4 decades (Mado et al., 2021; UNICEF, 2022). The World Health Organization (WHO) reports that in 2020, at least 38.9 million children under the age of 5 were overweight or obese (World Health Organization, 2022). In Indonesia, the problem of obesity has increased significantly in most groups of children aged 1-5 years by 20% (7.6 million), aged 13-18 years by 14.8% (3.3 million), and is increasing every year (UNICEF, 2022).

Considering that the increase in the cases of childhood obesity will affect their physical and emotional health. Physical health problem in children with obesity is found to be at higher risk of suffering noncommunicable diseases than adults (World Health Organization, 2022). Emotional health problems in children with obesity include feelings of insecurity, low self-esteem, depression, and even the risk of experiencing bullying, so it is reasonable for them to feel anxious and pull back from society (Puhl & Lessard, 2020; Williams et al., 2023).

In Indonesia, children that are categorized as obese based on anthropometry include: (1) Children from age 0-60 months old are discovered body weight based on body weight per body length (BW/BL) or body weight per body height (BW/BH) with maximum score (Z-Score) > + 3 SD; (2) children from age 0-60 months old is discovered Body Mass Index (BMI) based on Age (BMT/A) with maximum score (Z-Score) > + 3 SD; and children from age 5-18 years old is discovered Body Mass Index based on Age (BMI/A) with maximum score (Z-Score) > + 2 SD (Menteri Kesehatan Republik Indonesia, 2020).

Previous research has conducted various treatments and prevention by pharmacology to suppress childhood obesity (van Son et al., 2021; Vohra et al., 2022). However, the prior research still cannot stop the incidence of childhood obesity in society (Tran et al., 2019). In this sense, the medical team role is very important. They must collaborate to reduce this health problem (Meiklejohn et al., 2023). On the other hand, the researcher has yet to find the most effective

intervention program for childhood obesity in Indonesia.

Therefore, this research aims to discover tricks to solve the problem of childhood obesity in society. For the specific purpose, this research prefers to understand ideas on the effectiveness of a healthy diet in children with obesity, to understand concepts on the effectiveness of physical activity in solving childhood obesity problems, and challenges when implementing the program.

Method

Study design

This research uses a literature review method through stages, including research questions, literature search, literature analysis, and presentation of results.

Research question

This research question follows the guidelines as presented in Table 1 (Munn et al., 2018; Teesside University, 2018): Population (P): Obesity in Children; Exposure (E): Trick; Outcome (O): Reduce Incidence in Society (Considine et al., 2017; Munn et al., 2018). Simplified use of critical judgment in published articles and increased transparency.

Conducting search

Researchers used databases such as Pub Med, BMJ, BMC, Science Direct, and Plos One to find tricks to reduce the increasing incidence of childhood obesity in society. Before conducting a literature search, the research team determined inclusion criteria, including reputable journals from 2019-2023 with quantitative research, mix methods, full text, and English manuscripts discussing interventions to reduce obesity in children that can be implemented in the community. Exclusion criteria included conference papers, symposiums, discussion papers, qualitative paper, obese children undergoing hospital treatment, pharmacological therapy for obesity literature reviews, and systematic reviews. The filter has been explained by the researcher in Figure 1. A total of 10 articles were included in the study.

The search strategy for published manuscripts, which are presented in Table 1.

Articles retrieved from the database were cataloged using bibliographic management software (Mendeley 2.80.1.) and then reviewed and classified.

Literature analysis

After the description, researchers adjusted according to the preferred reporting items for systematic reviews and meta-analyses flowcharts (PRISMA). The general characteristics of selected articles were analyzed based on the year of publication, intervention to reduce obesity in children, and research design to determine content, results, and effects. We reviewed the entire literature independently and integrated the results of the analysis. Discussions and interrogative studies resolve differences of opinion until an agreement is reached.

Presenting results

This research includes ten research; the results are presented in the following section (figure 1). The literature review results are presented in order of general characteristics of the literature, content, and format, interventions to reduce the incidence of obesity in children, barriers experienced, and the effect of implementation to reduce the incidence of obesity in children in the community.

