



HOME BASED INTERVENTIONS FOR OBESITY AMONG SCHOOL CHILDREN AND ADOLESCENTS: A SYSTEMATIC REVIEW

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Abstract

Background: Globally, the prevalence of childhood obesity has risen in recent years. The International Association for the Study of Obesity (IASO) and International Obesity Task Force (IOTF) estimate that 200 million school children are either overweight or obese.¹

Objective: To examine systematically the evidence from randomized controlled or clinical trials (RCTs) and Quasi experimental research design to identify how family/parents have been involved in childhood obesity home based intervention and to examine the effects of multidisciplinary lifestyle intervention to treat overweight/obese children and adolescents.

Search strategy and Data Sources: Studies were electronically searched using Pubmed, Medline, Embase and Cochrane database from 2003 to 2021. Studies based on the selected inclusion criteria as well as the intervention for Obesity and the research Design.

Results: One hundred and seventy two articles were identified through the five databases and cross referencing. At the end 9 articles were selected based on criteria.

Conclusion: A family-based multidisciplinary approach is effective in the the health status, nutritional habits and physical performance in children.

Key words: Childhood Obesity, Home based intervention,

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Introduction

Childhood obesity is a complex health issue. It occurs when a child is well above the normal or healthy weight for his or her age and height. The causes of excess weight gain in young people are similar to those in adults, including behaviour and genetics. Obesity is also influenced by a person's community as it can affect the ability to make healthy choices.²

Obesity prevalence was 13.4% among 2- to 5-year-olds, 20.3% among 6- to 11-year-olds, and 21.2% among 12- to 19-year-olds. Childhood obesity is also more common among certain populations.³

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Children who have obesity are more likely to become adults with obesity.⁵ Adult obesity is associated with increased risk of several serious health conditions including heart disease, type 2 diabetes, and cancer.⁶

If children have obesity, their obesity and disease risk factors in adulthood are likely to be more severe.⁷

Materials and Methods

A systematic review was conducted to explore the approaches on managing overweight and obesity among school children. The review question was: How effective are intervention(s) in reducing weight related outcomes including anthropometry and body composition among overweight or obese schoolchildren? And with the the purpose of the present study is to examine the effects of multidisciplinary lifestyle intervention to treat overweight/obese children and adolescents.

Search strategy and Data Sources

Potential studies were electronically searched using Pubmed, Medline, Embase and Cochrane database from 2003 to 2021. Studies based on the selected inclusion criteria as well as the intervention for Obesity and the research Design. Search strategy was performed using Medical Subject Heading terms (MeSH) and keywords such as children OR child OR pediatric Obesity, diet OR food and nutrition, exercise OR physical activity for exercise.

Study Selection

Randomized controlled or clinical trials and Quasi experimental research design (RCTs) (ie, addressed diet, physical activity, and/or behaviour change) among children aged 5 to 18 years without major intellectual or developmental disabilities were considered. Published articles with peer reviewed, written in English, full text available. Studies were excluded if the trial did not include a control or comparison group, Studies are mainly focused Family/Home management on obesity and/or weight gain measures to reduce Obesity.

Study Screening and Data Extraction

In the first analysis 172 articles were reviewed. After removing duplicates and screening the titles and abstracts 17 articles were selected for full text and 9 studies were selected which met the inclusion. The articles were categorized as per sample, the instrument used to evaluate the outcome of study, the methodology and statistical analysis.

Based on inclusion criteria all retrieved citations were screened. Duplicates were removed; multiple articles published from the same trial were included if the outcome measure, follow-up time frame, or parent variables differed. Titles and abstracts of all articles were reviewed, followed by full-text articles if inclusion could not be determined from the title and abstract. A data extraction template was then developed to meet the aims of this review, from each included article data were independently extracted. It includes bibliographic information, population (demographics, sample size, and baseline characteristics), family/parent involvement, study design (duration, contact, and format), children's intervention approach, parent intervention approach, weight outcomes of the children, and parent outcomes (if reported).

Statistical Analysis

Descriptive analysis in terms of mean, standard deviation, and percentages were computed for the variables investigated. Student's *t*-test for Paired Sample was used to compare all assessment measures (anthropometry, nutrition habits, and physical activity) before and after intervention. Analyses were limited to participants with baseline data on the different measurements and performed using SPSS, version 21.0.

