DOES AN ANTENATAL EDUCATIONAL PROGRAM IMPROVE MATERNAL OUTCOMES AMONG OBESE PREGNANT WOMEN IN THE KURDISTAN REGION OF IRAQ

Aveen F. Hajimam [a] and Tina Harris [b]

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ABSTRACT

Background

Maternal obesity is associated with health risks for mother and new-born. Obesity during pregnancy has increased dramatically in Iraqi Kurdistan.

Objectives

The aim for this study is to assess the influence of an educational program on the maternal pregnancy outcomes of obese women attending primary health centres in a large city in the Kurdistan region of Iraq.

Methods

A quasi –experiment was undertaken. 292 pregnant women who attended one of three health centres for their antenatal care prior to 20 weeks gestation were recruited to the study. 99 women were recruited were of normal weight with a BMI of 20-25Kg/m^2, (baseline group), 96 women had a BMI $\geq$ 30 and were randomised to receive normal care (control group) and 97 obese women were allocated to received normal antenatal care and invited to participate in an antenatal education programme (intervention group). Maternal outcomes measured were gestational weight gain during pregnancy, pregnancy induced hypertension, Gestational Diabetes Mellitus and duration of pregnancy.

Results

Obese women were older and were more likely to have had more pregnancies than normal weight women. Regarding maternal outcomes there was no statistically significant difference among the three groups regarding pregnancy induced hypertension, and Gestational age at onset of labour. In relation to gestational diabetes mellitus findings indicated that the prevalence of gestational diabetes mellitus was reduced among those obese women who received the educational programme compared to the control and baseline groups. In addition all obese women (intervention and control groups) had a statistically significant lower weight gain in pregnancy compared to baseline group

Conclusions

The antenatal education programme made a small difference to maternal outcomes. The prevalence of gestational diabetes was reduced in women who accessed the programme suggesting that gestational diabetescould be decreased by educating women during pregnancy regarding healthy diet and exercise.One factor which may have affected the results of this study was the low attendance rate among women who were randomised to receive the education programme. A higher rate of attendance at education classes may have improved outcomes in others areas.

Keywords: *Antenatal education, Maternal outcomes, Obesity, BMI, Gestational diabetes.*

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[a] Gasha Institute, Erbil city- Iraqi Kurdistan.
Correspondence: p10004263@myemail.dmu.ac.uk

[b] School of Nursing and Midwifery, De Montfort University, Leicester. UK.

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INTRODUCTION

Worldwide, obesity has been recognized as a significant public health challenge [1, 2]. It can be defined as an excessive and abnormal body fat accumulation across the body [3]. Evidence shows that obesity during pregnancy has become a major public health problem in both developed and developing countries [1, 3]. The World Health Organization (WHO) reported that the prevalence of obesity, (classified as a body mass index (BMI of 30 or above) during childbearing) ranges from 18 to 25.3% [4]. According to Morgan et al (2014) stated that one in twenty women in England are identified as obese during pregnancy [5]. Statistics on obesity in Iraq are limited. However, a study carried out in Baghdad in 2007 illustrated that 25% of non-pregnant women aged 18 and above were obese [6]. Obesity in the reproductive period is linked to a wide range of adverse outcomes for both the mother and the new-born such as obstructed labour, pregnancy induced hypertension and gestational diabetes [7]. There is currently limited evidence of how such adverse events can be minimized for women who are obese during pregnancy through specific interventions [2, 8].In addition, there is, limited evidence regarding the design of effective intervention programmes and best practices for managing obese pregnant women. According to recommendations by NICE (2010), moderate intensity exercise is not harmful during pregnancy so pregnant women can do up to 30 minutes per day; an example of moderate- intensity physical activities are brisk walking and swimming [9].

Due to limited studies and data on obesity and pregnancy in the Kurdistan region,the prevalence of obesity remains unclear. A small pilot by Mirkhan et al (2012) suggested that 29% of women were obese during pregnancy in one of the health centres in Erbil-Kurdistan region [10]. Health care providers in Erbil have also observed that obesity has increased dramatically in women at onset of pregnancy, and therefore it has been identified that a strategy needs to be developed to minimize the effects of obesity on mortality and morbidity. In order to add to the body of literature about educational programmes in this context, this project was set up to evaluate the benefits of an antenatal education programme for obese pregnant women.