Results

General Characteristic Article

The General characteristic articles chosen in this research are 10 articles, mainly discussing the program to solve the problem of childhood obesity. These research findings come from European continent by 50% (n=5), American continent by 30% (n=3), and Asian continent by 20% (n=2). The program to overcome obesity is 90% by developed countries and 10% by developing countries. This research was 100% conducted in urban areas. The ages of the children who took part were 60% school-age children, 10% pre-school age children, 10% school-age to teenagers, and 20% pre-school age to school age. By the respondent's parents' financial condition, it was found that 30% of children with obesity came from a low social economy class (Anselma et al., 2019; Homs et al., 2021; Zacarías et al., 2019), 50% children with obesity come from upper middle social economy class (Karmali et al., 2019; Kummer et al., 2021; Lambrinou et al., 2019; Reilly et al., 2019; Xu et al., 2020), and 10% came from middle social

economy class (Li et al., 2019) (Table 2). The innovation program that 90% of the article used combined a healthy diet and physical activity in children. 50% of the research was conducted in schools involving parents and teachers, and the other 50% were born in families involving only parents. The researcher analyzed 3 main points from all article that has been reviewed: (1) Food intake to overcome obesity; (2) Physical activity in children to overcome obesity; (3) Challenges in program implementation to overcome obesity in children.

Food intake overcomes childhood obesity.

All articles described the importance of strategy in food intake that is given to children can prevent obesity by giving education and illustrations about children's nutritional needs. It was known that 40% of parents from all articles gave various snacks, such as instant food, as well as snacks and desserts with sugar or salt (Karmali et al., 2019; Lambrinou et al., 2019; Xu et al., 2020; Zacarías et al., 2019) with reason that children would nag if they did not give it.

It was known that all diet innovation programs recommended fruits and vegetables to be consumed more. All articles used anthropometry or body mass index (BMI) together with additional assessment such as 30% child Food Frequency Questionnaire (FFQ) (Kummer et al., 2021; Lambrinou et al., 2019; Zacarías et al., 2019); 20% Dietary Diversity Score (DDS) (Li et al., 2019; Xu et al., 2020); 10% Dietary Behaviour Score (Reilly et al., 2019); 10% Eating self-efficacy scale (ESES) (Karmali et al., 2019); 10% apps titled 'Eat Wisely, Move Happily' (Liu et al., 2019); 10% Dutch Obesity Intervention in Teenagers (DOiT) questionnaire (Anselma et al., 2019); and 10% e short Diet Quality Screener (sDQS). It was identified that 90% of programs had succeeded in overcoming childhood obesity while only 10% unsucceeded but were able to change their habits to a healthy breakfast (Xu et al., 2020), and 20% of programs had succeeded in suppressing healthy food expenses on every child (Li et al., 2019; Zacarías et al., 2019).

Physical activity in children to overcome obesity.

It was discovered that 80% of articles described the importance of physical activity in children to overcome obesity (Anselma et al., 2019; Homs et al., 2021; Karmali et al., 2019; Kummer et al., 2021; Li et al., 2019; Liu et al., 2019; Reilly et al., 2019; Xu et al., 2020). Various activities were conducted, such as physical activity in obese children for 39.57 minutes in the next 12 weeks, 53.04 minutes for 26 weeks (Kummer et al., 2021), 60 minutes every 32 meetings with physical activity and exercise (Homs et al., 2021), and 75 minutes every 13 sessions (Reilly et al., 2019). Moderate-to-Vigorous Physical Activity (MVPA) time for 10 hours that was reset every seven days with accelerometers (Anselma et al., 2019; Li et al., 2019) and for 24 hours every seven days by activating smartphone app 'Eat Wisely, Move Happily' (Liu et al., 2019); Children's motor fitness (MOPER) for 45 minutes at the weekend and National holiday (Anselma et al., 2019); Physical activity counting steps every seven days using pedometer during the program implementation (Karmali et al., 2019); physical activity, "Happy 10," every 10 minutes, two times during school hour with dance play, jump, squat, and resemble animals (Xu et al., 2020).

hallenges in Program Implementation overcome childhood obesity.

