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The Weigh to a Healthy Pregnancy: Evaluation of a Regional Weight Management Programme for Obese Pregnant Women

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Abstract

Background: Maternal obesity is associated with significant health risks and costs. Identifying effective interventions for treatment and management of obese women in pregnancy is required to reduce these risks. The aim of this project was to evaluate the feasibility of the 'Weigh to a Healthy Pregnancy Programme' (WTHP), designed to help limit gestational weight gain (GWG) in women with a body mass index (BMI) ≥ 40 kg/m^2 through healthy lifestyle changes. Pregnant women in Northern Ireland with body mass index (BMI) ≥ 40 kg/m^2 were recruited to participate in this programme between April 2013-April 2014. Women received a structured support programme including tailored advice and group sessions during pregnancy. Both quantitative and qualitative data were collected at 9 time points during pregnancy and in early postnatal period.

Results: Of 381 women invited to participate 306 (80%) agreed to take part of which 217 (71%) completed the programme. Women were approximately 118 kgs at recruitment (average 10.7 weeks gestation). Overall, women gained an average of 4.65 kgs from their booking appointment (<12 weeks gestation) to delivery (range 36-40 weeks), just below the Institute of Medicine (IOM) recommended guidelines of 5-9 kgs. Qualitative data collected from interviews demonstrates that women who completed the programme made positive changes to diet and physical activity habits.

Conclusion: Evaluation of WTHP provides evidence that this intervention has the potential to impact positively on weight management for pregnant women with a body mass index (BMI) ≥ 40 kg/m^2.

Keywords: Pregnant women; Obesity; Weight gain; Healthy lifestyle programme

Introduction

Rates of overweight and obesity are increasing in pregnant women and evidence suggests that greater than 20% of UK mothers are obese [1]. Obesity in pregnancy is associated with adverse maternal and perinatal outcomes; these include an increased risk of post term delivery, gestational diabetes, pre-eclampsia, caesarean delivery, miscarriage and stillbirth [1-3]. In addition maternal obesity and being overweight was found to be a contributing factor in more than 50% of maternal deaths [4].

One of the strongest predictors of weight retention following delivery is excessive gestational weight gain (GWG), and women who start pregnancy with a body mass index (BMI) in the overweight or obese range are more likely to gain weight in excess of that recommended [5]. Most women return to their pre-pregnancy weight within one year of delivery, however, around 15-20% of women retain ≥ 5 kgs [5]. The long-term effects of excess gestational weight gain (GWG) can result in continuation of this obesity cycle as post-partum weight retention for the mother leads to a higher pre-pregnancy body mass index (BMI) in a subsequent pregnancy [6].

In addition to the adverse health consequences, maternal obesity also impacts on health services by inducing significant financial implications. The healthcare costs associated with the management of adverse pregnancy outcomes are reported to be putting an unanticipated financial burden on the UK healthcare system. Obese pregnant women have been reported to cost the NHS up to 37% more than their counterparts with a healthy weight [7] therefore, Identifying effective interventions to prevent and manage maternal obesity could result in significantly lower care costs, as well as improved clinical outcomes [8].

Strong evidence suggests the need to start interventions during pregnancy which is the time proven to be more effective for limiting weight retention with evidence supporting a combination of both diet and physical activity components than either individually [8].

Methods

Subjects and recruitment

Pregnant women with a body mass index (BMI) ≥ 40 kg/m^2 attending antenatal care in all areas on Northern Ireland were recruited between April 2013 and April 2014 to participate in The 'Weigh to a Healthy Pregnancy Programme' (WTHP) which was a pilot study funded by the Public Health Agency (PHA), Northern Ireland (NI). The aim of the programme was to help limit gestational weight gain through healthy lifestyle changes [9]. Eligible subjects were identified from databases within each Trust area in Northern Ireland. Women were excluded if aged less than 18 years old, had history of cardiovascular disease, severe psychiatric condition, history of eating

disorders, or those with multiple pregnancies or had previous small for gestational age baby. Informed consent was provided by all women who participated in this programme.

Programme content

All participants received a structured support programme utilising one-to-one information and tailored advice sessions, (delivered in person and by telephone or text) as well as more generalised group information sessions delivered by either a trained dietitian, midwife or physiotherapist. Participants were provided with a calibrated telehealth remote monitoring weighing scale. Participants were asked to weigh themselves once a week and remotely send this weight to the programme staff. This weekly weight measurement which was used to monitor weight changes throughout the programme.