Results

One hundred and seventy two articles were identified through the five databases and cross

referencing. Due to duplication twenty seven were removed. After screening the titles and abstracts, 77 full text articles were retrieved and assessed for eligibility. Sixty eight articles were excluded because they did not fulfil the selection criteria. The reasons for exclusion was included participants age were not between 5 and 18 years of age (n = 12), studies identified were neither RCT nor quasi (n = 16), the comparison group was children with metabolic associated disorders (n = 09), intervention focused on Obesity prevention (n = 27), not an original research article (n = 4), not in English language. At the end 9 articles were selected based on criteria.

Discussion

This review has focused and identified lifestyle interventions for childhood obesity treatment that involved parents/family. Most of these trials

delivered the same type of intervention to all experimental groups while manipulating the target of the intervention (parent, children or both). Although some evidence suggests that parental /family involvement might result in greater weight loss in children compared to interventions that included parents or children alone. This review is strengthened by its focus on a unique, understudied population.

Conclusion

A family-based multidisciplinary approach is effective in the the health status, nutritional habits and physical performance in children. BMI was the most common variable used to measure children's treatment outcomes, yet it was operationalized in different ways across studies, including change in BMI percentage.

Author, year, country	Study Design	Participants, Sample size	Intervention /Control	Intervention length, Follow up from baseline,	Intervention Provider	Outcomes	Significant difference
Panagiotis Varagiannis , Emmanuella Magriplis et al ,2021, Athens. ⁸	Randomised control trial	Parents and school aged overweight or obese children, 8–12 years of age, 115 children	Three different family-based interventions: Group I -groupbased-12 training bi-weekly 1-h sessions. Group II -individual-based -12 bi-weekly, 30-min sessions. Group III -website approach-12 bi-weekly videos-20 to 30 min. Two educational kits were provided to the participants at the beginning of the intervention	6 months	Group 1 - Various experts like dietitian, a psychologist, a physical education trainer, and a chef. Group 2 – had interpersonal family meetings with a dietitian and Group 3 training through a specifically developed website	Anthropometric , dietary, physical activity, and screen time outcomes were measured at baseline and at the end of the study.	Within-group comparisons indicated significant improvement in body weight, body mass index (BMI)-z-score, physical activity, and screen time from baseline in all three study groups (p < 0.05). Furthermore, total body fat percentage (%TBF) was also decreased in Groups 2 and 3. Between-group differences varied with body weight and %TBF change, being larger in Group 3 compared to Groups 1 and 2, in contrast to BMI-z-score, screen time, and health behaviors, which were significantly larger in Group 2 than the other two groups.
Shirley M. Moore, Elaine A. Borawski et al ,2019 ,US. ⁹	Randomised clinical trial	360 middle school children	Family based intervention-Healthy change - cognitive behavioral and motivational interviewing interventions and system change process improvement techniques and restructuring family daily routines .25 face-to-face sessions in Year 1, Alternating monthly face-to-face group and individualized telephone sessions in Year 2, and 4 face-to-face and 8 telephone sessions in Year 3. And Control Group 1 hour of private coaching on healthy eating and physical activity in Year 1 as well as a social telephone call and social event in all study years.	Interventions were 3 years in length; data were collected annually for 3 years	trained and certified personnel at the Clinical Research Units and 2 trained interventionist (school teachers or recreation center Personnel) Dietitian	Primary outcome-BMI Secondary outcome-waist circumference, tricep skinfold thickness, dietary intake (three 24-hour dietary recalls	No significant differences were found in adjusted BMI slopes between either of the family-based interventions and the control group (P = .35). No differences were found between the experimental and control groups on secondary outcomes of diet, physical activity, sleep, perceived stress, or cardiometabolic factors.