All articles described challenges that were experienced. Internal and external challenges were found in all articles' descriptions. There were 60% internal challenges from all reports, such as 20% of parents did not understand the explanation of application-based technological innovation (Kummer et al., 2021; Zacarías et al., 2019); 20% articles experienced obstacles of not preparing for an alternative plan when the meeting was canceled (Anselma et al., 2019; Reilly et al., 2019); 10% experienced barrier on testing effectiveness assessment because their country has many seasons so they needed to adjust to the children's body situation (Lambrinou et al., 2019); 10% experienced cost-related obstacle (lack of research cost) and needed huge cost for program implementation (Xu et al., 2020).

On the other hand, there were 80% of external challenges experienced, such as 40% experienced obstacles in the financial plan by parents when purchasing healthy food for the respondent (Anselma et al., 2019; Karmali et al., 2019; Reilly et al., 2019; Zacarías et al., 2019); 30% claimed lack of commitment and obedience in family to deny snacks (Homs et al., 2021; Reilly et al., 2019; Zacarías et al., 2019);

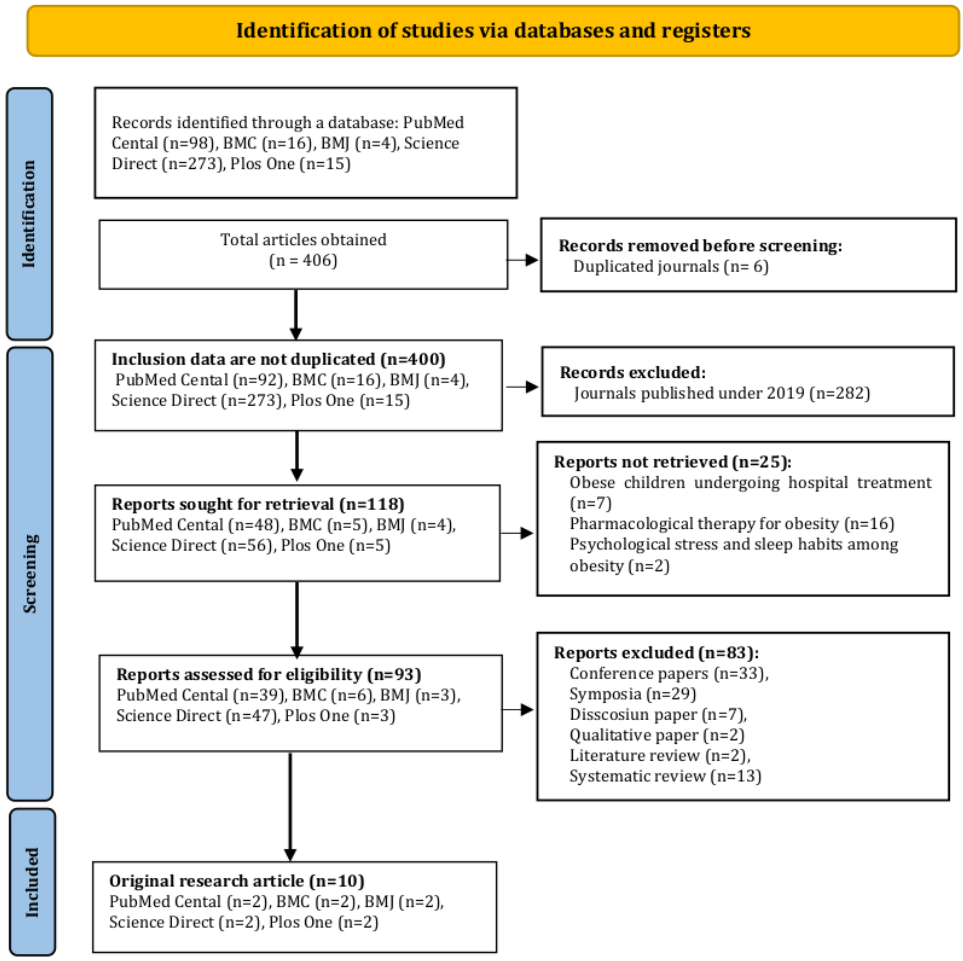

Figure 1. PRISMA flowchart steps in selecting the articles used for review (Page et al., 2021)

20% experienced obstacle on educational (school) policy that is integrated academically; it was needed for school to monitor children's health and children's food canteen (Liu et al., 2019; Xu et al., 2020); and 10% articles experienced cultural obstacles especially boys that has been taken care by grandfather or grandmother because they would pamper children with snacks (Li et al., 2019).

