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Knowledge & Library Services (KLS) Evidence Briefing

**Are healthy weight management interventions effective before,
during and after pregnancy?**

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Question

This briefing summarises the evidence for effective healthy weight management interventions before, during and after pregnancy, including those that reduce gestational weight gain (GWG) or prevent poor maternal and child health outcomes, from January 1st 2010 to 19th Sept 2019.

Key messages

- There were many systematic reviews addressing this topic, but there was no overall consensus on which interventions are the most effective for healthy weight management in pregnant or postpartum women
- Some reviews found that dietary interventions alone were significantly more effective at improving weight outcomes; others, that a combination of diet and exercise was more effective
- The best dietary approach or exercise intervention to maintain healthy weight in pregnancy or postpartum is currently unclear; this is partly due to the heterogeneity and methodological quality of the primary studies, and their different methods of data collection
- Dietary, exercise and combined approaches have been shown to reduce GWG, caesareans, gestational diabetes mellitus (GDM), maternal blood pressure, and improve other maternal and infant outcomes
- Effective multi-component approaches included a balanced diet and moderate physical activity; physical activity and diet counselling by a health professional plus motivational talks on weight management; and behavioural change techniques such as providing information on the consequences of behaviour, providing rewards contingent on successful behaviour, self-monitoring and motivational interviewing
- Health professional support and combined diet and exercise could be important for postpartum weight loss
- There are multiple barriers to healthcare professionals' effective practice for maternal obesity and weight management
- There are gaps in the research evidence for weight management in the pre-conceptual period; supporting health professionals overcome barriers to effective maternal weight management; postpartum weight management; safety of high intensity exercise in pregnancy; and women who are already overweight or obese pre-pregnancy

Evidence briefings are a summary of the best available evidence that has been selected from research using a systematic and transparent method in order to answer a specific question.

What doesn't this briefing do?

The findings from research papers summarised here have **not** been quality assessed or critically appraised. This briefing is a neutral presentation of the evidence and does **not** seek to make any recommendations.

Who is this briefing for?

This briefing is to inform the Health and Wellbeing Manager, PHE East of England

Information about this evidence briefing

This briefing draws upon a literature search of the sources NICE Evidence, Wiley Cochrane Library, TRIP, Ovid Medline and Ovid Embase, from 1st January 2010 to 19th September 2019.

Only systematic reviews were included.

58 highly relevant citations were used to produce this evidence briefing.

You may request any publications referred to in this briefing from libraries@phe.gov.uk

Disclaimer

The information in this report summarises evidence from a literature search - it may not be representative of the whole body of evidence available. Although every effort is made to ensure that the information presented is accurate, articles and internet resources may contain errors or out of date information. No critical appraisal or quality assessment of individual articles has been performed. No responsibility can be accepted for any action taken on the basis of this information.

Background

The prevalence of obesity in pregnancy is increasing, rising from 9–10% in the early 1990s to 16–19% in the 2000s. Pregnant women who are obese are at greater risk of pregnancy-related complications compared with women of normal BMI, including pre-eclampsia, gestational diabetes and increased risk of caesarean birth (1). There is still a lack of consensus on the optimal gestational weight gain for obese women, according to the Royal College of Obstetricians and Gynaecologists (1).

In 2010, the NICE Guideline PH27 provided recommendations on how to assess and monitor body weight and how to prevent a woman from becoming overweight or obese before, during and after pregnancy (2). The NICE guideline has not been updated since 2010, so this briefing seeks to outline the evidence on weight management interventions that has been published since that date. Only systematic review evidence will be included.

Diet

Five systematic reviews on dietary interventions alone to prevent weight gain in pregnancy were identified (3-7). These showed that dietary interventions conducted during pregnancy, and in some cases, postpartum, were significantly more effective at improving weight outcomes compared to usual care or other interventions. For example:

- 9/13 RCTs reduced gestational weight gain (GWG) in overweight and obese pregnant women (3)
- 10/15 RCTs/CTs reported significant differences in GWG of obese and overweight women between the dietary intervention and the control groups (4)
- Dietary interventions (from 29 RCTs) conducted during pregnancy and postpartum were significantly more effective at improving weight outcomes in women aged over 18, compared to usual care or other interventions (5)
- Dietary interventions during pregnancy appeared effective to reduce total (by almost 2 kg) and weekly GWG in pregnant women over 18 yrs, but there was no significant evidence for effects on preventing excessive GWG, in a meta-analysis of 13 RCTs (6)
- Antenatal dietary interventions (dietary programmes with energy intake restriction, educational materials, food diaries or counselling) in obese pregnant women can reduce maternal weight gain in pregnancy (reduced total GWG by 6.5 kg) without an effect on newborn birth weight (7)

However, most reviews state that the best dietary approach to take is currently unclear, due to the variation in content of the interventions and their reporting methods, and the methodological quality of the studies. Combining studies with such varied dietary intervention methods is not an easy task; one review author states: *“this review also confirms the variability in the strategies used to deliver dietary*

interventions in studies aiming to limit GWG.....and, hence, the difficulty of summarizing the components of effective dietary intervention” (4) p1736. This is reiterated in a meta-analysis where the authors state that “comparing GWG can be problematic as there is no common standard for calculations” (6).