Jacqueline F Hayes, Katherine N Balantek et al, Washington, 2019. ¹⁰	Randomised clinical Trial	181 parent-child dyads Children-7-11 years.	Participants engaged in a weekly, 16-session FBT. concurrent 45-minute parent and child groups and a 30-minute individual family session	Four Months weekly, 16-session FBT	Trained expert from respective field	Anthropometrics, Diet, Physical activity, Home environment, Neighbourhood Recreation and Food Environment	Families successfully made healthy home environment modifications during FBT. Regression models showed reducing RED (e.g., high energy-dense and low nutrient-dense) foods and electronics in the home during FBT had positive effects on child weight and weight-related outcomes. No neighborhood food or recreation environment variables were significantly related to outcomes.
Yvonne C. Anderson, Lisa E. Wynter et al, 2017, New Zealand. ¹¹	Unblinded Randomised control trial	5-16 years 239 children and adolescents	Intervention group (home-based assessments at 6-month intervals and a 12-month multidisciplinary program with weekly group sessions) or to a minimal intensity control group with home-based assessments and advice at each 6-month follow-up.	6 months follow up for 2 years with follow-up planned at 24 months and 5 years	physical activity coordinator, dietitian, and psychologist	BMI, Physical activity and Quality of Life	Mean BMI SDS 3.12). Both groups displayed a change in BMI SDS at 12 months from baseline (20.12 control, 20.10 intervention), improvements in cardiovascular fitness ($P < 0.0001$), and improvements in quality of life ($P < 0.001$). Achieving 70% attendance in the intense intervention group resulted in a change in BMI SDS of 20.22.
Claudia Ranucci, Roberto Pippi et al, 2017, Italy. ¹²	Quasi experimental study design	74 children and adolescents with Overweight /obesity. Childre ($n = 43$, aged 5–12 years) and adolescents ($n = 31$, aged 13–17 years)	A multidisciplinary structured program including the nutritional intervention, the exercise intervention, and the psychological intervention	Six months for children and three months for adolescents.	Pediatric clinic of the local hospital and Exercise Physiologist	Several anthropometric measures (height, body weight, body mass index or BMI, waist circumference, and body composition), cardiometabolic risk index (waist-to-height ratio or WHTR), and nutrition habits of the participants and their families.	Children. After the intervention (T1) data showed a significant decrease in all the measures. BMI ($t = 3.96$; $p < .001$; $d = 0.27$), waist circumference ($t = 4.02$; $p < .001$; $d = 0.27$), and WHTR index ($t = 3.36$; $p < .001$; $d = 0.44$) showed a significant reduction with a small effect size. Regarding body composition (subgroup of 33) data showed a significant decrease with a large effect size of percentage for fat body mass ($t = 4.61$; $p < .001$; $d = 0.83$) and a significant increase in percentage of fat-free mass with a medium effect size ($t = -4.77$; $p < .001$; $d = 0.50$). 3.1.2. Adolescents. After the three months intervention adolescents showed a significant decrease in waist circumference ($t = 5.60$; $p < .001$; $d = .35$). The subgroup ($N = 23$) assessed with BODPOD showed a reduction of fat body mass percentage ($t = 4.52$; $p < .001$; $d = 0.50$) with a medium effect size and an increase of fat-free mass ($t = -3.17$; $p = .004$; $d = .41$).
M.Yacobovitch-Gavan, D. Wolf Linhard et al, 2017, Israel. ¹³	An Open label randomised study	270 children. age 5–11 years. 89 in the parents-only, 84 in the parents-child and 74 in the follow up alone.	Parents-only, Parents-child and Control (Follow up alone). Each meeting focused on a different nutritional or lifestyle goal, including eating in accordance with the food pyramid, adequate fruit and vegetable consumption and abstention from sweetened beverages, the importance	12 once weekly group meetings of 60 min each (12–15 participants per meeting) and end of follow-up (24 months)	Dietician and Psychologist.	Changes in anthropometric, clinical and lifestyle. Blood test at baseline and three months, and 10-h overnight fast. Serum glucose, total cholesterol, triglyceride and	BMI-standard deviation score (SDS) decreased from baseline to 3 months in both intervention groups (parents-only: from 1.74 ± 0.31 to 1.66 ± 0.36 , $P < .001$; parents-child, 1.83 ± 0.33 to 1.76 ± 0.36 , $P = .012$), with no significant change in the controls (1.73 ± 0.32 to 1.70 ± 0.31 , $P = .301$). The