Discussion

The incidence of childhood obesity in this era is increasing and negatively impacts both physiologically (Kansra et al., 2021) and psychologically (Mandelbaum & Harrison, 2022). It makes sense for developed countries to curb the rise in childhood obesity aggressively. Even though the health system in developed countries is considered good, it cannot be denied that obesity still exists, especially in urban areas. Individual factors cause obesity, but socio-economic factors and urban communities are other main triggers (de Bont et al., 2021; Kansra et al., 2021).

Table 1. PEO

Research Title: Trick to Reduce the Incidence of Obesity in Children in Society

PICO questions:
1. What are the tricks used to reduce of childhood obesity in society?
2. How to reduce the increasing incidence of childhood obesity in society?

Research topics / Components		P (POPULATION)		E (EXPOSURE)		O (OUTCOME)
Key Term		Obesity in Children	AND	Trick	AND	Reduce Incidence in Society
Alternative Term	OR	Childhood Obesity	OR	Strategics	OR	Resolve problem in society
Alternative Term	OR	Fatness in pediatric	OR	Plan of Action	OR	Ease problems in the smallest part of society
Alternative Term	OR	Child's overweight	OR	Program	OR	Arrange problems in the community

Table 2. Explanation of steps to reduce the incidence of obesity among children

No	Author (s)/ Country	Sample	Program	Long of Implementation	Implementation activities	Results
1	(Zacarías et al., 2019) / Mexico	50 mothers and 57 school-aged children (6 to 11 years old)	Niño Sano Adulto Sano program	October 2016 and May 2018	Stage 1: Assessment of needs frequently purchased by mothers with Food Frequency Questionnaire (FFQ); Stage 2: goal setting; Stage 3: Obesity prevention intervention with the Niño Sano-Adulto Sano program; Stage 4: Implementation. Recommendations to increase fruit and vegetable intake, adequate meal portions for children, reducing sugar intake, and creating a healthy menu; Stage 5: Evaluation. Child anthropometric measurements, self-efficacy to consume recommended fruits and vegetables, and Mother's knowledge, attitudes, and practices.	Mothers visited convenience stores most often 44.4%; Impact on obesity prevention. (1) BMI for age using z score -0.19 (95% CI -0.11 to -0.27; p < 0.0001); Knowledge, attitudes and practices (KAP) 2.87 (95% CI 1.97 to 3.77; p < 0.0001); Self-efficacy to vary diet 9.12 (95% CI 2.02 to 16.22; p = 0.013); Self-efficacy to consume recommended fruits and vegetables 11.47 (95% CI 2.96 to 19.98; p = 0.010); and Average self-efficacy 6.40 (95% CI 0.86 to 11.92; p = 0.025)
2	(Kummer et al., 2021) / USA	44 families with one or more children aged 5–11 years	Telehealth video conferencing group 'eatNplay'	Phase 1 (12 weeks); Washout (2 weeks); and Phase 2 (12 weeks).	Stage 1: Assessment Stress and quality of life management in telehealth 'eatNplay'; Stage 2: Implementation via weekly small group video conference calls covering 4–6 families (1 hour per session; total 12 hours) 'eatNplay' program as guiandce, recommendations, and	The 'eatNplay' program regarding physical activity between the two groups (n = 20 each) was identified as "large" (Cohen's d = 0.9 effect size). The control group averaged 39.57 minutes of physical activity (SD = 14.97) for overweight or