METHODS

Setting of the study

This study was conducted at three health centres in Hawler city in the Kurdistan region of Iraq,which provided mother and child health care services. For the current study, the above health centres were selected purposely to reflect a range of participants drawn from across different parts of the city and included women from a range of socioeconomic groups. This research focuses on and comparing different socioeconomic areas within the city to reflect on the range of experiences among participating women.

Design of the study

A prospective study using quantitative methods of data collection was used to explore the effects of an education programme on maternal outcomes among obese pregnant women in three health centers in a large city in the Kurdistan region of Iraq. Quasi-experimental approach was used in this study. This study was conducted between November 2012 to January 2014 and ethical approval for the study was given by the ethics committee of the Faculty ofHealth and Life sciences at De Montfort University and Hawler Medical University, (which included access to all participating hospitals).

Recruitment

The selected health centre reserved a day in the week to register pregnant women. Women, who had just found out that they were pregnant, visited the clinic on this particular day to register for antenatal care. The first authortherefore visited each health centre on these days and invited women attending the booking clinic to participate in the study. The research project was introduced to women by a health care professional working in the health centre who then introduced the researcher to women willing to participate. All women were given a written information sheet relevant to their BMI and were invited to ask any questions about the study. Women who were unable to read the information sheet were given the information verbally by the first author or the woman's health care professional. Women who agreed to participate verbally were asked to sign a consent form, assured of their confidentiality and anonymity and that their contribution to the study was entirely voluntary and would not affect their on-going care if they chose not to participate. Informed written consent was achieved from all participants before their inclusion in the study. Participants were also informed that they could withdraw their consent at any time during the study without giving a reason.