Another concludes that: “*This lack of consensus [in content, delivery, and assessment methods] limits the ability to develop clinical guidelines and apply the evidence in clinical practice” (3).*

Two systematic reviews showed that dietary interventions could prevent poor maternal and child outcomes:

- A meta-analysis (of 28 RCTs) to determine the effect of dietary intervention before or during pregnancy on pregnancy outcomes, showed that dietary counselling during pregnancy reduced maternal blood pressure but not hypertensive disorders, and dietary interventions focused on modifying macronutrient intakes during pregnancy reduced the incidence of preterm delivery (8)
- A good maternal diet quality in general, and the adherence to the Mediterranean diet in particular, are associated with a reduced occurrence of some negative outcomes in babies – although 28/29 of the included studies in this review were observational (9).

Exercise/Physical activity

Twelve systematic reviews involving physical activity interventions in weight management for pregnant women were identified. There were a variety of outcomes demonstrated.

- No increase in GWG (10)
- No reduction in GWG (11)
 - Only 38% of exercise interventions achieved statistically significant reductions in GWG in a review looking at exercise dose and reductions in weight gain during pregnancy (11)
- Reduced GWG (12-19)
 - Moderate quality evidence indicated that exercise-only interventions reduced GWG and post-partum weight retention (PPWR) by about 1.0 kg, and decreased the odds of excessive GWG by 32% - to achieve at least a 25% reduction in the odds of excessive GWG, pregnant women need to do at least 105 min/week of moderate-intensity exercise (e.g. brisk walking, water aerobics, stationary cycling or resistance training) (14)
 - A meta-analysis showed that physical activity can reduce maternal GWG for pregnant women, especially for those with exercise frequency of 3 times per week and duration of 30-45 minutes (16)

- Reduced postpartum weight (14, 20)
 - The most effective interventions in reducing weight in postpartum women were exercise programs with objectively defined goals, such as the use of heart rate monitors or pedometer and exercise combined with intensive dietary intervention (20)
- No increase in postpartum weight loss (13)
- No difference in birthweight (10)
- No increase in risk of small for gestational age (10)
- No increase in low birth weight (10)
- No increase in risk of preterm birth (21)
- Increased vaginal delivery (21)
- Lower risk of caesarean delivery (17, 21)
- Less gestational diabetes (15, 21)
- Less hypertensive disorders (21)
- Increased self-efficacy (12)
- Alleviation of pregnancy pain (12)

Vigorous intensity exercise during the third trimester appeared not to compromise birth outcomes for most low-risk pregnancies (10).

As with the dietary intervention reviews, there is a lot of heterogeneity between physical activity interventions and in the methods used for data collection. One publication states: *“our review revealed rather inconsistent findings among the included studies..... While one cannot rule out the possibility of the heterogeneity of the nature of the interventions reported in the included studies as a cause for such inconsistencies in findings, it is possible that the variations in methodologies used in data collection among the studies could also be one of the contributing factors”* (12) p35.

A review looking at the relationship between exercise dose and weight management, found that an exercise dose that enables women to control their weight during pregnancy is still unknown, due to the high level of heterogeneity across the studies. The authors conclude that: *“the continuous use of poor measurements of gestational weight gain, changes in body composition and exercise dose will likely perpetuate the production of null findings found in exercise interventions among pregnant women”* p334 (11).

Another review concludes that it is difficult to recommend the most appropriate or effective exercise programme for either pregnant or postpartum women, due to inconsistencies in the research design of the studies analysed, but it is likely that for pregnant women the intervention should include aerobic, toning and strengthening exercises (13).

Combined interventions (including diet, exercise, advice, monitoring)

Eleven systematic reviews looking at combined diet/nutrition, exercise, advice, counselling and monitoring interventions for pregnant women were identified, and demonstrated mixed outcomes. Reviews showed that these interventions:

- reduced GWG (22-30)
- reduced caesarean births (22, 25, 26, 29, 31)
- led to postpartum weight loss (32).
- had no effect on birth outcomes (22, 31).
- reduced the risk of GDM (22, 27).
- had no effect on pregnancy-related outcomes (22)
- reduced the risk of large for gestational births (23, 25, 33)
- had no increased risk of small for gestational age (27, 33)
- reduced maternal hypertension (25, 27, 29)
- reduced newborn breathing difficulties (25, 29)
- reduced the risk of pre-eclampsia (27)
- reduced preterm birth (27).
- reduced intrauterine death (27)
- reduced infant birthweight (33)
- reduced the risk of macrosomia (33)

One review concluded that “*there is no optimal duration, frequency, intensity, delivery method, or diet for interventions aiming to prevent excessive GWG, making it impossible to definitively describe a tool box of ‘best bets’ that can be applied directly into practice settings*” p10 (24).

