The effect of weight management interventions that include a diet component on weight-related outcomes in pregnant and postpartum women: a systematic review protocol

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Review question/objective

What are the effects of weight management interventions that include a diet component on weight-related outcomes in pregnant and postpartum women?

The primary objective of this systematic review is to evaluate the effectiveness of weight management interventions which include a diet component and are aimed at limiting gestational weight gain and postpartum weight retention in women.

The second objective of this systematic review is to investigate included intervention components with respect to effect on weight-related outcomes. This may include, but is not limited to: length of intervention, use of face-to-face counselling, group or individual consultations, use of other interventions components including exercise, use of goals and use of support tools like food diaries, coaching, including email or text message support.

Background

Around half of all women of reproductive age are either overweight or obese,\textsuperscript{1,2,3} with women aged 25-34 years having a greater risk of substantial weight gain compared with men of all ages.\textsuperscript{1,4} Excessive gestational weight gain (GWG) and postpartum weight retention (PPWR) may play a significant role in long term obesity. Having one child doubles the five- and 10-year obesity incidence for women, with many women who gain excessive weight during pregnancy remaining obese permanently.\textsuperscript{5} Excessive GWG and/or PPWR can also significantly contribute to short- and long-term adverse health outcomes for mother, baby and future pregnancies.\textsuperscript{6,7}

Maternal obesity increases the risk of pregnancy related complications such as pre-eclampsia, gestational diabetes mellitus, stillbirth and the rate of caesarean section.\textsuperscript{5} Childhood obesity is a further long term complication of maternal obesity for offspring, which may persist into adulthood.\textsuperscript{9} Excess GWG is also a risk factor for PPWR both in the short and long-term.\textsuperscript{10,11} Nehring et al. conducted a meta-analysis with over 65,000 women showing that, compared to women who gained weight within recommendations during pregnancy, women with GWG above Institute of Medicine weight gain recommendations,\textsuperscript{12} retained an additional 3.1 kg and 4.7 kg after three and greater than or equal to 15 years postpartum, respectively.\textsuperscript{13} The health risk associated with PPWR is highlighted in a study of 151,025 Swedish women followed between 1992 and 2001. The study identified the risk of adverse pregnancy outcomes for those who gained three or more units of Body Mass Index (kg/m\textsuperscript{2}) between consecutive pregnancies (an average of two years) was much higher compared with women whose BMI changed from -1.0 and 0.9 units.\textsuperscript{14} Long-term chronic disease risk may also be affected by PPWR as weight retention at the end of the first year post-partum has been found to be a predictor of maternal overweight 15 years later.\textsuperscript{15} With around 14-20\% of women retaining 5 kg or more 12 months postpartum,\textsuperscript{16,5} the risk of developing conditions like diabetes, metabolic syndrome and cardiovascular disease may be increased.\textsuperscript{17} It becomes evident that interventions which aim to support attainment of healthy weight both in the antenatal and postpartum periods are key health priorities for women during this life stage.

Lifestyle factors of overweight, having poor diet quality, and not undertaking enough moderate-to-vigorous physical activity are amongst the top five predictors of mortality in women.\textsuperscript{18} Additionally it is noted that, for many women, pregnancy and the postpartum period are associated with a reduction in physical activity.\textsuperscript{19} It is known that a combination of poor dietary choices, an increase in

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sedentary time and reduction in physical activity are all contributors to the development of overweight and obesity. With this in mind, current research has focused on lifestyle interventions to limit GWG and PPWR. Thangaratinam et al. reviewed 44 randomized controlled trials (7278 women) where interventions including diet, physical activity or both were evaluated for their influence on maternal weight during pregnancy.\textsuperscript{20} Results indicate that all were significantly effective in reducing GWG compared with the control group. More specifically, dietary interventions were the most effective in reducing weight gain, with a mean weight loss of -3.84kg compared with -0.72kg and -1.06kg for physical activity and the mixed (diet plus physical activity) approach, respectively.\textsuperscript{20} This finding is supported by Hill and colleagues' recent systematic review of theory based interventions to limit GWG.\textsuperscript{21} Included studies in this review reported an underpinning theory base and were classified as adopting a dietary, physical activity or mixed approach. Hill et al. concluded that studies which included a diet intervention were significantly more effective at limiting GWG.\textsuperscript{21}

In 2011 Tanentsapf et al. reviewed the effect of dietary interventions alone for reducing GWG in normal weight, overweight and obese pregnant women.\textsuperscript{22} This review analysed 13 randomized controlled trials and quasi-randomized controlled trials with a dietary intervention to prevent excessive GWG in women. The review concluded that dietary interventions during pregnancy were effective in reducing GWG with an effect of -1.92kg (n=1434) compared with the control group.\textsuperscript{22} Tanentsapf et al. identified that trials differed in the conduct of the interventions with various diet and non-diet related components utilised. Dietary approaches were highly variable with some trials focusing only on calorie restriction and others included additional target macronutrient distribution for intake. Some trials further provided feedback based on maternal weight gain guidelines.\textsuperscript{12} Interventions also varied in delivery method with a variety of modes used, including face-to-face, individual or group consultations and/or written correspondence. The frequency of communication, despite the type or mix, also changed from trial to trial with additional methods via telephone, posted materials, feedback or food diaries utilised. The inclusion of physical activity in addition to diet intervention was also common. Whilst the recent review by Tanentsapf et al.\textsuperscript{22} identified that dietary interventions are effective in reducing GWG, the review did not investigate the impact that different intervention components, delivery methods or dietary counselling approaches had on gestational weight management. It remains unclear as to which intervention components optimize GWG in women.