The programme consists of four face-to-face sessions with a midwife and/or dietitian, two group sessions, and an additional three contacts made via telephone or text. Participants were provided with an information booklet and asked to record food intake and activity during the programme.

The aim of this evaluation was to assess the feasibility and effectiveness of the WTHP programme in altering a range of physical, physiological, psychosocial and dietary parameters in pregnant women with a body mass index (BMI) ≥ 40 participating in this programme.

Objectives of the evaluation

The six key objectives of the evaluation were to:

1. Examine uptake of and attrition of the WTHP programme

2. Determine maternal weight gain during pregnancy and weight loss at 6 weeks post pregnancy

3. Assess the impact of the intervention on maternal lifestyle factors including dietary behaviour, physical activity and breastfeeding

4. Assess the impact of the intervention on maternal and neonatal pregnancy outcomes

5. Ascertain the ability of the programme to facilitate sustained lifestyle changes in the postpartum period

6. Examine the feasibility of delivering the programme within the current clinical environment

A mixed methods study was undertaken using the NOO framework process evaluation [10] and also MRC complex intervention guidance [11]. Both quantitative and qualitative data were collected as part of this evaluation. Standardised procedures were followed with regards data access agreements. Quantitative data collected included weekly weights, parity, smoking, alcohol intake, type of delivery and also information on maternal and neonatal outcomes.

For the purposes of evaluation, weight was recorded weekly by participants using telehealth remote monitoring scales and also by programme staff on four occasions during the pregnancy (booking appointment (~12 weeks gestation), 16-18 weeks gestation, 36-40 weeks gestation, and at delivery) and twice after delivery (early postnatal period and at the 6-8 week postpartum).

Qualitative data were also collected from both participants and healthcare professionals to gain an insight into the programme. Participants (n=35) who completed the programme were randomly selected by the funders (PHA Public Health Agency) to receive a telephone interview by the research assistant. Participants provided verbal consent for the interview to be recorded at that time. These in-depth telephone interviews were conducted to explore women's experiences of the programme and attitudes towards the intervention. A random sample of women, who did not complete the programme was contacted by telephone to explore reasons for non-completion of the programme. A random sample of healthcare professionals (n=15) involved in delivery of the programme was selected (by funders PHA) to attend a semi structured face to face interview with the research assistant. These interviews were structured to explore their perceptions and attitudes towards the programme content, delivery and effectiveness.

Data analysis

Telephone interviews were recorded and data transcribed verbatim into the data management programme, NVivo10 in before undergoing thematic analysis [12]. Key themes that emerged were verified within the evaluation team.

All quantitative data were entered into a standardised, password protected Excel database and imported into the statistical programme SPSS version 22. Chi-squared analysis was undertaken to identify any statistically significant differences between women who participated in the programme and those who did not engage with the programme (non-completers). With regard to weight as an outcome, three participants defined as twin pregnancies were removed prior to analysis, leaving a sample of 303 women. A latent growth curve modelling (LGM) approach was undertaken, providing an estimate of the average initial level (mean and variance at time one),an estimate of the average rate of change through the various stages of the pregnancy and then the change in weight six weeks after delivery.

Results

Subject characteristics

Characteristics of the sample: Of the 303 almost exclusively Caucasian (99%) women, mean overall body mass index (BMI) was 44 kg/m^2 (SD 3.87) and average weight 118 kgs at recruitment (average 10.7 weeks), average age 30 years (range 18-42 years). There was no significant difference in age, ethnicity, booking body mass index (BMI) or gestational age at booking between women who agreed to participate in the programme and those who did not complete the programme (Figure 1).

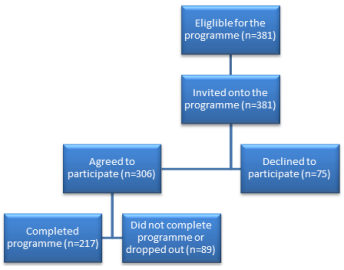

Figure 1: Flow chart showing number of eligible participants from all five Trusts and their engagement throughout the programme.

Although chi-squared analysis showed no significant relationship between parity and agreeing to participate in the programme, it did influence whether women completed the programme or not. Of those women, defined as 'non-completers', 82% were parous mothers compared to 18% who were first-time mothers. A chi-square analysis found that parous mothers were more likely to drop out or not engage fully in the programme compared to first-time mothers (X^2=10.77, df=2, P=.005).