No	Author (s)/ Country	Sample	Program	Long of Implementation	Implementation activities	Results
					material related to eating outcomes encourage changes in children's behaviour regarding praising or rewarding healthy food choices; Stage 3: Evaluation—Telehealth 'eatNplay' program, effective weight control behaviour change interventions for children in rural communities.	obese children and 47.21 minutes (SD = 18.56) for healthy children, while the experimental group increased to 53.04 minutes.
3	(Homs et al., 2021) /Spain	810 children aged 8–12 years with obesity and 600 parents	FItness, VAlues and Healthy Lifestyle (FIVALIN) project	Three editions (1st – 2019/2020; 2nd – 2020/2021; 3rd - 2021/ 2022) of 10 months each	Experimental group stages:1 qualitative session (2 hours); 3 training (4 hours/training) face-to-face training method; 8 sports education sessions on health topics; 32 sports education sessions (1 hour/session); 8 workshops were held for 2 hours each session with the schedule: Basic evaluation; Duration and quality of sleep; Healthy diet; Emotional Wellbeing; physical activity (PA) & Sports; Closing; and Final evaluation.	Differences between the intervention and control groups were considered significant at $p < 0.05$
4	(Lambrinou et al., 2019) / Belgium, Bulgaria, Germany, Greece, Poland and Spain	Kindergartens (n=309) in six European countries with children aged 3 to 6 years	ToyBox - intervention	Conducted during the 2012-2013 school year	Implemented projects: Levels 1 and 2 relate to healthy snacks and daily consumption of healthy snacks in classrooms/kindergartens that use fruit and vegetables during the 2012–2013 school year; Levels 3 and 4 include implementing interactive classroom activities and delivering information through bulletins, tip cards and posters to parents/caregivers by teachers. The ToyBox intervention was implemented by kindergarten teachers who attended three training sessions by research staff for at least one hour per session.	The ToyBox intervention had an impact on the choice of healthy and unhealthy snacks, significantly increasing parents' sensitivity regarding the timing of snack consumption (limiting snacks while watching television α 0.11 (95% CI 0·05, to 0· 16) and permission only at certain times α 0.11 (95% CI 0.05, to 0.17; β −0.05 (95% CI −0.09 to −0.02) and increasing parental awareness of unhealthy snacks, while increasing parents' knowledge of recommendations for healthy fruit and vegetable snacks α 0.16 (95% CI 0.09 to 0.23); β −0.11 (95% CI −0.16 to – 0.07).

No	Author (s)/ Country	Sample	Program	Long of Implementation	Implementation activities	Results
5	(Anselma et al., 2019) / Netherlands	Four elementary schools in low socioeconomic neighborhoods with children aged 9–12 years	'Kids in Action' project	April 2016 to November 2019	Phase 1: Creating partnerships with schools and community centres; Phase 2: Formation of an Action Team consisting of an academic researcher and a research assistant; Phase 3: Intervention development held Action Team; Phase 4: Implementation and evaluation of the intervention. Meetings about participating in the implementation plan by partnering with communities;	(1) ENERGY-child questionnaire about the consumption of sugary drinks (0.71/0.59); play (0.80/0.65); Exercising (0.64/0.09); watch (Weekdays (0.67/0.63) and Weekend days (0.68/0.56)); playing games (Weekdays (0.67/0.35) and Weekend days (0.67/0.65)); (2) The DOiT questionnaire asks about the consumption of sweet foods and snacks (0.73/0.07); participation (0.98/0.86); long exercise (0.94/0.78); participation outside of sports clubs (. 0.64/0.33); (3) EuroQol about health assessment (0.83/−0.51)
6	(Liu et al., 2019)/ China	Twenty-four schools (n= 1200 students) children aged 8 to 10 years	Diet, ExerCIse and CarDiovascular hEalth--Children (DECIDE)	September 2018 to June 2019	Activities that focus on students (health education activities, strengthening physical activity, and monitoring students' weight and height periodically); Activities for parents (health education for parents and supervision and encouragement to increase children's physical activity outside of school); Activities towards school; (4) Smartphone Application 'Eat Wisely, Move Happy'.	There is a comparison of initial and follow-up visits based on body mass index (BMI), changes in prevalence and incidence of overweight/obesity, waist circumference, waist-to-hip ratio, systolic and diastolic blood pressure, body fat percentage, physical fitness measures, activity duration behavior physique.
7	(Reilly et al., 2019)/ United Kingdom	40 families who have children aged 6 and 14 years	Children's Health and Activity Modification Program ("C.H.A.M.P. Families)	Two years in the summer	Experimental group: C.H.A.M.P. Families (Dietary Behavior; Physical Activity; Empowerment and Autonomy; Healthy Food for Families; Improved Family Dynamics; Parental Self-Confidence and Health Behavior in Children)	Interventions to overcome obesity in children must start from the family, with parental involvement, group dynamics, and positive family communication essential for solving this problem.
8	(Li et al., 2019)/ China	Primary school (n=40) School Children age 6 until 7 years old (n=1,641)	Children's Physical Activity and Dietary Behaviour Changes Intervention	12 months	Step 1: Train 5 project teacher staff (CHIRPY DRAGON) and equip them with the program handbook. Step 2: Do measurement: anthropometry, Eating behaviours, Physical activity, Sedentary behaviours, Psychosocial outcomes (potential benefits and harms), and Blood pressure; Step 3: Evaluation process.	There was a decrease in children's BMI (−0.18, 95% CI −0.32 to −0.05, p = 0.007); proven to reduce obesity (OR 0.20, 95% CI 0.06 to 0.62, p = 0.005); there was a reduction in waist circumference −0.69, 95% CI −1.26 to −0.12, p = 0.017); actively exercising, dancing, or playing (OR 1.72,