The impact of lifestyle interventions has also been investigated in the postpartum period. The recent systematic review from van der Pligt et al. reported seven of 11 studies reviewed were successful in limiting PPWR.\textsuperscript{23} As with studies aimed at limiting GWG, interventions included in van der Pligt et al.’s review differed greatly in their conduct. Six of these seven studies included both dietary and physical activity components for the intervention, with the final successful study including a diet only intervention. Five of the successful studies recruited overweight or obese women only. Intervention time varied considerably in successful studies with some running for as little at ten days, and others up to six months.

Bertz et al. demonstrated that their 12-week behavior modification intervention which targeted diet alone or diet and exercise, including two individual sessions with a dietitian and physical therapist, provision of scales for weight self-monitoring and bi-weekly text messages was successful in achieving significant weight loss following the intervention, and sustained at one year.\textsuperscript{24} The diet intervention and the diet and exercise intervention yielded significant weight loss compared to the control. Following 12
weeks a reduction of -8.3 +/- 4.2kg for diet intervention and -6.9 +/- 3.0kg for diet and exercise was observed. Additionally after one year, the diet intervention showed -10.2 +/- 5.7kg reduction and -7.3 +/- 6.3kg for the diet and exercise intervention (p<0.001). Colleran et al. also found significant weight change results by implementing a 16-week intervention which consisted of weekly individual sessions with a dietitian regarding calorie restriction, two additional home visits regarding exercise, weekly food diary completion and email support. The intervention group had greater weight loss compared to the control group (-5.8kg +/- 3.5kg vs -1.6kg +/- 5.4kg). It can be seen that various methods have been utilized in investigating the impact of diet and physical activity interventions on PPWR. The review by van der Pligt et al. highlights the impact successful lifestyle interventions can have on postpartum weight change. However, this review did not investigate the different intervention strategies utilized. It remains unclear as to the optimal setting, delivery method, diet strategy, contact frequency or intervention length to limit PPWR.

Previous systematic reviews for both GWG and PPWR have focused on the effectiveness of lifestyle interventions as a whole for weight management in pregnant and postpartum women. And despite Tanentsapf et al.’s focus on dietary interventions for GWG, much is still unknown about the effectiveness of differing diet interventions over the antenatal and postpartum period. Specifically, the impact of differing diet intervention strategies on maternal weight gain is not known. Firstly, this systematic review will focus on whether weight management interventions which include a dietary component are effective in pregnant and postpartum women. In addition to this, this review will investigate the different intervention strategies utilized and their effectiveness in maternal weight management. A search of systematic review protocol databases has shown that there is no current review underway for this topic.

**Keywords**

Pregnancy; postpartum; diet; nutrition; weight management

**Inclusion criteria**

**Types of participants**

Participants of interest are pregnant or post-partum adult females (18 years and over), from all pre-pregnancy BMI categories. Women will be included if they have co-morbidities of gestational diabetes or diabetes; all other medical conditions will be excluded.

**Types of interventions**

Studies will be included if the weight management interventions include a dietary component and have an objective of determining the relationship with antenatal and/or postpartum weight change. The interventions must have been conducted across the antenatal or postpartum period, with intervention initiation at any point up to six weeks after delivery. Interventions will be compared with usual care, wait-list controls or alternative intervention component or intensity.

**Types of outcomes**

This review will consider studies that include body weight as the primary outcome, measured either during pregnancy and/or postpartum. Weight change outcomes reported as weight (kg or lb), Body
Mass Index, waist or hip circumference and/or percentage body fat will be included. Adverse outcomes will be documented if reported.

**Types of studies**

This review will include only the quantitative study design of randomized controlled trials (RCTs) – level II evidence from National Health and Medical Research Council, and level 1 from The Joanna Briggs Institute.²⁶

**Search strategy**

The search strategy is designed to find published studies in the English language from 1980 to present (September, 2014). The search did not aim to find earlier studies as the authors wanted to focus on literature published since the marked increase in obesity in the 1980s.²⁷ A three-step search strategy will be utilized in this review. The 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 articles. A second search using all identified keywords and index terms will then be undertaken across all included databases. The databases to be searched include MEDLINE, EMBASE, CINAHL, Cochrane database, Scopus and PsycINFO. The third stage will involve hand searching reference lists of all identified reports and articles will be searched for additional studies. Only studies with published results in the literature will be considered.