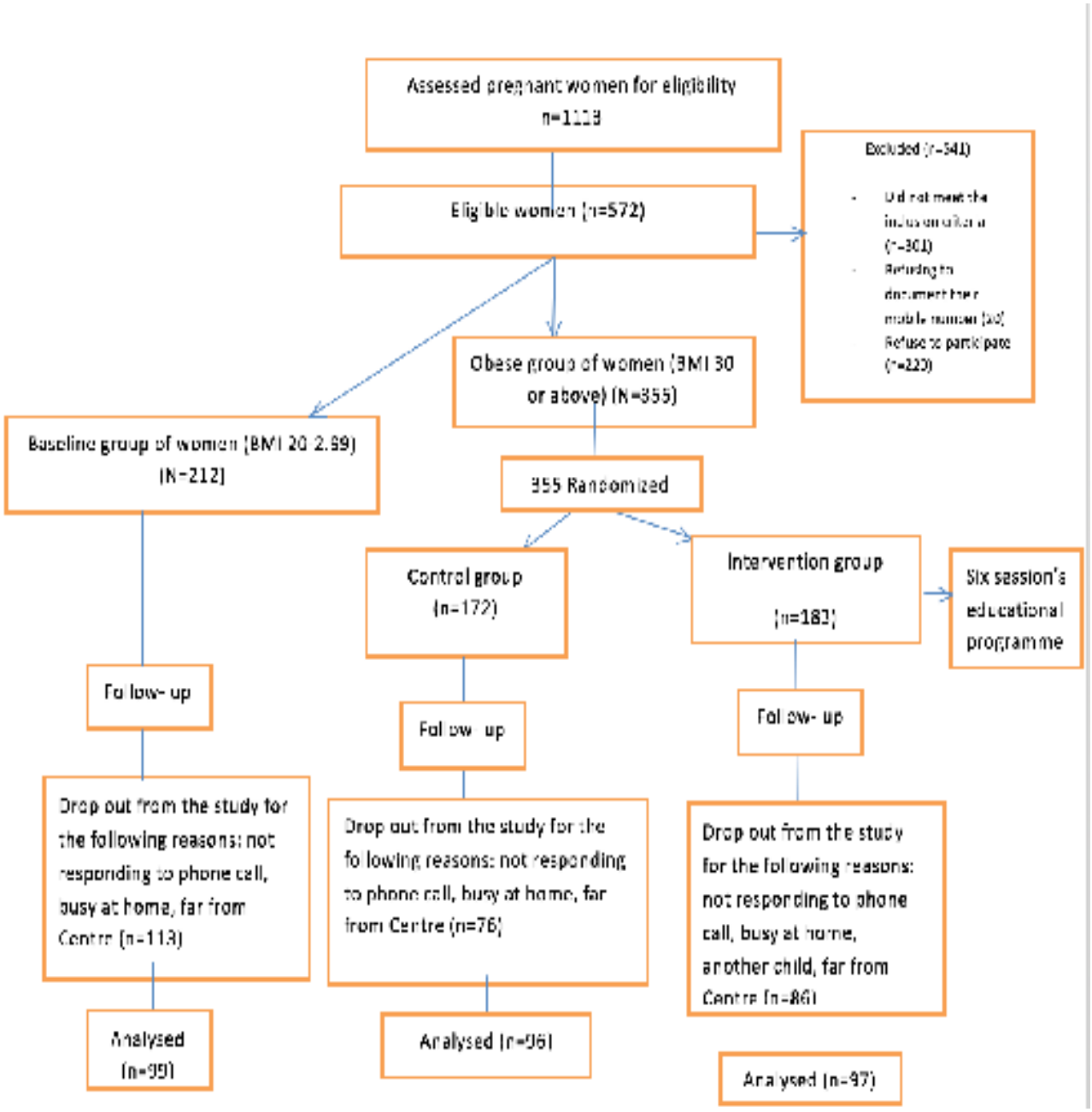

Figure 1. Flow chart of trial recruitment and follow up.

Development of an educational programme

All topics for inclusion were selected after extensive literature review on obesity and educational programmes for pregnant women.

Initially the first author produced draft programme content next; with the help of her supervisor(s) she was introduced to a leader of a similar education programme in the UK, who was happy to share her programme design and content with the researcher. The researcher consequently attended some sessions to become familiar with the programme, reflected on the environment in which it was conducted, the style used by the educator and the content of the programme.

The study education programme was then developed and adapted to reflect the Kurdish cultural and health care context. As a consequence, certain element, such as Aqua natal exercise, was excluded.

The educational programme

Women randomised to the intervention group were invited to attend the education programme immediately. The programme was interactive and included several

topics related to having a healthy lifestyle (e.g. healthy eating, physical activity, and coping with pain at home and in the hospital). These types of programmes have been recommended in literature [8]. During the educational programme the educator distributed CDs to participants about exercise during pregnancy and also recommended women to be more active physically. She used motivational interviewing which is regarded as a client centred therapeutic intervention which enhances readiness to change [11]. Furthermore, the educator taught women about the normal weight gain in pregnancy based upon IOM (2009) guidance. Women in the intervention group started the education programme between 12-20 weeks gestation, whilst continuing to receive routine care from their health care professional at the health centre [12]. All education programmes were delivered at the health centre where the women were booked and delivered by the first author. Women in the baseline group (normal BMI) and control group (obese women with BMI 30 or above who were not randomised to receive the education programme) received routine antenatal care only.

Regarding educational materials used varied and was carefully chosen after consultation with the supervisors and local advisor, and after attending the UK education programme.UK. Educational materials included; Lecture hall including chairs, a white board and a flip board, Laptop and power point presentations, CD , hand outs, pamphlets, written instructions and videotapes on minor discomfort during pregnancy, pregnancy and nutrition, obesity and its effect on pregnancy outcomes, and exercising during pregnancy.