No	Author (s)/ Country	Sample	Program	Long of Implementation	Implementation activities	Results
			(CHIRPY DRAGON)		Collecting data (Implementation record form) including daily children's challenges; Step 4: Economic evaluation to find a cost for children's food.	95% CI 1.22 to 2.43, p = 0.002). School-based obesity intervention attendance was high in 97.9% to 99.3% of children, and this program was cost-effective in children's food consumption (95% CI 0.000 to 0.007; p = 0.034).
9	(Xu et al., 2020)/ China	Elementary school (n=38) Children with age 3 until 7 years old (n= 4846)	Comprehensive intervention (nutrition education intervention (NE) and physical activity intervention (PA))	12 months	The intervention group is given a nutrition guidebook, hangs a poster "Pagoda Diet for Chinese" in class, and implements "Happy 10" as a physical activity program. Then, evaluating anthropometry measurements based on children's BMI, Dietary diversity using Food Variety Score (FVS), and food variety measurements using Dietary Diversity Score.	Comprehensive Intervention did not increase whole daily food intake variation (0 (95% CI 0 to 0,1; p = 0,382) in DDS9, 0,1 (95% CI -0,1 to 0,2; p = 0,374), DDS28 0,1 (95% CI: -0,1, 0,3; p = 0,186) however, there was changed to a healthy breakfast (FVS 0,1 (95% CI: 0 to 0,1; p <0,001). On the other hand, there was no increase in activity but rather a decrease in activity by -16.8 (95% CI -1 0.3 to 0.9); p = 0.023).
10	(Karmali et al., 2019)/ Canada	50 parent-child dyads with children aged 2.5 to 10 years	Co-Active coaching	six months	The experimental group is given Co-active coaching and health education, a 7-day step count with a pedometer, 24-multi-pass recall, filling in an international physical activity questionnaire (IPAQ) and continued by secondary measurement.	Evaluation Multi-dimensional scale of perceived social support (MSPSS) with Cronbach's alpha 0.84 to 0.92; Weight efficacy lifestyle (WEL) questionnaire with Cronbach's alpha 0.70 to 0.90; Self-efficacy for overcoming barriers Cronbach's alpha 0.73 to 0.95; Eating self-efficacy scale (ESES) Cronbach's alpha 0.70, p<0.001; Generalized self-efficacy (GSE) scale Cronbach's alpha 0.75 to 0.91; and Short-form 36 (SF)-36 Cronbach's alpha 0.85.