Key words will include pregnan* or pregnancy or postpartum period or antenatal or postpartum or perinatal or postpartum or gestation AND obesity or body weight or overweight or weight status or weight or weight retention or body mass index or weight gain or weight loss or weight change or weight management or obes* AND diet* or nutrition* or eat*.

All studies identified during the database search will be retrieved and examined to ensure relevance and that they meet the inclusion criteria using the title, abstract and full description by two independent reviewers. If the two independent reviewers disagree on whether a study should be included, a third independent reviewer will be consulted until a consensus has been reached.

**Exclusion criteria**

- Studies not published in the English language
- Studies in animals

**Assessment of methodological quality**

Quantitative papers selected for retrieval will be assessed by two independent reviewers for methodological quality before 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 I). Any disagreements that arise between the reviewers will be resolved through discussion, or with a third reviewer.

**Data collection**

Data extraction from the studies included in the review will be conducted using the standardized data extraction tool from JBI-MAStARI (Appendix II). Data collected will include relevant information on study
characteristics (e.g. intervention design, participants) and results from diet and/or nutrition assessment and weight change:

- Study characteristics: detailed description of the dietary components of the intervention (e.g. dietary prescription method, self-monitoring strategies, individual or group counselling, weight gain recommendations), length of intervention, length of follow-up, data collection points, setting, participants (n, age, gender, retention), description of components in addition to diet intervention (e.g. inclusion of exercise goals or counselling, use of goal setting, breastfeeding support).

- Results: outcomes of significance to the review question; dietary assessment, pregnancy and post-natal weight change and whether objectively measured at each time point.

**Data synthesis**

Data will be synthesized from experimental study designs as follows:

Experimental (e.g. RCT): Quantitative papers will, where possible, be pooled in statistical meta-analysis using JBI-MAStARI. Sub-group analysis will be performed where appropriate. 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 modify text as appropriate. Heterogeneity will be assessed statistically using the standard Chi-square. 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**

None to be declared.

**Acknowledgements**

This systematic literature review will form part of the theses work for PhD candidate Lisa Spencer from the University of Newcastle, Australia.
References


5 Davis E, Olson C. Obesity in pregnancy. Primary Care; Clinics in Office Practice. 2009; 36(2): 341-56.


18 Kendall-Tackett K. A new paradigm for depression in new mothers: The central role of inflammation...

19 Sui ZX, Moran LJ, Dodd JM. Physical activity levels during pregnancy and gestational weight gain among women who are overweight or obese. Health Promot J Austr. 2013; 24(3): 206-213.


Appendix I: Appraisal instruments

MAStARI appraisal instrument

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

Reviewer .......................... Date ........................................

Author .............................. Year ........ Record Number ........

1. Was the assignment to treatment groups truly random?  
   - Yes ☐  - No ☐  - Unclear ☐  - Not Applicable ☐

2. Were participants blinded to treatment allocation?  
   - Yes ☐  - No ☐  - Unclear ☐  - Not Applicable ☐

3. Was allocation to treatment groups concealed from the allocator?  
   - Yes ☐  - No ☐  - Unclear ☐  - Not Applicable ☐

4. Were the outcomes of people who withdrew described and included in the analysis?  
   - Yes ☐  - No ☐  - Unclear ☐  - Not Applicable ☐

5. Were those assessing outcomes blind to the treatment allocation?  
   - Yes ☐  - No ☐  - Unclear ☐  - Not Applicable ☐

6. Were the control and treatment groups comparable at entry?  
   - Yes ☐  - No ☐  - Unclear ☐  - Not Applicable ☐

7. Were groups treated identically other than for the named interventions?  
   - Yes ☐  - No ☐  - Unclear ☐  - Not Applicable ☐

8. Were outcomes measured in the same way for all groups?  
   - Yes ☐  - No ☐  - Unclear ☐  - Not Applicable ☐

9. Were outcomes measured in a reliable way?  
   - Yes ☐  - No ☐  - Unclear ☐  - Not Applicable ☐

10. Was appropriate statistical analysis used?  
    - Yes ☐  - No ☐  - Unclear ☐  - Not Applicable ☐

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

**Comments (Including reason for exclusion):**

__________________________________________________________________________________________

__________________________________________________________________________________________

__________________________________________________________________________________________
Appendix II: Data extraction instruments

MAStARI data extraction instrument

JBI Data Extraction Form for Experimental / Observational Studies

Reviewer: ___________________ Date: ___________________

Author: ___________________ Year: ___________________

Journal: ___________________ Record Number: __________

Study Method

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Participants

Setting

Population

Sample size

Group A: ___________   Group B: ___________

Interventions

Intervention A

Intervention B

Authors Conclusions:

Reviewers Conclusions:
## Study results

### Dichotomous data

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<th>Intervention (2) number / total number</th>
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### Continuous data

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