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Diet, physical activity and behavioural interventions for the treatment of overweight or obese children from the age of 6 to 11 years

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ABSTRACT

Background

Child and adolescent overweight and obesity has increased globally, and can be associated with significant short- and long-term health consequences. This is an update of a Cochrane review published first in 2003, and updated previously in 2009. However, the update has now been split into six reviews addressing different childhood obesity treatments at different ages.

Objectives

To assess the effects of diet, physical activity and behavioural interventions (behaviour-changing interventions) for the treatment of overweight or obese children aged 6 to 11 years.

Search methods

We searched CENTRAL, MEDLINE, Embase, PsycINFO, CINAHL, LILACS as well as trial registers ClinicalTrials.gov and ICTRP Search Portal. We checked references of studies and systematic reviews. We did not apply any language restrictions. The date of the last search was July 2016 for all databases.

Selection criteria

We selected randomised controlled trials (RCTs) of diet, physical activity, and behavioural interventions (behaviour-changing interventions) for treating overweight or obese children aged 6 to 11 years, with a minimum of six months' follow-up. We excluded interventions that specifically dealt with the treatment of eating disorders or type 2 diabetes, or included participants with a secondary or syndromic cause of obesity.

Data collection and analysis

Two review authors independently screened references, extracted data, assessed risk of bias, and evaluated the quality of the evidence using the GRADE instrument. We contacted study authors for additional information. We carried out meta-analyses according to the statistical guidelines in the *Cochrane Handbook for Systematic Reviews of Interventions*.

Main results

We included 70 RCTs with a total of 8461 participants randomised to either the intervention or control groups. The number of participants per trial ranged from 16 to 686. Fifty-five trials compared a behaviour-changing intervention with no treatment/usual care control and 15 evaluated the effectiveness of adding an additional component to a behaviour-changing intervention. Sixty-four trials were parallel RCTs, and four were cluster RCTs. Sixty-four trials were multicomponent, two were diet only and four were physical activity only interventions. Ten trials had more than two arms. The overall quality of the evidence was low or very low and 62 trials had a high risk of bias for at least one criterion. Total duration of trials ranged from six months to three years. The median age of participants was 10 years old and the median BMI z score was 2.2.

Primary analyses demonstrated that behaviour-changing interventions compared to no treatment/usual care control at longest follow-up reduced BMI, BMI z score and weight. Mean difference (MD) in BMI was -0.53 kg/m^2 (95% confidence interval (CI) -0.82 to -0.24); $P < 0.00001$; 24 trials; 2785 participants; low-quality evidence. MD in BMI z score was -0.06 units (95% CI -0.10 to -0.02); $P = 0.001$; 37 trials; 4019 participants; low-quality evidence and MD in weight was -1.45 kg (95% CI -1.88 to -1.02); $P < 0.00001$; 17 trials; 1774 participants; low-quality evidence.

Thirty-one trials reported on serious adverse events, with 29 trials reporting zero occurrences RR 0.57 (95% CI 0.17 to 1.93); $P = 0.37$; 4/2105 participants in the behaviour-changing intervention groups compared with 7/1991 participants in the comparator groups). Few trials reported health-related quality of life or behaviour change outcomes, and none of the analyses demonstrated a substantial difference in these outcomes between intervention and control. In two trials reporting on minutes per day of TV viewing, a small reduction of 6.6 minutes per day (95% CI -12.88 to -0.31), $P = 0.04$; 2 trials; 55 participants) was found in favour of the intervention. No trials reported on all-cause mortality, morbidity or socioeconomic effects, and few trials reported on participant views; none of which could be meta-analysed.

As the meta-analyses revealed substantial heterogeneity, we conducted subgroup analyses to examine the impact of type of comparator, type of intervention, risk of attrition bias, setting, duration of post-intervention follow-up period, parental involvement and baseline BMI z score. No subgroup effects were shown for any of the subgroups on any of the outcomes. Some data indicated that a reduction in BMI immediately post-intervention was no longer evident at follow-up at less than six months, which has to be investigated in further trials.

Authors' conclusions

Multi-component behaviour-changing interventions that incorporate diet, physical activity and behaviour change may be beneficial in achieving small, short-term reductions in BMI, BMI z score and weight in children aged 6 to 11 years. The evidence suggests a very low occurrence of adverse events. The quality of the evidence was low or very low. The heterogeneity observed across all outcomes was not explained by subgrouping. Further research is required of behaviour-changing interventions in lower income countries and in children from different ethnic groups; also on the impact of behaviour-changing interventions on health-related quality of life and comorbidities. The sustainability of reduction in BMI/BMI z score and weight is a key consideration and there is a need for longer-term follow-up and further research on the most appropriate forms of post-intervention maintenance in order to ensure intervention benefits are sustained over the longer term.

PLAIN LANGUAGE SUMMARY

Diet, physical activity and behavioural interventions for the treatment of overweight or obese children from the age of 6 to 11 years

Review question

How effective are diet, physical activity and behavioural interventions in reducing the weight of overweight or obese children aged 6 to 11 years?

Background

Diet, physical activity and behavioural interventions for the treatment of overweight or obese children from the age of 6 to 11 years (Review)

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Across the world more children are becoming overweight and obese. These children are more likely to suffer from health problems, both while as children and in later life. More information is needed about what works best for treating this problem.

Study characteristics

We found 70 randomised controlled trials (clinical trials where people are randomly put into one of two or more treatment groups) comparing diet, physical activity, and behavioural (where habits are changed or improved) treatments to a variety of control groups delivered to 8461 overweight or obese children aged 6 to 11 years. We reported on the effects of 64 multicomponent interventions (different combinations of diet and physical activity and behaviour change), four physical activity interventions and two dietary interventions compared with no intervention, 'usual care' or some other therapy if it was also delivered in the intervention arm. The children in the included studies were followed up between six months and three years.

Key results

The average age of the children was 10 years. Most studies reported the body mass index (BMI) z score: BMI is a measure of body fat and is calculated by dividing weight (in kilograms) by the square of the body height measured in metres (kg/m^2). In children, BMI is often measured in a way that takes into account sex and age, weight, and height changes as children grow older (BMI z score).

We summarised the results of 37 trials in 4019 children reporting the BMI z score, which on average was 0.06 units lower in the intervention groups compared with the control groups. We summarised the results of 24 trials in 2785 children reporting BMI, which on average was $0.53 \text{ kg}/\text{m}^2$ lower in the intervention groups compared with the control groups. We summarised the results of 17 trials in 1774 children reporting weight, which on average was 1.45 kg lower in the intervention groups compared with the control groups.

Other effects of the interventions, such as improvements in health-related quality of life were less clear. No study investigated death from any cause, morbidity or socioeconomic effects. Serious adverse events were rare: only two of 31 trials with data reported any serious adverse events (4/2105 participants in the behaviour-changing intervention groups compared with 7/1991 participants in the comparator groups). This evidence is up to date as of July 2016.

Quality of the evidence

The overall quality of the evidence was low or very low, mainly because of limited confidence in how studies were performed, and the results were inconsistent between the studies. Also there were just a few studies for some outcomes, with small numbers of included children.