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[Intervention Review]

Effects of total fat intake on bodyweight in children

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ABSTRACT

Background

As part of efforts to prevent childhood overweight and obesity, we need to understand the relationship between total fat intake and body fatness in generally healthy children.

Objectives

To assess the effects of total fat intake on measures of weight and body fatness in children and young people not aiming to lose weight.

Search methods

For this update we revised the previous search strategy and ran it over all years in the Cochrane Library, MEDLINE (Ovid), MEDLINE (PubMed), and Embase (Ovid) (current to 23 May 2017). No language and publication status limits were applied. We searched the World Health Organization International Clinical Trials Registry Platform and ClinicalTrials.gov for ongoing and unpublished studies (5 June 2017).

Selection criteria

We included randomised controlled trials (RCTs) in children aged 24 months to 18 years, with or without risk factors for cardiovascular disease, randomised to a lower fat (30% or less of total energy (TE)) versus usual or moderate-fat diet (greater than 30%TE), without the intention to reduce weight, and assessed a measure of weight or body fatness after at least six months. We included prospective analytical cohort studies in these children if they related baseline total fat intake to weight or body fatness at least 12 months later. We duplicated inclusion decisions and resolved disagreement by discussion with other authors.

Data collection and analysis

We extracted data on participants, interventions or exposures, controls and outcomes, and trial or cohort quality characteristics, as well as data on potential effect modifiers, and assessed risk of bias for all included studies. We extracted outcome data using the following time point ranges, when available: RCTs: baseline to six months, six to 12 months, one to two years, two to five years and more than five years; cohort studies: baseline to one year, one to two years, two to five years, five to 10 years and more than 10 years. We planned to perform random-effects meta-analyses with relevant subgrouping, and sensitivity and funnel plot analyses where data allowed.

Main results

We included 24 studies comprising three parallel-group RCTs (n = 1054 randomised) and 21 prospective analytical cohort studies (about 25,059 children completed). Twenty-three were conducted in high-income countries. No meta-analyses were possible, since only one RCT reported the same outcome at each time point range for all outcomes, and cohort studies were too heterogeneous.

For the RCTs, concerns about imprecision and poor reporting limited our confidence in our findings. In addition, the inclusion of hypercholesteraemic children in two trials raised concerns about applicability. Lower versus usual or modified total fat intake may have made little or no difference to weight over a six- to twelve month period (mean difference (MD) -0.50 kg, 95% confidence interval (CI) -1.78 to 0.78; 1 RCT; n = 620; low-quality evidence), nor a two- to five-year period (MD -0.60 kg, 95% CI -2.39 to 1.19; 1 RCT; n = 612; low-quality evidence). Compared to controls, lower total fat intake (30% or less TE) probably decreased BMI in children over a one- to two-year period (MD -1.5 kg/m^2, 95% CI -2.45 to -0.55; 1 RCT; n = 191; moderate-quality evidence), with no other differences evident across the other time points (two to five years: MD 0.00 kg/m^2, 95% CI -0.63 to 0.63; 1 RCT; n = 541; greater than five years; MD -0.10 kg/m^2, 95% CI -0.75 to 0.55; 1 RCT; n = 576; low-quality evidence). Lower fat intake probably slightly reduced total cholesterol over six to 12 months compared to controls (MD -0.15 mmol/L, 95% CI -0.24 to -0.06; 1 RCT; n = 618; moderate-quality evidence), but may make little or no difference over longer time periods. Lower fat intake probably slightly decreased low-density lipoprotein (LDL) cholesterol over six to 12 months (MD -0.12 mmol/L, 95% CI -0.20 to -0.04; 1 RCT; n = 618, moderate-quality evidence) and over two to five years (MD -0.09, 95% CI -0.17 to -0.01; 1 RCT; n = 623; moderate-quality evidence), compared to controls. However, lower total fat intake probably made little or no difference to HDL-C over a six- to 12-month period (MD -0.03 mmol/L, 95% CI -0.08 to 0.02; 1 RCT; n = 618; moderate-quality evidence), nor a two- to five-year period (MD -0.01 mmol/L, 95% CI -0.06 to 0.04; 1 RCT; n = 522; moderate-quality evidence). Likewise, lower total fat intake probably made little or no difference to triglycerides in children over a six- to 12-month period (MD -0.01 mmol/L, 95% CI -0.08 to 0.06; 1 RCT; n = 618; moderate-quality evidence). Lower versus usual or modified fat intake may make little or no difference to height over more than five years (MD -0.60 cm, 95% CI -2.06 to 0.86; 1 RCT; n = 577; low-quality evidence).