Data analysis process

Quantitative Data were analysed using the Statistical Package for Social Scientists version 22 (SPSS). Both descriptive and inferential statistics were used in this study. Descriptive statistical analysis were displayed as mean, medium, standard deviation, frequency distribution and used to formulate and describe the set of data in addition to finding out the relationship between data. Descriptive tests were performed for the socio-demographical data using mean and standard deviation for continuous variables like women's age, BMI and gestational weeks whereas, median and frequencies were used for categorized variables such as women's educational level, women's occupation and pregnancy outcomes. Further, percentage and frequencies were used to describe all demographical variables and to calculate the prevalence of maternal outcomes among participants. Inferential statistical analysistests were used based on the nature of the data. The Chi square test (X^2)was used for categorical variables, to investigate the differences of maternal outcomes among three groups of the study (women's occupation, level of educations, Pregnancy Induced Hypertension (PIH), and Diabetes Mellitus (DM). Kruskal-Wallis One way analysis of variancewas used for continuous variables which were not normally distributed, were among more than two groups such as (gestational weight gain). To find out the exact differences among the three groups the Pairwise test was used for comparisons among groups regarding the continuous variables (BMI, age, gestational weeks, gestational weight gains and gestational age at onset of labour).

RESULTS

Socio demographic data shown in Table 1. Women in the baseline group were younger than women in the other two groups (control and intervention).The mean age of women was 25.04 $\pm$4.9 years, in the baseline group, 28.98 $\pm$5.43 in the control group and 28.6 $\pm$ 5.9 in the intervention group. . To check if age was related to number of pregnancies among women table (1) shows that just under three quarters (74% & 68.0%) of women in obese groups (control and intervention) were multigravida compared to 58.6% in the baseline group. Therefore the women in the baseline group were on average younger and more likely to be primiparous.

Regarding women`s occupation the results showed that the vast majority of women, 74.2% of the intervention and 72.2% of the control group were housewives, whereas only 63% of women in the baseline group fell into this category. Whilst this suggests women in the obese groups were more likely to stay at home and had no job compared to women in the normal weight group, this did not reach statistical significance (P Value = 0.22).

Regarding women`s level of education, women in the baseline group had a higher level of academic achievement compared to women in the intervention and control groups. 45.5% of women in the baseline group had graduated with a BSc/Diploma, compared to only 28% of women in the control group and 26% of women in the intervention group. Levels of literacy were also different, with obese women being more likely to be illiterate than women of normal weight. This suggests that normal weight women are more likely to have achieved a higher level of education than obese women.

Table 1. Socio-demographic characteristics and maternal outcomes among groups of the study.

Variables	Baseline group (n=99)	control obese (n=96)	Intervention obese (n=97)	P values
Women`s age (mean ± SD)	25.04± 4.95	28.94± 5.43	28.62 ± 5.97	- Baseline Vs. control (<0.000) - Baseline Vs. Intervention (<0.000) - control Vs. Intervention (=1.000)
Gravidity, n (%) **Primigravida** **Multigravida**	(58)58.6 (41)41.4	(25)26.0 (71)74.0	(31)32.0 (66)68.0	- Baseline Vs. control =0.000) - Baseline Vs. Intervention =0.000) - control Vs. Intervention =0.36)
Occupation, n (%) **Housewife** **Employee**	(63)63.6 (36)36.4	(72)72.2 (27)27.8	(74)74.2 (25)25.8	=0.229
Literate, n (%) **BSc/ Diploma** **Secondary school** **Primary school** **Illiterate (can`t read and write)**	(45)45.5 (26)26.3 (22)22.2 (6)6.1	(28)28.9 (23)23.7 (31)32.0 (15)15.4	(26)26.8 (15)15.5 (35)36.1 (21)21.6	=0.23
Maternal outcomes(mean ± SD) **gestational weight gain**	13.29 ± 5.32	10.99 ± 4.98	9.67 ± 4.95	- Baseline Vs. control =0.000) - Baseline Vs. Intervention =0.000 - control Vs. Intervention =0.43
Pregnancy Induced Hypertension, n (%)	(14)15.1	(17)19.3	(14)15.6	- control Vs. Intervention <0.704
Gestational diabetes, n (%)	(5)5.4	(11)12.5	(3)3.3	- Baseline Vs. control =0.07 - Baseline Vs. Intervention =0.037 - control Vs. Intervention =0.02
Gestational age at onset of labour (GA), n (%) **Premature (before 37 weeks)** **Mature (37-41 weeks)** **Post mature (after 42 weeks)**	18 (19.4) 72(77.4) 3(3.2)	20(23) 62(71.3) 5(5.7)	16(17.6) 71(78.0) 4(4.4)	- Baseline Vs. control =0.52 - Baseline Vs. Intervention =0.88 - control Vs. Intervention =0.58

