Intermittent fasting interventions for the treatment of overweight and obesity in adults aged 18 years and over: a systematic review protocol

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Review question/objective

Are intermittent fasting interventions an effective treatment for overweight and obesity in adults, when compared to usual care treatment (continuous daily energy restriction – reduced calorie diet) or no treatment (ad libitum diet)?

Background

Overweight and obesity (classified as Body Mass Index [BMI] of greater than or equal to 25 and 30 respectively) is a global public health concern, with more than 1.9 billion adults worldwide being overweight in 2014 (over 600 million of whom are obese), and resulting in more deaths than underweight.[1] A raised BMI in adulthood is associated with an increased risk of developing a number of chronic diseases which include diabetes, cardiovascular disease, muscular skeletal disorders and some cancers.[1] In addition to this substantial impact on individual health and well being, there are also significant wider costs, for example, in England the annual direct cost to the national health service for treating overweight, obesity and associated morbidity is estimated at over £5 billion pounds, with costs to the wider economy estimated at £27 billion.[2,3] Therefore effective weight management is essential.

As overweight and obesity results from an accumulation of excess body fat arising from an energy imbalance – consuming more energy (kcal) than is expended – the majority of weight management approaches center around behaviors to address this imbalance, i.e. reducing energy intake through caloric restriction and increasing energy expenditure through physical activity. However, the aetiology of overweight and obesity is highly complex, involving an interplay of biological, psychological, societal and environmental drivers.[3] Consequently, effective weight management is challenging, and whilst there exists a plethora of available weight loss programs, not all are comprehensively evaluated and compared, and many weight loss attempts result in weight regain and poor long term results.[4] It is therefore vitally important to review the effectiveness of all new approaches to support an evidence-based approach to weight management.

Intermittent fasting (IF), also known as alternate day fasting (ADF), periodic fasting or intermittent energy restriction (IER) is a relatively new dietary approach to weight management that involves interspersing normal daily caloric intake with a short period of severe calorie restriction/fasting. In terms of the possible underlying biological benefits of intermittent fasting, there is some evidence, predominantly from animal studies, to demonstrate beneficial effects on weight loss and cardio-metabolic risk factors. Whilst the underpinning mechanistic evidence is limited,[6] there is some evidence to suggest that the benefits may be explained mechanistically through fat utilization and nutritional stress[7]. However current National Institute for Health and Care Excellence (NICE) guidance on the treatment of adult obesity[5] does not recommend the routine use of very low calorie diets (VLCD) (defined as a hypocaloric diet of 800 or less kcal/day) for the treatment of adult obesity. The National Institute for Health and Care Excellence states that this approach should only be recommended if there is a clinical rationale for rapid weight loss and must be nutritionally complete, part of a multi-component weight management strategy, including ongoing support, and should be undertaken for a maximum of 12 weeks (followed continuously or intermittently). Furthermore, the British Dietetic Association[8] raises concerns that rapid weight loss associated with fasting may largely be due to loss of water and glycogen rather than fat, and may result in fatigue, dizziness and low energy levels. Essentially IF involves the intermittent use of a VLCD, and there remain questions about the side effects of this approach, whether there is an optimal fasting pattern or calorie limit, and how sustainable it is for long term weight management.

Intermittent fasting has recently gained much popularity following significant media attention. In the UK this dietary approach reached mainstream after a BBC Horizon documentary aired in August 2012, featured an IF approach called the 5:2 diet, which involves five days of regular eating patterns interchanged with two days of fasting (max 500kcal for women and 600kcal for men). However other IF patterns are used such as alternate day fasting.[6] Despite the recent popularity of intermittent fasting[9] and associated weight loss claims,[10] the supporting evidence base in humans remains small and there is only one published systematic review[7] examining the health benefits of this approach. However the aim of this review[7] was to examine the impact of this intervention on wider health benefits (not specifically as a treatment approach for overweight and obesity), and did not provide a comprehensive methodology or meta-analysis of RCT data. This proposed review will hence address these gaps in the evidence base.