Weight change

Average weight at initial booking (average 10.7 weeks), controlling for gestation period, was approximately 118 kgs (260.1 lbs). On average women gained 4.65 kgs from booking (118 kgs (260.1 lbs)) to delivery. Baseline and booking weight for each woman was adjusted to control for variation in booking gestation. Individual trajectories for each weight change over the remaining five data collection points were calculated as shown in Figure 2. The model fit statistics were as follows: X^2=37.364, df=15, p-value=0.011; (Figure 2).

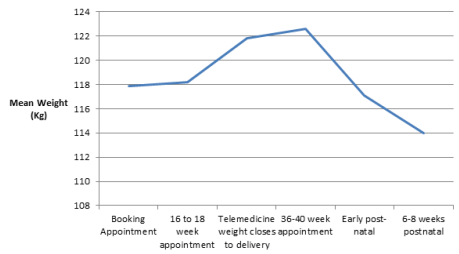

Figure 2: Mean weight change trajectory, based on model estimates, for the 303 women in the sample. RMSEA=0.07, 90 Percent C.I. 0.042 0.099; CFI 0.974; TLI=0.963.

When compared to recommended IOM weight gain guidelines of between 5-9 kgs for pregnant women with body mass index (BMI) ≥ 30 kg/m^2, 47% of women gained within the guidelines with 25% gaining below and 16% gained above these guidelines (Figure 3) [9].

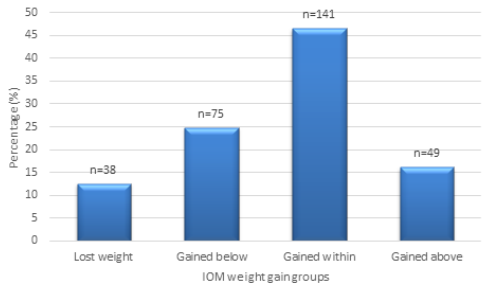

Figure 3: Bar chart illustrating participants' weight change in relation to the IOM (2009) weight gain guidelines.

Impact of programme on eating behaviour and lifestyle

Changes in eating behaviours and physical activity as a result of WTHP were assessed using qualitative data collected during interviews with health professionals and participants. In addition all participants were provided with food and activity diaries for self-completion, however 99% of participants did not complete these diaries therefore no quantitative nutritional or activity data were available for this analysis.

Overall participants who completed the programme reported some dietary changes, including developing healthier eating patterns which included regular meals:

'My eating habits before I got pregnant was atrocious I'd eat nothing all day and then eat at night. Now I eat breakfast and lunch and snack throughout the day and have a small dinner' (P015 completer).

Others reported that they had reduced their food portion sizes since participating in the WTHP programme, describing how they had been given hints and tips allowing them to modify their eating behaviour, such as using a smaller plate:

'I think it made me more aware of my portion size that's one of my main issues that I'm eating the same size as my husband you know the way you're brought up, you finish everything that's on your plate as well so even going to using a smaller plate…'(P018 completer).

Women who completed the programme often reported an increased awareness of their food and drink intake. Being more mindful of these behaviours provided women with the ability to identify specific habits which could be changed to improve the overall quality of their diet:

'It keeps you in the back of your mind to be conscious of what you're eating and it wasn't at all about a diet it was making me aware that I'm pregnant and I need to keep healthy' (P003 completer).

Women often expressed their lack of knowledge on how to exercise during pregnancy reporting fear around the safety of engaging in physical activity:

'I think because I hadn't been pregnant before I wasn't sure about exercise and what I should be doing and what I shouldn't be doing, those kind of things' (P023 completer).

Other women reported barriers to their ability in increasing physical activity levels. Common barriers included limited time available and accessibility to attend exercise classes. Women who expressed a wish to be more active often referred to limited availability to attend especially when they had older children:

'I didn't take up any extra exercise. I have a 3 year old so there's a lot of park walks and running after her. I mean I enjoy things like swimming and yoga but my husband works shifts and with a 3 year old it's difficult because I have no child care for her, so the only time I can go is in the evening when everyone is in bed and I didn't manage to do that, I suppose it's more of a personal situation than not wanting to go...I would love to do a weekly yoga class' (P017 completer).