Genetics, intrauterine environment, parental factors, ethnicity, physique, sleep time, and diet influenced individual factors of obesity in children. Socio-economic factors were influenced by parental employment, education (individual and parents), household, and income) (Jebeile et al., 2022; Kansra et al., 2021) Social factors were influenced by housing, school, and literacy (Kansra et al., 2021). Frequently identified reasons for obesity in children in urban area was affected by high air pollution, which disturbed molecular mechanisms such as obesity pathogenesis (Zafra-Tanaka et al., 2023); the noise was associated with stress hormones and sleep deprivation; therefore, it influenced children's physical growth, especially risk of overweight (de Bont et al., 2021); lack of green space and lots of road traffic influenced physical activity and healthy behaviour (de Bont et al., 2021); and instant food consumption (Jebeile et al., 2022).

The inability to overcome individual factors, socio-economic, and society led to architectural body complexity, which had neuron regulation control and hormonal, gut-brain axis role in hunger and full, helped by sensory stimulation that gave the signal to gastrointestinal hormone towards uncontrolled food intake (Jebeile et al., 2022; Kansra et al., 2021). The hypothalamus, which controls appetite, is governed by the Ghrelin hormone as orexigenic, and the leptin hormone, secreted from adipose tissue functioning as body energy stores and anorexigenic, has dysregulation.

Nutritional intake overcome childhood obesity

The success of the program was not only assessed by anthropometry examination or BMI but also by some additional screening assessments to understand the program's effectiveness (Fan et al., 2023). The success of the program indeed already have a children's diet guide, daily children's energy needs, and limitation in children's sugar consumption.

A diet guide for obese children is required to recommend fruits and vegetables (Homs et al., 2021; Li et al., 2019; Reilly et al., 2019; Zacarías et al., 2019). Fruit and vegetable intake is different for boys and girls. You can use a cup to measure fruit and vegetable intake by 236.58 ml or use a measurement cup by 250 ml. Girls aged 12 to 23 months old needed ½ to 1 cup fruit and 2/3 to 1 cup vegetables; aged 2 to 3 years old needed 1 to 1 ½ cups fruits and vegetables; aged 4 to 8 years old needed 1 ½ cups fruits and 1 ½ to 2 cups vegetables; age 9 to 13 years old needed 1 ½ to 2 cups fruits and 2 to 2 cups vegetables; age 14 to 18 years old needed 2 cups fruits and 2 ½ cups vegetables. Boys aged 12 to 23 months old needed ½ to 1 cup of fruits and 2/3 to 1 cup vegetables; age 2 to 3 years old needed 1 – 1 ½ cups fruits and vegetables; age 4 to 8 years old needed 1 ½ cups fruits and 1 ½ to cups vegetables; age 9 to 13 years old needed 1 ½ - 2 cups fruits and 2 ½ - 3 cups vegetables; and age 14 to 18 years old needed 3 cups fruits and 3 – 3 ½ cups vegetables (Hamner et al., 2023).

Children's daily energy fulfillment is essential more energy when they have more physical activity (Homs et al., 2021; Kummer et al., 2021; Li et al., 2019; Liu et al., 2019). It was discovered that the daily energy requirement for infants is 100cal/kg/day; aged 1 to 3 years old needed 80kcal/kg/day; aged 4 to 5 years old needed 70kcal/kg/day; aged 6 to 8 years old needed 60 to 65 kcal/kg/day and age >9 years old needed 35 to 45kcal/kg/day (Unaiza Faizan & Rouster Affiliations, 2022).

Daily energy requirement for children correlated with sugar intake (Reilly et al., 2019; Zacarías et al., 2019). Parents' ignorance is needed to provide understanding (Mahajan et al., 2021). Sugar refers to natural and sugar-free sugar. Natural sugar is contained in fruits, vegetables, nuts, and lactose in milk and dairy food. Meanwhile, free sugar undergoes several processes. It was proven to have physiological consequences, such as ice cream, cake, biscuits, chocolate, soda, packaged juice, cupcakes, and so on (Zacarías et al., 2019). Maximum daily sugar measurement intake for children aged 2 to 4 years old was 15-16 grams or equal to 4 tablespoons; age 4 to 7 years old, it was 18- 20 grams or equivalent to 4-5 tablespoons; age 7 to 10 years old was 20-23 gram atau equal to 5 ½ tablespoon; age 10 to 13 years old was 24 - 27 gram atau equal to 5 ½-6 ½ tablespoon; age 13 to 15 years old was 27-32 gram or equal to 8 tablespoon; and age 15 to 19 years old needed 28-37 gram or equal to 9 tablespoon (Romano et al., 2017).