Multi-component approaches including a balanced diet with low glycaemic load and light to moderate intensity physical activity, 30–60min per day, 3–5 days per week, could be introduced from the first trimester of pregnancy and maintained during the postpartum period (29).

One review that found that lifestyle interventions for pregnant women reduced GWG but had no effect on preeclampsia, gestational diabetes, caesarean delivery or birth weight, suggested that body composition or body fat may be the most appropriate outcome metric, rather than maternal weight (30).

Several reviews did find that diet/nutrition-only interventions were *more* effective for GWG when compared with exercise or combined approaches (24, 34).

Antenatal care

Weighing as a stand-alone intervention is not worse nor better at reducing excessive gestational weight gain than routine antenatal care (35).

GWG for women in group prenatal care had inconsistent findings, but overall there were no differences in GWG outcomes in group compared to traditional prenatal care (36).

Behavioural change techniques

Interventions designed to reduce excessive GWG that target single behaviours (i.e. a change in diet or change in physical activity NOT both combined) were found to reduce the incidence of GDM – the authors stated that changing behavioural habits of both physical activity and diet simultaneously may simply be too difficult when being pregnant (37).

A 2011 review concluded that there was a lack of sufficient evidence to conclude that behavioural interventions are effective in reducing GWG, but no evidence to suggest there are any adverse effects (38). The lack of effect may reflect the failure of the interventions to address some of the barriers to healthy weight gain identified in the qualitative studies.

Behavioural interventions in pregnancy may be effective in reducing GWG in obese women, but not overweight or morbidly obese women (39). Behavioural interventions had no effect on postpartum weight loss or retention, gestation week of delivery and infant birth weight in overweight, obese and morbidly obese women. The techniques that were most commonly used in the successful interventions involved physical activity and diet counselling by a dietician, physician or a midwife supplemented by motivational talks on weight management, feedback on the progress of participants and weight monitoring during pregnancy (39).

Other effective interventions designed to limit gestational weight gain included the behaviour change techniques of providing information on the consequences of behaviour to the individual woman, providing rewards contingent on successful behaviour, prompt self-monitoring of behaviour and motivational interviewing – but none of these behaviour change techniques were present in the dietary or physical activity interventions (40).

When primary care providers (PCPs) counsel nutrition and physical activity, obese and overweight pregnant women had greater success meeting GWG targets and may be more motivated to modify their behaviour than with other modes of intervention deliveries (41).

Postpartum

Combined postpartum nutrition and exercise interventions can achieve weight loss, but evidence is limited; there was an overall low strength of evidence for postpartum interventions on weight loss (42).

Lifestyle interventions during pregnancy were shown to have the potential to reduce long-term postpartum weight retention (43).

Interventions which started during the postpartum period were effective in reducing postpartum weight, but due to the small number of trials, no conclusion could be drawn about the effect of interventions which start during pregnancy (44).

Interventions that use diet-and-exercise approaches, use self-monitoring, and have a shorter duration (6 months or less) resulted in significantly greater weight loss in postpartum women - the combination of diet and exercise resulted in twice as much weight loss as that achieved through exercise alone (45).

Health professional support and combined diet and physical activity were shown to be the core interventional elements for implementation of postpartum weight management (46).

A dietary and/or physical activity intervention in the postpartum period was associated with modest weight loss after birth, which appeared to be maintained at 12 months postpartum, and to be of greater magnitude following a combined dietary and lifestyle intervention (47).

Education

Theory-based education and educational models such as theories of self-regulation, self-efficacy, and social support, and health belief models played an effective role in controlling gestational weight and changing lifestyle and pregnant women's behaviours (48).

Pregnant women with lower educational attainment are at an increased risk of both excessive and inadequate weight gain (49). *“Given that dietary interventions do not widen health inequalities, are successful in promoting appropriate weight gain, and are acceptable, healthcare professionals should consider implementing nutrition-based interventions as part of baseline maternity care packages for all pregnant women”* p9 (49).

Ehealth/ Technology-supported interventions

Exposure to eHealth technology was associated with a non-significant benefit for weight management during pregnancy, and a statistically and clinically significant weight reduction in the postpartum period (50). The eHealth interventions that were effective in minimising excessive weight gain during pregnancy comprised multiple components, including individualised text messaging and the use of social media.

Technology-supported lifestyle interventions including telemonitoring and coaching can optimise GWG and postpartum weight retention, although not all results were significant (51).

