

Review

Intervention empowerment of families in preventing and controlling overweight and obesity in children: A systematic review

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Abstract

There have been an increasing overweight and obesity in very anxious children. Furthermore, obesity is a condition that occurs due to the accumulation of excess or abnormal fat. This disorder is believed to be the most significant public health problem that affects children in the 21st century. This study aimed to examine the literature review, articles and research results analyzing the effectiveness of family or parent empowerment interventions through health education. Many research articles were searched on several databases such as PubMed and PreQuest, using the following keywords which include “family empowerment”, “overweight”, “obesity”, “health lifestyle”, “BMI”, “children”, “RCT” starting from 2014 to 2019. The searched results obtained 162 articles on family empowerment, overweight and obesity. Out of the 162 articles, 20 were selected that discussed family empowerment interventions for overweight and obesity. Critical analysis of the 20 articles was carried out based on design, sample, treatment, parameters, findings and conclusions. The literature review analysis showed that family empowerment interventions in the form of health education or promotion activities vary widely in terms of methods, components, duration, individuals involved, specificity and effectiveness. Furthermore, this intervention consists of training activities, courses, and teaching practices. Statistical analysis showed that all these methods significantly increased the ability and independence of the family in controlling overweight and obesity. In conclusion, health education interventions that are packaged in various programs are proven to significantly improve the ability of families or parents in preventing and controlling overweight and obesity in children.

Introduction

Overweight and obesity is a chronic mismatch between food intake and the energy expended. It is a situation whereby food

consumption exceeds the normal requirements for increasing body mass index.¹ The overweight and obesity in children increased drastically with the most recent estimates that indicate it's effect in approximately 340 million worldwide.² Furthermore, there have been an increasing overweight and obesity in anxious child.³ The addition of cases overweight and obesity in children occurs in all geographical areas in the world, especially for residents living in urban areas both in developed and developing countries. The world health agency reported that total number of cases obesity for children is 340 million, of which 83.3% are in developing countries. Therefore, disorders have become the center of attention of WHO.⁴ A foresight report on obesity on its estimated prevalence in the general population of the world and based on the current trend shows that in 2050, 60% of men and 50% of women will suffer from obesity.⁵

Childhood is regarded as the most important period of life. health problems or illness that occurs during this period, would be brought to maturity or become a risk factor for the onset of diseases at adulthood.⁶ The growth and development of children will be disrupted due to overweight and. However, other health problems such as psychological disorders and cognitive dysfunctions also affects their development. Abnormalities in body weight that occur in adults already happened in children adolescent. Furthermore, previous studies has shown that 10% of school-age children in various parts of the world are obese.⁷

Factors that causes obesity in children are very complex, namely biological, psychosocial, behavioral and cultural. The biopsychosocial framework for understanding obesity shows that the biological, psychosocial and behavioral factors greatly contribute to the weight status of children. These include the characteristics of the child, such as sex, age, birth weight, food intake, physical activity behavior, parenting styles and family characteristics, lifestyle, family, leisure and the environment.⁸

The physical and psychologi effects of obesity are very detrimental to them and has the potential of continuing into adulthood. Short-term health risks of obese children include metabolic disorders such as high blood pressure, dyslipidemia, homeostatic glucose disorders, and syndrome metabolic.⁹ In the

Significance for public health

Overweight and obesity are disorders that occur as a result of the accumulation of nutrients and fats which exceeds the normal body weight. The presence of this disorders in school children is a major problem because it continues into adulthood and act as risk factors for the incidence of metabolic and degenerative diseases. The Prevention and therapy of obesity in children is carried out by regulating their diet, increasing their physical activities and changing their pattern of behavior. One of the effective way of preventing overweight and obesity is through a family-based approach. Family empowerment interventions through Health Education and behavior change ultimately prevents and controls overweight and obesity. This study describes the strong relationship between family empowerment interventions and the efforts to prevent and control overweight and obesity.

long term, obesity in children tend to settle when the age of adulthood is attained, this puts the risk of morbidity such as diabetes, cardiovascular, stroke same cancer. In the psychological context of obesity, children generally experience poor body image and low self-esteem which often develops into anxiety and depression in adulthood.¹⁰ Proactive strategies are needed when childhood has been advocated for, and this would help in prevention of overweight and obesity.¹¹ Examples of such strategies include promoting a health diet, physical activity, and the subtraction of screen time (watching TV, playing games). This is important in preventing obesity among children in the early period of life and it was also stated in the guidelines pioneered by WHO on the prevention of obesity in children.¹²