Others participants acknowledged that they had been offered aqua natal classes (free of charge) as a way to being more physically active:

'Throughout pregnancy I did attend the swimming pool to do the aqua natal once a week and I probably tried to do a short walk at least once a week as well and I did limit my food as well cause I thought I have to step on those scales on Sunday' (P029 completer).

Impact of the programme on initiation of breastfeeding was assessed and showed that 23.8% (n=72) of women exclusively breastfed compared to 10.7% (n=9) of women who did not participate in the programme. Despite this positive trend towards participating in the

programme and breastfeeding, this relationship was not significant (P=.088).

Impact of the programme on sustained lifestyle changes postpartum

Interviews conducted with women after delivery of the programme (average 6 months) indicated positive lifestyle changes which have been extended to include the wider family. Participants reported changes in usual shopping habits and in attitude towards weight gain:

'When I was made to change it was reflected in the shopping for the household, so now that we've continued to buy those things as part of the household, we've continued on with those changes" (P001 completer).

Likewise healthcare professionals commented positively:

"I do think it has made some very positive changes, and even some of the ladies we've had its made positive changes in the family's circumstances. We've had ladies with maybe four or five children and they've actually changed their all children's eating habits as well. So I do think it's very successful" (midwife).

Integration of the programme into the clinical environment

Healthcare professionals involved in delivering the programme were asked to explore and evaluate the process of integrating the programme into routine clinical practice. Healthcare professionals reported that training was required to ensure all participants received the same advice and support regardless of which healthcare professional provided it. Support from the management structure was required as was adequate resources, co-operation and good communication mechanisms between healthcare professions to deliver the programme.

Discussion

The aim of this study was to assess the effectiveness and feasibility of the 'Weigh to a Healthy Pregnancy Programme' (WTHP), programme in limiting gestational weight gain (GWG) in obese pregnant women body mass index (BMI) ≥ 40 kg/m^2.

Out of 381 women approached 306 (80%) agreed to participate. Of those who agreed to participate 29% (n=89) did not complete the programme which is a lower rate than previous similar studies which reported 30% to 50% [13,14]. Lower attrition rate in this study may have been due to the design in that it was centrally funded by local Government and all pregnant women eligible were individually counselled by healthcare professions to participate in the programme. However, this study showed a significant relationship between parous mothers and higher rates of drop out or lowers rates of engagement in the programme compared to first-time mothers. Parous mothers reported reasons for non-participation as a lack of time available as a result of caring for other small children.

Weight change

Those women who participated in the programme are closely reflective of the population targeted as no significant difference in age, ethnicity, booking body mass index (BMI) or gestational age at booking between women who agreed to participate in the programme and those who did not complete the programme (drop outs). Average body mass index (BMI) of women who participated was 44 kg/m^2 (SD 3.87) with an average weight of 118 kgs (SD 10.5 kg) at booking appointment (average 10.7 weeks). Overall, women participating in the programme gained on average 4.65 kgs from booking (average 10.7 weeks) to delivery (range 36-40 weeks) which when compared to Institute of Medicine's [9] guidelines is lower than the recommended range of between 5-9 kgs for women with body mass index (BMI) ≥ 30 kg/m^2. Approximately half (47% n=141) of women gained within the recommended range of 5-9 kgs, 25% (n=75) gained below, 16% (n=49) gained above and 12% (n=38) lost weight. Evidence suggests that obese women may be predisposed to higher weight gain in pregnancy and Haugen et al. reported 66% of obese women gained over the recommended range, however when compared to this current programme only 16% gained excessive weight which suggests that interventions to limit weight gain can be successful [15]. However it must be noted that a limitation of this is that there are currently no guidelines in the UK for weight gain recommendations, therefore US [9] guidelines were used which recommend weight gain guidelines for women body mass index (BMI) ≥ 30 kg/m^2. While the average body mass index (BMI) of women in this programme was 44 kg/m^2, the current IOM guidelines highlight insufficient evidence is yet available to differentiate recommended gestational weight gain (GWG) between differing classes of obesity; these guidelines may not be applicable to this group. Although the purpose of the programme was not for weight loss, 12% of women weighed less at the end of their pregnancy than at the booking appointment. This study did not provide any evidence on any potential effects of losing weight during pregnancy and that it seems reasonably safe for obese women (class II and III) to lose weight in pregnancy [16], although it has been noted that NICE guidelines do not recommend weight loss during pregnancy [17]. Data on gestational weight gain (GWG) trends in obese women is scarce and controversy exists as to the recommended weight gain in pregnancy for women with body mass index (BMI) ≥ 40 kg/m^2. Kiel et al. [18] found that limited or no weight gain in obese pregnant women has favourable pregnancy outcomes. Similarly Jewell et al. [19] found that restricting gestational weight gain (GWG) did not have a negative impact on the birth weights or other birth outcomes