Phone-based interventions (e.g. SMS and phone call) can help pregnant women control GWG by providing guidance, reminders and educational materials (52).

Preconception care

A Cochrane review in 2015 found no randomised controlled trials that evaluated the effectiveness of preconception health programs and interventions for improving pregnancy outcomes for women who are overweight or obese (53).

A review looking at dietary and physical activity counselling at the pre-conceptual stage showed reduced GWG, but this was based on a single study (39).

Health Professionals

The current focus of maternal obesity and weight management research is targeted towards changing pregnant women's behaviours and does not address the multiple healthcare professionals' barriers to maternal obesity and weight management practice (54).

The theoretical domains of 'knowledge', 'beliefs about consequences' and 'environmental context and resources' are the most frequently identified determinants of healthcare professionals' behaviours in relation to maternal obesity and weight management - there were more barriers to behaviours than facilitators, especially in relation to communicating weight status and providing weight management advice and support (55).

Qualitative

Women require sensitively delivered advice that accounts for their personal attitude towards their weight and its management – this may mean focusing more on healthy lifestyle advice than on weight, or more detailed advice on weight management (56). Poor communication skills by some health professionals may act as a barrier for uptake of advice.

Evidence gaps

Weight management in the pre-conception period

- *“There is a lack of appropriately designed, high-quality studies on weight management in pre-conceptual women”* p14 (39)

Supporting health professionals to overcome their barriers to practice

- *“It is clear that interventions are urgently required to facilitate the implementation of international maternal obesity and weight management guidelines”* p4 (54)
- *“Further research is needed to explore effective implementations of primary-care-provider delivered interventions during routine prenatal care”* (41)

Postpartum weight loss and retention

- *“The longer-term effects on sustained behavioural change and on subsequent pregnancy and birth outcomes are still unknown”* p653 (47)

- *“Larger trials utilising comparative methodologies in the pregnancy and postpartum periods are required to inform the development of targeted strategies preventing PPWR or reducing postpartum weight”* p1 (57)

Investigating body composition and fat mass of mothers

- *“.....it would be prudent to carefully investigate how such [lifestyle] interventions impact dietary content and affect body composition, particularly fat mass of mothers and children”* p10 (30)

The optimal components and delivery methods of the diet and physical activity interventions

- *“Quantifying dietary intakes before, during and after an intervention would provide an important measure of compliance with the dietary intervention regime”* (8)
- *“In future research it would be crucial to tailor the duration and contents of dietary interventions more consistently”* p1735 (4)
- *....it is strongly recommended that future researchers allocate their resources to designing a large randomized controlled trial consisting of varying exercise doses in pregnant women to identify an effective exercise dose”* p334 (11)

Women who are already overweight or obese pre-pregnancy

- For example, in 2013, a Cochrane review found no randomised controlled trials designed for obese pregnant women to lose weight (58)
- *“Based on analysis, pre-pregnancy BMI is a better predictor of GWG than the type of intervention program studied”* e118 (34)

Smartphone applications for GWG

- *“.....there is no evidence about the impact of smartphone applications on GWG control, further investigations are required to evaluate the impact of these interventions on controlling GWG and other gestational outcomes”* p13 (52)

High intensity exercise in pregnancy

- *“Further research is needed on the effects of vigorous intensity exercise in the first and second trimester, and of exercise intensity exceeding 90% of maximum heart rate”* p1 (10)

There is also a need for additional research that conforms to methodological quality standards and bias prevention, to accurately determine the efficacy of exercise and diet interventions for weight management in pregnant women (13).

Example search strategy

Ovid Medline

1. pregnan*.tw,kw.
2. (pre-pregnancy or prepregnancy).tw,kw.
3. (post-partum or postpartum).tw,kw.
4. (pre-conception or preconception).tw,kw.
5. (pre-natal or prenatal).tw,kw.
6. *Pregnancy/
7. Postpartum Period/
8. *Pregnant Women/
9. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
10. ((weight adj2 los*) or (weight adj2 gain*) or (weight adj2 chang*)).tw,kw.
11. (obesity or obese).tw,kw.
12. body mass index.tw,kw.
13. *Overweight/
14. *Weight Gain/
15. *Obesity/
16. Body Weight/
17. *Body Mass Index/
18. 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17
19. 9 and 18
20. limit 19 to yr="2009 - 2019"
21. limit 20 to "reviews (best balance of sensitivity and specificity)"

Inclusion/exclusion criteria

Inclusion criteria

- Systematic review
- Weight management intervention, including diet, physical activity, counselling and combinations
- Healthy weight, overweight or obese pregnant/postpartum/pre-conceptual women
- Outcomes of weight gain or weight loss, and/or pregnancy- and infant-related health

Exclusion criteria

- Conference abstract or protocol
- Not in English language

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