			of drinking water, reducing fast-food consumption, limiting the time spent watching television or using the computer, increasing the time spent in physical activity, special dietary consideration during parties and vacations and strategies to implement an active lifestyle in the family. The control group did not participate in group meetings.			high- density lipoprotein cholesterol levels. Parents completed a questionnaire that included items on socio-demographic characteristics and lifestyle behaviours. outcomes were assessed	2-year follow-up was compared with baseline, only the parents-child group showed a significant decrease in BMI-SDS (1.56 ± 0.46 , $P = .006$).
Wendy Robertson, Joanna Fleming et al, 2016, England ¹⁴	Randomised control trial	115 families (128 children) were randomised to FFH (n=56) or UC (n=59). Overweight or obese (≥ 91 st or ≥ 98 th centile body mass index (BMI)) children aged 6-11 years and their parents /carers	FFH: a 10-week, 2½-hour sessions, with children and parents addressing parenting, lifestyle change and social and emotional development. Additional sessions were planned for 1 month and 3 months post-intervention. UC: usual support for childhood obesity at each site.	3 months and two at 12 months Follow up	Investigators	Primary outcomes were 12-months change in children's BMI z-score and incremental cost per quality-adjusted life-year gained (QALY). Secondary outcomes included changes in children's physical activity, fruit and vegetable consumption and quality of life, parents' BMI and mental well-being, family eating/activity, parent-child relationships and parenting style	There was no significant difference in change in BMI z-score at 12-months with Families for Health compared to usual care. <ul style="list-style-type: none"> ► Families for Health was significantly more costly than usual care. ► The Families for Health programme is neither effective nor cost-effective for the treatment of obesity in children aged 6 to 11.
W. Robertson, T. Friede, et al, 2008, UK. ¹⁵	Programme development, pilot study and evaluation using intention-to-treat analysis	27 overweight or obese children aged 7-13 years (18 girls, 9 boys) and their parents, from 21 families.	with parallel groups for parents and children, addressing parenting, lifestyle change and social & emotional development. Measures of Overweight- BMI Psycho-Social Measurements -Children's self-esteem. Eating and activity behaviour eating related to hunger, and eating style.	12 week Programme 'Before and after' evaluation was undertaken to compare quantitative measures at baseline, with the end of the programme (3 months) and at 9 months follow-up.	a health visitor, school nurse, school lifestyle worker, nutritionist and mental health worker.	Primary: change in baseline BMI z-score at end of programme (3 months) and 9 month follow-up. Parents' perception of programme, child's quality of life and self esteem, parental mental health, parent-child relationships and lifestyle changes were also measured.	BMI z-score was reduced by -0.18 (95%CI -0.30 to -0.05) at end of programme and by -0.21 (-0.35 to -0.07) at 9 months. Statistically significant improvements were observed in children's quality of life and lifestyle (reduced sedentary behaviour, increased steps and reduced exposure to unhealthy foods), child-parent relationships and parents' mental health. Fruit and vegetable consumption, participation in moderate/vigorous exercise and children's self-esteem did not change significantly
Moria Golan, Scott Crow, 2003, Israel. ¹⁶	Randomised control trial	Fifty children were randomly recruited. At the point of the 7-year follow-up, the children were 14 to 19 years of age	The children were randomly assigned to either the parent only group (only parents were targeted) or the child-only group (children were targeted). Parent-only Group. Parents attended Fourteen, 1-hour support and educational group sessions. The first four sessions were held weekly, the next four were held biweekly, and the last six were held once every six weeks. Child-only Group. Thirty 1-hour group sessions - physical activity, eating behaviour modification, stimulus control, self-monitoring, nutrition education,	Weight and height were measured 1, 2, and 7 years after the program's termination	Clinical Dietitian	Weight Heeight at 1 year, 2 years and 7 years	At the 1-year follow-up visit the weight loss in the children of the parent-only group was statistically significant compared with that of the child-only group (-13.6 vs. 0 , $p < 0.05$) At the 2-year follow-up, there was a mean reduction in overweight of 15% in children of the parent-only group and an increase of 2.9% in children in the child-only group ($p < 0.01$; At the 7-year follow-up (7 years after program termination), to our surprise, both treatment conditions demonstrated substantial weight loss. However, the

			problem solving, and cognitive restructuring. Individual counseling sessions				mean reduction in overweight was 29% in children in the parent-only group and 20.2% in those of the child-only group ($p < 0.05$).
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