Weight gain, was assessed by calculating the differences between the woman's weight at booking and her weight just before delivery of the baby. Table 1 showed that the mean weight gain of women in the baseline group was 13.29 kg with a SD of 5.32 kg. For obese women in the control group it was 10.99 kg with a SD of 4.98 kg, and in the obese intervention group it was 9.67 kg with a SD of 4.29 kg. After conducting Kruskal Wallis, the results indicated that women in the Baseline group were more likely to gain more weight in comparison to women in the Intervention and control groups (P value =0.000) Overall women in the control arm of the study gained on average over 1Kg more in weight during pregnancy than those who were in the intervention group. This did not, however reach statistical significance.

Pregnancy induced hypertension (PIH) was more prevalent (19.3%) among women in the control group when compared with women in the baseline group (15.1%) and intervention group (15.6%). Results using Chi-Square test (P value =0,704) indicated that there were no statistical differences among groups. That means educational programme made no differences among women regarding the prevalence of PIH.

Gestational Diabetes Mellitus was more common among women in the control group (12.5%) compared

to the baseline group (5.4%) and intervention group (3.3%) This was a statistically significant finding (P 0.02). This suggests that GDM is more common in obese women in the control group compared to obese women in the intervention and baseline groups and suggests an intervention programme may reduce the risk of GDM in obese pregnant women.Analysis of data relating to gestational age at onset of labour showed, the majority of women in control group (23%) were had premature, (19.4%) in the baseline group and (17.6%) among intervention group, Differences were found between normal weight women with control and intervention. Differences between groups did not reach statistical significance, suggesting that gestational age at onset of labour was not affected by maternal obesity.

DISCUSSION

Findings from this study have indicated that an antenatal educational programme can make a small difference to maternal; outcomes among obese pregnant women.

Regarding GDM, there was no statistical difference regarding GDM between normal weight and obese women. This is in contrast with the results of Morin and Reilly (2007), who found that pregnant women who were obese were more liable to gestational diabetes during pregnancy [13]. However the study did find a difference in the rate of GDM in obese women who accessed an education programme compared to obese women who did not. This suggests that if obese women receive education relating to diet and physical exercise during pregnancy, that this can have a positive effect on their pregnancy outcomes, decreasing the chance of GDM, a leading risk factor in pregnancy leading to potential adverse outcomes for both mother and baby.

Regarding GWGamong study groups, it was revealed that obese pregnant women in the intervention and control groups gained less weight when compared to normal weight pregnant women. A similar result was identified by Weiss and Malone (2001) who identified that mean weight gain among obese women was less than normal weight women [14].

The difference observed in GWG between the intervention group and the control group, suggests that women in the intervention group were less likely to gain weight compared to control group (1.32kg reduction throughout pregnancy), suggesting an education programme for obese women may be linked to less weight gain during pregnancy than those obese women who do not receive an education programme. Thangaratinam*et al* (2012), who evaluated 44 clinical trials using healthy lifestyle interventions during pregnancy across all BMI ranges, also found a reduction in GWG (1.42 kg reduction). After statistical analysis, the results of this study were not significant, which is commensurate with the findings of other researchers [15]. In a systematic review conducted by Dodd et al (2010), which included thirteen clinical trials (n=743 overweight and obese pregnant women) they reported that an education programme did not influence gestation weight gain in pregnancy (16) . In contrast, several other studies [17-20], have suggested an educational intervention for obese pregnant women could reduce GWG to some degree. Anothersystematic review of thirteen randomised clinical trials of a lifestyle interventions for overweight and obese pregnant women (n=1228), concluded that there was a modest influence on GWG (-2.21 kg; 95% confidence interval (CI) -2.86 kg to -1.59 kg) [21].