The environment provides a great impact on all social, cognitive, behavioral and health aspects, including overweight and obesity.¹³ Intervention at an early stage when the behavior and biology of the body is relatively unchanged, is capable of preventing overweight and obesity in children.¹³ Furthermore, such interventions need to begin in the period of childhood, and parents have a strategic role to play in shaping the health and healthy lifestyle of their children at an early age.¹⁰ Parents need to watch their children's weight and eating behavior and control their food intake. Furthermore, the involvement caregivers in the stages of children is reported to enhance the long-term effects of weight control interventions.¹⁰ Parents is closely related to a healthy lifestyle and children's behavior, family-based intervention are used to effectively prevent obesity by providing behavior changes for all family members. Theoretically, the process and results of family empowerment provide knowledge about the benefits and strategies of obesity prevention.¹⁴

The most effective way of preventing and controlling overweight and obesity is through family empowerment. Social reality context, parents of children that are overweight and obese are able to control the risk factors for obesity through family empowerment. In other contexts the empowerment of family and parents include the parental knowledge about nutrition, its influence on the choices and structures of food, and eating patterns. Furthermore, it also include sedentary habits such as watching TV, movies, playing games, cellphones, and everything influential in the development of children's lifetime habits that contribute to normal weight, overweight or obesity.⁵ The construction of other measured empowerment of parenting self-efficacy is important in maintaining obesity-risk behaviors. It also include the beliefs of parents if promotion and health lifestyle through by parents can effectively make a difference to their children.¹⁵ The reason for choosing family empowerment interventions is because it is one of the most effective and successful methods of managing and preventing obesity in children.¹⁶

Design and Methods

Strategy the search was identified from relevant electronic databases, namely PubMed and PreQuest. The lists of reference for all relevant articles were searched simple to further identify additional studies that may exist and have not been captured by search engines. In addition, the articles sought were limited to the last 5 years. Search strategies for English-language research articles that are relevant to this research topic were carried out using the following keywords, namely "family empowerment", "overweight", "obesity", "health lifestyle", "BMI", "children", "RCT". This study analyzes family empowerment interventions to improve the ability of families in preventing and controlling

overweight and obesity in children. Furthermore, the selection criteria was based on the PRISMA checklist and the study design used was RCT (randomized control trial). However, other quantitative studies (cross-sectional, laboratory-based observations, longitudinal) were not included.

Results and Discussions

In the beginning of the search, 13,056 articles were obtained (Figure 1). The proportion of articles (n=8145) was excluded because it was not relevant, and 4911 articles were filtered. Most of them (n=4751) were released at the time of review because they were still irrelevant. One hundred and sixty full text articles were read, while the remaining twenty-two were included in the analysis of this study because they are very relevant to the literature review and could be further analyzed. In general, the articles that were used as samples in this study were the results of a quasi-experimental design research with a pre-test and post-test control group, using the RCT approach (Table 1). The advantages of the quasy-experimental studies is that they are often carried out at the population level and not the individual level. Therefore, they are capable of covering a larger population. Quasi-experimental studies are considered more real because it shows the effectiveness of the real world and the intervention that is being implemented.¹⁷ The samples used in this study were parents, children and health workers with a total number of 1335. Furthermore, the proportion of the sample in the intervention group was slightly more than the control group. Most of the studies did not provide intervention for the control group. From the 20 studies that have been reviewed, it was shown that majority of observations in the intervention group were always better than the control group.

The method of giving intervention was carried out with various health education programs, which include health education intervention, educational program, educational intervention, home based management, and participative health education.^{4,17-19} Furthermore, the components of the intervention were training activities, courses, and teaching practices. This Health Education approach was very important. Health Education does not only increases knowledge and skills but also improves long-term health and acts as a powerful tool in promoting health justice.²⁰ The media used in implementing the intervention include flipcharts, posters, books, and modules. The duration of administration of the research interventions varied widely, ranging from 6 weeks to 4 years.^{4,21} The parameters seen in the results of this study include increased ability and the family or parents independence in the prevention and control of overweight and obesity, by measuring several existing independent variables Some of the main variables in the prevention of obesity and obesity are organizations that regulate nutrition, behavior and lifestyle changes.²²⁻²⁴

The results of the research that were critically examined for the preparation of the literature review showed that the strategies needed to improve the ability and independence of families or parents in the prevention and control of overweight and obesity are health education and other approaches in the form of training activities, courses, teaching practices in the classroom, and using various media, such as flipcharts, posters, books, and modules.²⁵⁻²⁷ The socioeconomic backgrounds of families or parents are very diverse and it will greatly affect the effectiveness of prevention and control of overweight and obesity.^{28,29} From the 20 articles reviewed, it was shown that not all studies produced signifi-

Table 1. A summary of the study intervention empowerment of families to prevent and control overweight and obesity in children based on RCTs.

