

The Effect of Lifestyle Intervention to Prevent Excessive Weight Gain During Pregnancy and Promote Postpartum Weight Loss in Overweight and Obese Women

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1. Abstract

1.1. Objective: To assess the efficacy of a theory-based lifestyle counselling intervention sessions in overweight and obese women for the prevention of excessive pregnancy weight gain and indorse postpartum weight loss.

1.2. Methods: Participants with singleton pregnancy at a 12th week of gestation, 18–40 years and BMI $\geq 25 \leq 40$ kg/m² were included. The pregnant women were randomized to intervention and control group. Three face-to-face lifestyle counselling sessions was attended during the pregnancy (at 12-16, 16-20 and 30-34 weeks) and one after delivery at 6-8 weeks' postpartum stage by the intervention group participants. While, the control group received routine prenatal care. The guidelines of the Institute of Medicine (IOM) were used for the gestational weight gain assessment.

1.3. Results: We included 25 women in intervention and 24 in control group in this study. There was no statistically significant difference between the demographic features of the two groups. The mean pre-pregnancy weight was 27.8 kg in intervention and 29.4 kg in control group. The intervention group gained an average less total weight gain (12.23 kg) as compared to control group (18.64 kg); P -value 0.002. The IOM weight gain guidelines were met by 52% of the intervention group. In the intervention group, 28% of pregnant women gained more weight than the IOM guidelines, but this ratio was higher (95.8%) in the control group. Additionally, by 6-8 week of postpartum, revealed that intervention group women were significantly more likely to be at or below their early pregnancy weights as compared to control group (72% vs. 29.1%, p=0.003).

1.4. Conclusion: In our study, lifestyle counselling intervention

had a statistically significant impact on the prevention of weight gain or postpartum weight loss in overweight or obese pregnant women. The observed effects are needed to be confirmed in further large randomized studies.

2. Introduction

The obesity remains a major global public health challenge, particularly in pregnant women [1]. It is also reported in recently published meta-analysis that worldwide 50% of all women are overweight or obese during child-bearing age [2]. According to the World Health Organization (WHO), obesity is based on a Body Mass Index (BMI). The BMI is determined by dividing the weight (kilogram) by the square of height (meters) [3]. Maternal BMI is graded as under-weight (BMI <18.5), normal (BMI = 18.5 to 24.9), overweight (BMI ≥ 25.0 to 29.9) and obese (BMI ≥ 30) [4]. It is now recognized that pregnant women with below or above BMI than normal range have an increased danger of adverse maternal pregnancy and birth outcomes [1, 5]. Overweight and obese women have higher risk for various complications associated to pregnancy such as gestational diabetes, hypertensive illnesses, cesarean sections, thromboembolism and development of long-term obesity relative to normal weight women [6-8]. Additionally, obesity has negative effects on placental, embryonic and fetal development and also rises infant mortality and danger of postpartum problems [1, 7, 9].

Overweight and obese females experience about twice the increase in weight gain in pregnancy relative to average weight females. The incidence of overweight and obesity among pregnant women is alarming in both developed and developing countries [10]. According to the previously published studies, approximately 12-38% of pregnant women in developed countries [10, 11] and 8 to

26% in developing countries are estimated to be overweight or obese [12, 13]. Pakistan is a developing middle resource income country and is among the top ten nations where obesity is prevalent [14]. Approximately 23.9% and 6.3% of Pakistani women of childbearing age are stated to be overweight and obese, respectively [14, 15]. According to the latest Pakistan Maternal Mortality (MM) survey 2019 data, the estimated MM ratio was 189 maternal deaths/100,000 live births during the previous 3 years. The MM ratio was higher in rural areas (203/100,000 live births) as compared to the urban areas (159/100,000 live births). Obesity was reported as one of the main cause for mortality death in Pakistan. 16 However, the Sustainable Development Goals of Pakistan aimed to decrease the MM ratio to less than 70/100,000 live births by 2030 [17].

According to previous published studies the strategies aimed at reducing excessive weight gain during pregnancy are successful. Theoretically based approaches and interventions that emphasize on physical activity as well as nutrition education are strongly needed for pregnant women [18, 19]. The elimination of unnecessary gestational weight gain (GWG) is one solution to avoid the excessive weight and obesity in mothers and their infants. There are limited lifestyle interventional studies that followed women during pregnancy into the postpartum period and the findings have been mixed [20-22]. However, no studies examined the effectiveness of lifestyle counselling interventions for the overweight and obese pregnant women in Pakistan. Therefore, this study was conducted to evaluate the efficacy of a theory-based lifestyle counselling intervention sessions in overweight and obese women for the prevention of excessive pregnancy weight gain and in-dorse postpartum weight loss.

3. Methods

This prospective randomized controlled study was carried out during 10 May 2019 to 30 May 2020 in a tertiary care hospital, Peshawar, Pakistan. The hospital's Ethical Committee approved this study (Reference number). Written consent from all the participants was also obtained. Women participants with singleton pregnancy at a 12th week of gestation, 18–40 years and BMI $\geq 25 \leq 40$ kg/m² were included in this study. Women with any physical disabilities and chronic diseases and unwillingness to continue the study were excluded. A total of 52 eligible women were included in this study. We randomly recruited 26 overweight or obese Pakistani women to intervention and 26 to control group. The intervention groups received a detailed lifestyle intervention program while, the participants in the control group while, the control group received regular routine prenatal care.