Keywords

intermittent fasting; obesity; overweight; weight loss

Inclusion criteria

Types of participants

This review will consider studies that include free-living (not hospitalized) male and female adults aged 18 years and over (adults of any age will be included; however age will be considered as a potential moderator) who are overweight or obese (i.e. have a BMI greater than or equal to 25 or 30). Participants will be excluded if they have secondary or syndromic forms of obesity or are diabetic, undergoing bariatric surgery, pregnant or breast feeding, and taking medication associated with weight loss (e.g. orlistat, metformin) or weight gain (e.g. steroids, antipsychotics).

Types of intervention(s)/phenomena of interest

This review will consider studies that evaluate intermittent fasting interventions (defined as consumption of 800* kcal or less on at least one day, but no more than six days in a calendar week) that follow participants for at least 12 calendar weeks from the start of the intervention.

*as there is no accepted formal definition of "fasting" - the NICE upper limit for a very low calorie diet will be used in this review.[5]

Types of comparators

Interventions will be compared to control (no intervention) or usual care (which is likely to consist of advice to continuously follow a reduced calorie diet, which is usually around 25% of recommended energy intake).

Types of outcomes

Primary outcome: any objective, validated measure of adiposity: measured (not self-reported) body mass; body mass index; waist circumference; skin fold thickness; bio-impedance; hydrostatic or BodPod measures; and dual X-ray absorptiometry (DXA) or magnetic resonance imaging (MRI) scans. Secondary outcomes: adverse events; quality of life; disease risk markers (e.g. blood glucose, cholesterol, blood pressure); diet and physical activity.

Types of studies

This review will only consider randomized or pseudo randomized controlled trials.

Search strategy

The search strategy aims to find both published and unpublished studies. A three-step search strategy will be utilized in this review. An initial limited search of MEDLINE and CINAHL will be undertaken followed by analysis of the text words contained in the title and abstract, and of the index terms used to describe the relevant articles. A second search using all identified keywords and index terms will then be undertaken across all included databases. Thirdly, the reference list of all identified reports and articles will be searched for additional studies. Studies in English language, published since database inception will be considered for inclusion in this review.

The databases to be searched include:
Medline via OVID Host
Embase via OVID
Cinahl via EBSCO Host
Cochrane Central Register of Controlled Trials (CENTRAL)
The search for unpublished studies will include:
Clinicaltrials.gov
ISRCTN registry
anzctr.org.au

Initial keywords to be used will be intermittent fasting or periodic fasting, alternate day fasting or intermittent calorie restriction, and overweight or obesity. A provisional full search strategy (to be confirmed following the initial search) is presented in Appendix I.

Assessment of methodological quality

Papers selected for retrieval will be assessed by two independent reviewers for methodological validity prior to inclusion in the review using standardized critical appraisal instruments from the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MAStARI) (Appendix II).

Any disagreements that arise between the reviewers will be resolved through discussion, or with a third reviewer.

Data extraction

Data will be extracted from papers included in the review using the standardized data extraction tool from JBI-MAStARI (Appendix III). The data extracted will include specific details about the interventions, populations, study methods and outcomes of significance to the review question and specific objectives.

Data synthesis

Quantitative data will, where possible be pooled in statistical meta-analysis using JBI-MAStARI. All results will be subject to double data entry. Effect sizes expressed as odds ratio (for categorical data) and weighted mean differences (for continuous data) and their 95% confidence intervals will be calculated for analysis. Heterogeneity will be assessed statistically using the standard I-squared and tau-squared. Where possible, subgroup analyses will also be conducted based on baseline weight status of participants (i.e. overweight [BMI: 25-29], obese [BMI: 30-39] & morbidly obese [BMI 40+]); gender; age; length of study and IF approach. Where statistical pooling is not possible the findings will be presented in narrative form including tables and figures to aid in data presentation where appropriate.

Conflicts of interest

The authors have no conflicts of interest to declare.