Author	Sample	Intervention	Duration	Relevant findings	Conclusion
Small <i>et al.</i> ¹⁷	Parent-child partner (n=60). Intervention group (33) and control (27).	Intervention of cognitive-behavioral and development of skills of the elderly for the treatment or prevention of obesity	12 months	These findings on the intervention of cognitive-behavioral therapy was given to parents to increase their skills and ability to make modifications to the environment that healthy for their children. This brought about both internalizing and externalizing behavior in child compared to the control group.	A parent-based or parent-focused obesity- care/prevention approach showed a positive effect on the child's anthropometrics and an important impact on their behavior.
Cao <i>et al.</i> ⁴	-14 elementary school -7 SD intervention groups -7 SD control group. There were 1287 students in the treatment group and 1159 in the comparison group.	Health education, diet and exercise	4 years	Overweight and obesity in general decreased from 28.92% in 2011 to 24.77% in 2014 the difference was 4.15% in the treatment group compared to a decrease of 0.03% in the comparison group. The treatment group was much less likely to be overweight and obese and to experience a decrease in average BMI scores than the control group, especially for students who were overweight or obese.	The intervention approach targeting the family-individual-school is generally able to reduce overweight and obesity.
Daniels <i>et al.</i> ¹³	A total of 698 mothers devoted extensively to the health of their babies. These mothers were randomly given the opportunity to attend age 5 years and education for 6 sessions, 12 weeks.	Health education	12 weeks	Retention at 5 years of age is 61%. For ages 2 to 5 years, treatment of mothers was reported to be non responsive to inadequate feeding practices on a 6 out of 9 scale. At 5 years of age, there was a more appropriate response to food rejection in 7 of the 12 items (F 0.05). The anthropometric results (BMI Z-score; p=0.06) were statistically not significant.	A guide for anticipatory mothers about supplementary feeding was reported to have increased the protection against feeding practices. The effect of this treatment persisted until was in line with the insignificant trend for children who had the lowest BMI Z values at each point calculated after treatment.
Benestad <i>et al.</i> ²⁰	37 children in each group. 69 families	Education healthy lifestyles, family education. Behaviors, motivated to a healthy lifestyle	2 years	Half of the 90 children are women. In general, they were (SD) 9.7 (1.2) years old, BMI 28.7 (3.9) kg/m ² and SD BMI 3.46 (0.75). The children had relatively small adjustment (95% CI) and increased BMI (-0.8 (-3.5 to -0.2) kg/m ² during summer camp. However, the decline in BMI was relatively the same (-0), 11 (-0.49 to 0.05).	The 2-year trial of the family camp care program showed relatively similar results for BMI SDS of severely obese children with the usual outpatient care measures for families.
Stern <i>et al.</i> ²²	66 caregivers	NOURISH-T intervention. Health education and skill competence	16 weeks	The results showed that the feasibility and effectiveness of the intervention were compared to the control group.	Most pediatric cancer patients survived into adulthood, but were at increased risk of weight gain and decreased PA.
Wu <i>et al.</i> ²¹	623 children and adolescents that are obese and overweight (393 interventions and 230 controls).	Intervention: Soccer Training in aerobic Endurance training Combination	12 weeks to 6 months	The results showed that PA was generally associated with improved CRP levels (mean difference) - 0.45 mg/l, p=0.02) in overweight or obese children and adolescents. From 115 adolescents who are overweight and obese, it was found that the PA results did not significantly reduce IL-6 levels. In addition, meta-regression analysis showed a statistical association between CPR rates and changes in BMI.	Physical activity was associated with a very large reduction in CRP concentrations, but there was no significant association with IL-6 or TNF- α obesity/overweight children. However, there is a tendency to decrease IL-6.
Warschburge <i>et al.</i> ¹⁰	Parents of obese children (n=686; 7-13 years)	Health education and skills	6-12 months	Significant reduction in intervention groups from 0.24 (95% CI 0.18 to 0.30) BMI-SDS points from initial hospitalization until the first year. However, there was no difference at the one-year follow-up (average difference 0.02; 95% CI -0.04 to 0.07).	Care and hospitalization proved to be very effective, additional training in the elderly do not produce better results in the maintenance of weight loss in the long term.
Warketin <i>et al.</i> ²³	98 children 49 intervention groups 49 controls	Intervention Physical activity	10 months	Prior to the physical activity intervention, 85.7% of the children in the treatment group occupied the 95 th / over percentile position for hypertension. At the end of the study there was a tremendous decrease where this value became 16.13% (p = 0.001).	Obesity in children will increase the potential for hypertension. To prevent this can be through physical activity and nutrition regulation. One effective way to measure blood pressure is to use percentiles, according to age, weight and height.