Over half the cohort analyses that reported on primary outcomes suggested that as total fat intake increases, body fatness measures may move in the same direction. However, heterogeneous methods and reporting across cohort studies, and predominantly very low-quality evidence, made it difficult to draw firm conclusions and true relationships may be substantially different.

Authors' conclusions

We were unable to reach firm conclusions. Limited evidence from three trials that randomised children to a lower total fat intake (30% or less TE) versus usual or modified fat intake, but with no intention to reduce weight, showed small reductions in body mass index, total- and LDL-cholesterol at some time points with lower fat intake compared to controls, and no consistent differences in effects on weight, high-density lipoprotein (HDL) cholesterol or height. Associations in cohort studies that related total fat intake to later measures of body fatness in children were inconsistent and the quality of this evidence was mostly very low. Twenty-three out of 24 included studies were conducted in high-income countries, and may not be applicable in low- and middle-income settings. High-quality, longer-term studies are needed, that include low- and middle-income settings and look at both possible benefits and risks.

PLAIN LANGUAGE SUMMARY

Effect of cutting down the amount of fat on bodyweight in children

Review question

What is the relationship between the amount of fat a child eats and their weight and body fat?

Background

To try to better prevent people from being overweight and obese, we need to understand what the ideal amount of total fat in our diets should be, and particularly how this is related to bodyweight and fatness. This relationship differs in children compared to adults, because children are still growing and developing.

Study characteristics

This review looked at the effects of eating less fat on bodyweight and fatness in healthy children aged between two and 18 years, who were not aiming to lose weight. We carried out a comprehensive search for studies up to May 2017.

Key results

We found three randomised controlled trials (clinical trials where people are randomly put into one of two or more treatment groups) conducted in 1054 children in high-income (wealthy) countries, that compared children who consumed a lower total fat intake (30% or less of their total daily energy) to children who consumed a usual or modified fat intake (more than 30% of their total daily energy) for between one and seven years. Some of these results showed that a lower fat intake may reduce body mass index (BMI; a measure of body fatness based on height and weight) and the blood levels of different types of cholesterol (a fat carried in the blood) when compared to a higher fat intake. However, these effects varied over time with some results showing that a lower fat intake may make little or no difference. Evidence from one trial suggested that lower fat intake probably had no effect on blood levels of one type of cholesterol (called HDL-cholesterol) and may have no effect on height compared to higher fat intakes. This evidence cannot necessarily be applied to all healthy children, as two studies were done in children with raised blood cholesterol levels.

We also looked at 21 studies in approximately 25,059 children that observed and measured the children's intake of fat and their weight, BMI, and other body measures over time (these are called cohort studies). Over half of these cohort studies that reported on body fatness

suggested that as total fat intake increases, body fatness may move in the same direction. However, results varied across all these studies and we could not draw any firm conclusions.

Quality of the evidence

We found no high-quality evidence with which to answer this question. Evidence from the cohort studies was generally of very low quality so we are uncertain about these results and cannot draw conclusions. For the three randomised controlled trials, the results that we were most interested in were generally of moderate- or low-quality evidence. We could not make any conclusions about children in low- and middle-income countries as 23 of the 24 studies were done in high-income countries. More high-quality, long-term studies are required that also include children from low- and middle-income settings.