Acknowledgements

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References

1. World Health Organization. Overweight and obesity factsheet. 2015. [Internet]. [Cited in May 2015] Available from: http://www.who.int/mediacentre/factsheets/fs311/en/
2. Scarborough P. Bhatnagar P, Wickramasinghe KK, Allender S, Foster C, Rayner M. The economic burden of ill health due to diet, physical inactivity, smoking, alcohol and obesity in the UK: an update to 2006?07 NHS costs. J Public Health .2011; 33(4): 527-535.
3. Butland B, Jebb S, Kopelman P, McPherson K, Thomas S, Mardell J, Parry V. Tackling obesities: future choices. Foresight Programme of the Government Office for Science. 2007
4. Laddu D, Dow C, Hingle M, Thomson C, Going S. A review of evidence-based strategies to treat obesity in adults. Nutr Clin Pract. 2011; 26(5): 512-525.
5. NICE. Obesity: identification, assessment and management of overweight and obesity in children, young people and adults. 2014 [Internet]. [Cited on August 28, 2015] Available from: http://www.nice.org.uk/guidance/cg189
6. Antoni R, Johnston KL, Collins AL, Robertson MD. The Effects of Intermittent Energy Restriction on Indices of Cardiometabolic Health, Research in Endocrinology. 2014; Article ID 459119
7. Horne BD, Muhlestein JB, Anderson JL. Health effects of intermittent fasting: hormesis or harm? A systematic review. Am J ClinNutr 2015;102(2): 464-470.
8. British Dietetic Association. Food fact sheets: detox diets. 2014. [Internet]. [Cited on August 28, 2015] Available from: https://www.bda.uk.com/foodfacts/detoxdiets.pdf
9. NHS choices. News analysis: Does the 5:2 fast diet work? NHS choices: your health your choices. 2013.
10. Brown JE, Mosley M, Aldred S. Intermittent fasting: A dietary intervention for prevention of diabetes and cardiovascular disease?. Br J DiabVasc Dis.2013;13(2): 68-72.

Appendix I: initial list of search terms

intermittent fast* OR
alternate-day fast* OR
intermittent energy restriction OR
intermittent calorie restriction OR
fasting calorie restriction intervention OR
intermittent restrictive diet OR
very low calorie diet OR
periodic fasting OR

AND
body mass OR
body size OR
body weight OR
bodysize OR
body-size OR
fat OR
fatness OR
obes* OR
overnutrition OR
overweight OR
over-weight OR
weight OR
Weight gain OR
Weight maintenance OR
Weight management OR

AND
adiposity OR
adverse events OR
bio-impedance OR
blood glucose OR
blood pressure OR
bmi OR
bodpod OR
body mass index OR
cholesterol OR
diet OR
dxa (scan) OR
exercise OR
hydrostatic OR
MRI OR
physical activity OR
quality of life/QoL OR
skin-fold/skin fold thickness OR
waist circumference OR
weight loss

Appendix II: Appraisal instruments

MAStARI appraisal instrument

JBI Critical Appraisal Checklist for Randomised Control / Pseudo-randomised Trial

Reviewer _____ Date _____

Author _____ Year _____ Record Number _____

	Yes	No	Unclear	Not Applicable
1. Was the assignment to treatment groups truly random?	☐	☐	☐	☐
2. Were participants blinded to treatment allocation?	☐	☐	☐	☐
3. Was allocation to treatment groups concealed from the allocator?	☐	☐	☐	☐
4. Were the outcomes of people who withdrew described and included in the analysis?	☐	☐	☐	☐
5. Were those assessing outcomes blind to the treatment allocation?	☐	☐	☐	☐
6. Were the control and treatment groups comparable at entry?	☐	☐	☐	☐
7. Were groups treated identically other than for the named interventions	☐	☐	☐	☐
8. Were outcomes measured in the same way for all groups?	☐	☐	☐	☐
9. Were outcomes measured in a reliable way?	☐	☐	☐	☐
10. Was appropriate statistical analysis used?	☐	☐	☐	☐
	☐	☐	☐	☐

Overall appraisal: Include ☐ Exclude ☐ Seek further info. ☐

Comments (Including reason for exclusion)

Appendix III: Data extraction instruments

MAStARI data extraction instrument

JBI Data Extraction Form for Experimental / Observational Studies

Reviewer _____ Date _____

Author _____ Year _____

Journal _____ Record Number _____

Study Method

RCT ☐ Quasi-RCT ☐ Longitudinal ☐

Retrospective ☐ Observational ☐ Other ☐

Participants

Setting

Population

Sample size

Group A _____ Group B _____

Interventions

Intervention A

Intervention B

Authors Conclusions:

Reviewers Conclusions:

Study results

Dichotomous data

Outcome	Intervention ( ) number / total number	Intervention ( ) number / total number

Continuous data

Outcome	Intervention ( ) number / total number	Intervention ( ) number / total number