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Table 1. Continued from previous page.

Author	Sample	Intervention	Duration	Relevant findings	Conclusion
Wen <i>et al.</i> ¹²	The trial took 1155 mothers during the third trimester of pregnancy. Parallel RCTs with the number of mother-child pairs expected	Health education through telephone and SMS	24 months	Support for a combination approach between telephone and SMS interventions is a new model that is estimated to produce better results as well as lower costs and wider coverage.	The telephone and SMS approach is a new and effective approach.
Larsen <i>et al.</i> ¹¹	8 doctors, 6 nurses	Health education, prevention and motivation for diet, physical activity, healthy lifestyle	60-70 min for each FGD	They recognize that overweight management during childhood was a complex task that requires evidence-based strategies with the possibility of supervision. Health experts had issues in overcoming overweight in children. However, increasing awareness of obesity in childhood and the consequences in the society are considered useful in knowing the best way to overcome this problem.	Health professionals in general practice recognize that they have obligations, capacities, and special roles in the management of obesity in childhood. The implementation of future management programs must overcome obstacles outside the evidence-based standard strategy.
Resnicow <i>et al.</i> ¹⁸	42 practitioners 645 patients	Health education for parents. Short interview and motivation	2 years	At the 2-year follow-up, the adjusted BMI percentiles were 90.3, 88.1, and 87.1 for groups 1, 2, and 3, respectively. In general, better results were found in group 3 ($p=0.02$) compared to group 1. For all groups, namely 1, 2, and 3 the mean change from the baseline percentile body mass index was 1.8, 3.8 and 4.9.	MI given by the provider and RD (group 3) resulted in a statistically significant reduction in the percentage of BMI.
Döring <i>et al.</i> ¹⁹	1355 families with 1349 babies	Health education and skills	39 months old	There were no statistically significant difference in the children's BMI ($= -0.11$, 95% confidence interval [CI]: -0.31 to 0.08), waist circumference ($= -0.48$, CI 95 %: -0.99 to 0.04), and the prevalence of being overweight (relative risk = 0.95 , 95% CI: 0.69 - 1.32). No significant intervention effect was observed in the maternal anthropometric data or regarding the child's physical activity habits. There was a small intervention effect in terms of healthy food habits among children and mothers.	There were no significant group difference in children and mothers anthropometric data and physical activity habits. However, there was some evidence to suggest healthier food habits, but it needs to be interpreted with caution.
Pakpour <i>et al.</i> ⁷	409 Iranian adolescents (age range 14-18 years) were randomly assigned to the parent-supported MI treatment (MI + PI) including assessment only (passive control).	Intervention, Diet with a balanced nutritional menu and physical activity	12 months	Against these parameters we found better results for most of the outcome parameters for MI + PI (eg. mean score of 6 SD BMI: $2.58.60.61$) than the passive comparison group. The results of anthropometry, biochemistry, psychometry and behavior also explain the same thing.	In controlling obesity, MI approach which is fully supported by parents is a powerful method and has a positive effect. These results can be an important reference in regulating MI at the school level.
William <i>et al.</i> ²⁵	229 families and 251 children	Health education for diet, care and physical activity	6 months	There are 78% of families who are willing to become respondents where there are 92% of mothers and 79% of children aged 2-9 years who attend at least one session. Most of the families (69%) took this program seriously.	Substantially, it is necessary to know methods to involve disadvantaged families who have a high potential for obesity in childhood. Understanding different sources of reference and parents' readiness for change can help in tailoring program content
Robertson <i>et al.</i> ²⁸	120 families	Health education, lifestyle changes, parenting	10 weeks	There were 115 families or 128 children who took part in the FFH program, which was taken randomly. The results showed that the 12-month body mass index z-score (0.114 , 95% CI- 0.001 to 0.229 , $p=0.053$; $p=0.026$ and referring to UC showed insignificant differences. In the economic context explaining the larger average cost at FFH compared with UC, the difference was roughly (\$ 998 vs \$ 548 , $p<0.001$).	Economically, UC is more efficient than FFH when it comes to controlling obesity.
Buscemia <i>et al.</i> ²⁹	362 participants	Health education; nutrition and physical activity	Intervention (14 weeks) and follow-up of 1 and 2 years	There was retention in several time periods ie for 14 weeks the retention was 89%, for a duration of 1 year the retention was 71%, while for a follow-up of 2 years the retention was 73%. Furthermore, the intervention with this method, for 14 weeks the participants completed the assessment by 95% and for 1 year by 88%. Other retention outcomes of 91% and 89% for the 12 and 18 month periods were clearly demonstrated in the third study.	Retention of success requires adequate input, including rational resource improvement, planning systems, experience and flexibility.