This study also showed that at 8 weeks postpartum, women were on average 3.96 kg less than at the beginning of pregnancy. This indicates a trend towards overall weight reduction which is encouraging as evidence suggests that pregnancy related weight gain is a major contributor to increasing obesity and is consistent with Mamun et al. [20] who reported that women who gained more weight during pregnancy were heavier at 21 years postnatally.

Changes in dietary and lifestyle behaviour

Dietary changes were investigated during telephone interviews with participants following completion of the study (3-6 months postpartum). Reported changes in dietary behaviours included reducing portion sizes, reducing intake of foods high in fat and sugar, increasing fruit and vegetables and generally being more aware of foods eaten. Women also reported attempts to increase activity levels (albeit less than dietary changes) by incorporating walking into their daily lives. Feedback from healthcare professionals confirmed that they had observed participants actively making positive lifestyle changes. However due to poor compliance with completion of food intake and physical activity diaries it was not possible to ascertain and quantify these behaviours. Participants reported that the burden of completing such diaries was impractical. Therefore perhaps the use of a structured food frequency questionnaire to assess changes in the types of foods consumed and eating behaviours over the study would be less

burdensome, also the use of an accelerometer to assess all intensities of physical activity or a pedometer to assess for daily step counts could provide a more objective measurement of physical activity.

Rates of breastfeeding were investigated to assess the potential impact of the programme on method of feeding at initiation. It is well documented that that breastfeeding rates are poor among obese women [21,22]. This was consistent with the current programme where reported overall 24% (n=72) of participants exclusively breastfeed compared with 10.7% of women who declined to participate in the programme. Despite this positive trend there was no statistically significant (P=.088) detected between those who participated and those who declined. However, of those who did participate, comparison between women who completed the programme and those defined as 'non-completers' (drop outs) it was found that women who completed the programme were more likely to breastfeed than those who dropped out or had poorer engagement, X^2 (6, N=378) =16.7, p=0.01. However a causative relationship between programme participation and likelihood of breastfeeding is difficult to determine based on data available.

The impact of the programme was investigated using telephone interviews to assess sustained lifestyle changes following the programme. However, this was difficult to ascertain. Many participants reported that the programme had influenced positive changes that have impacted the whole family. Some women talked openly of the challenges they faced in the early postpartum period making it difficult to implement positive lifestyle changes. Postpartum is widely recognized as a busy time for mothers and poses enormous challenges to engage women at this time [23,24]. Contrary despite this some participants in the current study reported that they would have preferred the support of the programme to continue for longer, therefore future development of the programme should address this issue.

The process of integrating this programme into routine practice was explored during interviews with healthcare professionals involved in delivering the programme. Overall healthcare professionals reported that the programme was very useful and participants generally engaged. However, feedback suggested that all healthcare professional disciplines should receive similar training including solution focused therapy. Consistency in training within each discipline would ensure all participants regardless of geographic area received similar guidance and support. It was recognised that continued support from the management team was required, also co-operation and good communication mechanisms between healthcare professions including adequate resources to deliver the programme.

This evaluation has highlighted the need for future interventions to be designed using evidence based practice shown to be effective with this group for example Bogaerts et al. [25] demonstrated that motivational interviewing was successful in reducing gestational weight gain (GWG) in obese pregnant women.

Conclusion

The present study which involved 303 obese pregnant women with an average body mass index (BMI) 44 kg/m² demonstrated evidence that this WTHP intervention has the potential to impact positively on weight management during pregnancy. However, there is a need to minimise drop outs among parous mothers by creating better accessibility for engagement and considering the use of remote or virtual technology.

However, given that a minority of women participating in the programme lost weight during pregnancy, it is important that protocols are in place to monitor women's weight and fetal growth throughout pregnancy and to alert other members of the obstetric team. Consideration should be given to encouraging weight loss in the post-partum period.

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