Physical activity overcomes childhood obesity.

Extensive energy release significantly helps to reduce obesity in children. Regarding the program's success, we cannot only evaluate the total released energy when doing physical activity but also the total whole energy release that must be released every day or 24 hours with total energy expenditure (TEE). TEE was a combined calculation of resting energy expenditure (REE), thermal effect of food, and energy release in physical activity (PA) (Acar-Tek et al., 2023). Total energy expenditure (TEE) in children aged 1 to 18 years old in 24 hours for boys and girls was absolutely different. TEE in boys is $310.2 + 63.3 \times \text{body weight (kg)} - 0.263 \times \text{body weight (kg)}^2$ and TEE in girls is $263.4 + 65.3 \times \text{body weight (kg)} - 0.454 \times \text{body weight (kg)}^2$(Komura et al., 2017). REE became the biggest component of total daily energy release because all body organs use 60-70% of energy to function automatically (Acar-Tek et al., 2023; National Academies of Sciences, 2023). It was known that the REE calculation in boys and girls was = (0.02606 × Weight (kg)) + (0.04129 × Height (cm)) + (0.311 × Gender (sex) – (0.08369 × Age (years)) – 0.808. In genders, boys get "1" points, and girls get "0" points (Fuentes-Servín et al., 2021).

Reaching results in accordance with TEE; therefore, we need to measure energy release when doing physical activity. The higher children's physical activity is, the closer they get to achieving TEE's target. It was proved that children's physical activities, such as dancing, play, and squatting, resemble animals; it could reduce energy with an average of 25,0-35,1 kcal per 10 minutes (Xu et al., 2020).

Challenges in overcoming childhood obesity.

To attain long-term success in childhood obesity intervention through change to a healthy and positive lifestyle has been planned protractedly; however, in fact, it was difficult to maintain (Clemente et al., 2022). Internal challenges come from inside the research team. Obesity Intervention should be considered carefully because substantial preparation is needed before implementation. This intervention indeed must have guidance regarding healthy food intake considering children's age, also giving seminars and workshops to the society about it. Inspection of parent's income in the research area and healthy food prices that parents should purchase is also needed. It is indeed directly proportional to the respondent's hometown, especially the urban area. Technology advancement also eases the implementation of this intervention, yet socialization, understanding evaluation, and parents' readiness in time they use the obesity intervention application are essential. Otherwise, in implementing this obesity intervention program, a considerable cost is necessary, as well as government support.

External challenges come from the respondent itself. During the implementation of the obesity intervention program, it was known that urban area became one contributor to the incidence of childhood obesity because of low income; however, it was not an excuse, as every country have primary health service to help society to prevent childhood obesity (Mandelbaum & Harrison, 2022). Parents play a crucial role in creating and developing healthy lifestyles and active exercising at home for children. Parents formed behavior and discipline when children were eating and exercising in various ways at various stages in every child's growth and development without being affected by other family members' assumptions (Clemente et al., 2022). Besides, it was essential for schools to cooperate with medical services to form a curriculum policy that required physical activity in children (Liu et al., 2019), food service in the canteen which included total calorie intake, and screening service about children's nutritional status which became part of school health facility (Liu et al., 2019; Xu et al., 2020).

The limitations of this research are using the literature review method, and it is essential to design experimental-based activities to see the effectiveness of natural diet and physical activity programs in treating obesity in children.

Conclusion

It is not easy to achieve success in implementing an obesity intervention program. Proper and thorough preparation is essential in implementing the program to minimize the challenge. Children's obesity intervention is not only by giving healthy diet but also doing calculations on total energy released every 24 hours by giving games as children's physical activity. Parents play a crucial role in overcoming

childhood obesity, and society becomes the primary support to suppress the incidence of childhood obesity.

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