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Table 1. Continued from previous page.

Author	Sample	Intervention	Duration	Relevant findings	Conclusion
Karmal <i>et al.</i> ²⁶	50 parents and children	Health education and training	3 months	When compared to only providing education, it is clear that there is a big difference in providing education plus intervention.	Given that the parent is in control of the behavior, physical activity and nutrition of their children, interventions that supports their healthy choices should be explored and promoted.
Jurkowski <i>et al.</i> ¹⁴	All parents of 423 children (ages 2-5 years)	Training	10 months	Compared with before the intervention, there was a big change in the empowerment of resources for parents in the follow-up phase, including children's weight ($t = 3.235, p < 0.01$), physical activity ($t = 4.459, p < 0.001$), and diet ($t = 4.04, p < 0.001$). Children's screen time ($t = 2.049, p < 0.05$) was well controlled with appreciable changes in parental self-efficacy.	The results of the pilot study of CHL are reported to provide evidence of its feasibility and in the context of preventing obesity it can shift the target to low-income families. Interventions need to be fully supported by parents while still considering the socio-ecological situation.
Taylor <i>et al.</i> ²⁴	686 pregnant women	Health education, promotion of breastfeeding, healthy eating, physical activity	6-24 months	After 24 months of intervention there was little effect on body mass index ($p = 0.086$). However, there was an effect on the group as a whole ($p = 0.027$). An exploratory analysis of "sleep intervention" showed a positive effect on obesity compared with sleep and combined with FAB and comparison: OR 0.54.	Nutrition intervention and management do not appear to have an impact on changes in children's body weight
Fagg <i>et al.</i> ²⁷	298 children	Education, vocational training and increased motivation.	6 - 12 months	The MEND program starts with children who are more obese than overweight, excluding obesity, women, Asian, from single-parent families, living in less conducive socio-economic conditions, living in cities rather than rural areas. 'Normal' levels of psychological stress, are boys with single parents, live in less favorable socioeconomic conditions, and have participated in relatively large groups of MEND programs, or where administrators run more programs.	The terms or take of MEND are unlikely to be compromised. Even though its existence will help strengthen the involvement of marginalized groups. However, this was reduced due to the completion of the program for those living in disadvantaged socio-economic conditions.

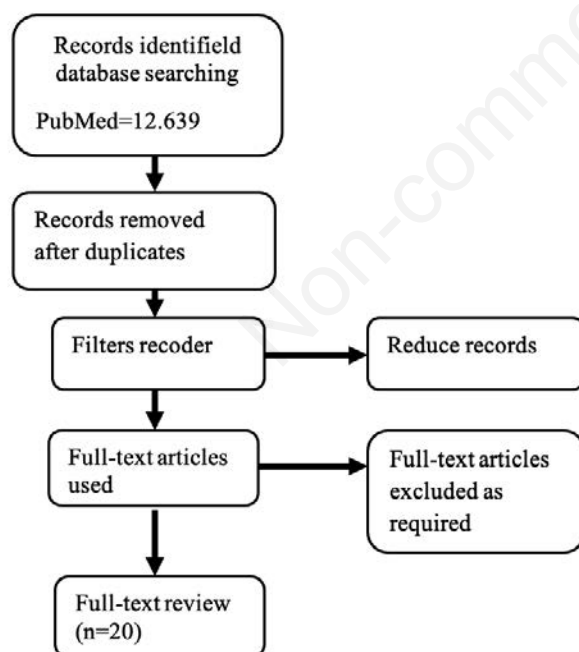


Figure 1. Prisma flowchart.

cant values on all parameters measured. Through family empowerment, parents or related stakeholders could optimize the health education program by modifying the methods of providing interventions and the media used, and relevant stakeholders to achieve optimal results.

Based on the analysis of the 20 articles, the participative Health Education method was recommended to be applied in all families in order to prevent overweight and obesity. This intervention has several advantages, which include 1) it occurred in a smaller scope such as the family level for it to be more effective, 2) the pattern of intervention could be flexible according to the situation of each household, 3) the media used varies greatly, and 4) the duration of the intervention was quite long (± 6 months) in order to guarantee the resistance of health behavior in the community.

Conclusions

Health education intervention activities that are packaged in various programs are proven to have an effect in increasing the ability of families or parents to significantly prevent and control overweight and obesity.

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