However, in this study, findings showed that the healthy lifestyle intervention programme used did not lead to a statistically significant difference in GWG among obese pregnant women. One factor which may have affected this result was the low attendance rate among women who received the education programme. As a consequence, they may have had a limited benefit from receiving the programme. Reasons for poor attendance were women's roles within the home and lack of support from the family. This is supported by the Institute of Medicine (2009), who indicated individual`s attention and support from women`s health care providers, family and community are needed for achieving the recommended weigh gain during pregnancy [12]. General antenatal education in this community is not currently available, which may reflect the disinterest in the intervention generally in this context.

In terms of the rate of PIH in obese pregnant women, no differences were found between normal weight women compared to obese women. Findings of this research was in the same direction as Basu et al (2010), who investigated the prevalence of PIH on maternal outcomes in South Africa, which concluded that there is no association between PIH and BMI groups. , Basu and his colleagues suggested that PIH might be linked to other causal factors in South Africa. So as Obesity on its own does not affect PIH among obese pregnant women, other factors might contribute to this condition which may include age, parity and family History [22].

However these findings are not consistent with the results of several other studies which were conducted in different countries. For example, a case control study conducted in a hospital in south of Tehran/ Iran [23], identified maternal obesity as a risk factor for developing gestational hypertension, with women with a BMI above 30 kg/m2 being nearly 4.5-fold at risk of developing gestational hypertension compared to pregnant women with a normal BMI (20-25 kg/m^2) [23].

There was no statistically significant difference in PIH prevalence between obese women who did not receive the education intervention compared to obese women who did. The suggestion being that the intervention programme did not affect the prevalence of PIH among those women who received the programme. This result was in contrast with the results of a systematic review conducted by Thangaratinam et al (2012), who showed that a lifestyle intervention for obese pregnant women reduced the incidence of PIH. However, Thangaratinam and his colleagues considered that the quality of evidence which was used in their reviews was very low [15]. Conversely, Dodd et al (2014) implied that antenatal advice alone will not improve pregnancy outcomes such as PIH, due to cofounding variables and multifactorial causes of PIH. The main limitation of their trial were the generalizability and external validity of the findings, the population being predominantly white and of high social advantage, with 60% of eligible women declining to participate, reflecting both a lack of interest and time because of other commitments [24]. However Vinter and colleagues (2011) found that, despite high attendance rates, PIH prevalence was not affected. The attendance rate in this research project was poor overall, which may or may not explain the lack of benefit of the educational programme on prevalence of PIH [20].

In terms of gestational age at onset of labour (GA), findings showed that there was no statistical difference regarding GA at onset of labour (p value = 0.52; 0.88; 0.58). This is opposite to a retrospective cohort study by Smith et al (2007) who concluded that preterm deliveries can been seem more among obese women [25]. This result was accepted with available evidences that intervention did not significantly reduce the risk of preterm among their study participants [26, 27]. The education programme may have influenced women's choice over agreeing or waiting when offered a caesarean section, having received education on normal pregnancy and the benefits and limitations of caesarean section. This may have impacted on results.

Conclusion

This research used an educational program for obese pregnant women to see if the education programme positively influenced pregnancy outcomes. The antenatal education programme delivered to obese pregnant women in this context had little effect on maternal outcomes. However there was some suggestion that education relating to diet and physical exercise could make a difference to obese women in terms of risk of GDM. The overall results may have been affected by the contextual features of antenatal care in this region of the world, where preparation for childbirth classes are not available and where attendance at antenatal education programmes is not valued. In addition the low rate of attendance by women allocated to the intervention may have minimized the potential benefits. This study concludes that obesity during pregnancy has an impact on adverse pregnancy outcomes like gestational diabetes and this can be reduced by an educational program.

Declaration

We declare that the main text of this research is entirely our work. This work has not previously been submitted wholly or in part for any academic award or qualification other than that for which it is now submitted.

List of Abbreviations

GWG: Gestational weight gain during pregnancy

PIH: Pregnancy induced hypertension

GDM: Gestational Diabetes Mellitus

DOG: Duration of gestation

GA: Gestational age at onset of labour

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