3.1. Lifestyle Counselling Intervention Program: Three face-to-face lifestyle counselling sessions was attended during the pregnancy (at 12-16, 16-20 and 30-34 weeks) and one after delivery at 6-8-week postpartum stage by the intervention group participants.

Each counselling session was lasting for 30-45 minutes. Practices were provided by qualified midwives, gynecologists or physician assistants. Pregnant women were advised to eat a balanced diet, indulge in physical activity and monitor their own weight gain regularly. Participant received a weight-gain plan recommended by the Institute of Medicine (IOM) for self-monitoring of the Gestational Weight Gain (GWG) according to their BMI-baseline group. The IOM recommended plan showed healthy weight gain during pregnancy. The 2009 IOM standard recommended pregnancy weight gain targets are 7-11.5 kg for overweight and 5-9 kg for obese women.²³ In the postpartum stage, pregnant women were advised to set short-term targets for losing approximately 1-3 lbs/week. The proportion adequate, inadequate or excessive weight gain was also determining according to the IOM recommendations [23]. GWG estimated as maternal weight at the last prenatal visit minus the weight calculated at the first routine prenatal visit. At the time of recruitment, the pre-pregnancy BMI was calculated and based on self-reported pre-pregnancy weight as explained in previously published studies [21, 22]. The 2018 Pakistan Dietary Guidelines for Better Nutrition recommendations were used for the information about a balanced diet in pregnancy [24]. During counselling sessions, description about the food and serving size charts for pregnant women were clarified and information were given to the participants. The importance of essential nutrients (e.g. iron, folate and iodine) in pregnancy was discussed alongside the general concepts of healthy diet. The participants in intervention group also advised regarding easy daily aerobic (take the stair, walk around the house, swimming etc.) and a 5-min stretching exercises with moderate intensity. The details about exercise was adopted from previous published protocol [20, 25].

Four follow-up cycles were conducted for eligible pregnant women; 12-16, 16-20 and 30-34 weeks of gestation during pregnancy and one at 6-8 weeks postpartum after delivery. To obtain demographic data, all the participants completed a short questionnaire (age, educational level, residence area, occupational status, and pre-pregnancy weight). The investigator issued informative booklets and pamphlets that contained diet and physical activity information to the intervention group. Afterwards, mothers were recommended during pregnancy to attend follow-up and weight management sessions. Counselling was provided in each session, depending on the needs of the pregnant women. The researcher also shared contact number with the participants of the intervention group to address their questions regarding self-care at any time during the study. The researcher contacted the mothers during this study at scheduled dates via telephone calls to tackle their weight if they did not come to the health center due to any problem. Finally, the GWG between two groups were compared (intervention and control group). The secondary outcomes of this study gestational diabetes and mortality rate was also documented. Gestational diabetes mellitus (GDM: 2-hr oral glucose tolerance

test: OGTT) diagnosis at the 24–28 week of gestation were also recorded based from medical records. This test is routinely performed in our health care settings. GDM was diagnosed when the 2-hour threshold value was equal to or above 153 mg/dL (8.5 mmol/L).

After the collection of important data from all participants, the findings were analyzed using SPSS 22.0. Mean and standard deviation were used to characterize the symmetric quantitative results. Frequency and percentage were used for qualitative variables. The chi-square test was used to compare qualitative results.

4. Results

Out of total 52 (intervention group, n=26, control group, n=26) pregnant women, three (One women from intervention group and two from control group due to miscarriage and unable to involve in study) were drop out from the study. Finally, we included 25 women in intervention and 24 in control group. According to the demographic data in study, the mean (SD) age of the intervention group women was 25.9 (4.2) years, 48% had primary education, 64% were from urban areas and 56 % were housewives. There was no statistically significant difference between the demographic features of the two groups (Table 1). A total of 68% women in

intervention group and 66.7% in control group were characterized as overweight. Furthermore, 32% and 33.7% participants were categorized as obese in intervention and control group respectively. The mean pre-pregnancy weight was 27.8 kg in intervention group and 29.4 kg in control group. Further details are given in (Table 1).

The details about the total weight gain and proportion of females exceeding the IOM guidelines are given in (Table 2). Lifestyle intervention group gained an average less total weight gain (12.23 kg) as compared to control group (18.64 kg); P -value 0.002. About, 52% of the intervention group met the IOM weight gain recommendations. None of the control group met the weight gain recommendations by IOM. Almost 28% women in the intervention group were gain exceeded weight than the IOM recommendations, however this ratio was higher (95.8%) in control group. Additionally, by 6-8 week postpartum, revealed that lifestyle intervention women were significantly more likely to be at or below their early pregnancy weights as compared to control group (72% vs. 29.1%, p=0.003; Table-II). GDM was detected in 25% of the control group however, GDM was not observed in the intervention group. Maternal mortality was not documented in both groups in this study.

Table 1: Characteristics of the participants

Variables	Intervention group (n=25)	Control group (n=24)	P value*
Age (years), mean (SD)	25.9 (4.2)	26.3 (4.8)	0.12
Educational level n (%)			0.08
None	5 (20)	8 (33.4)	
Primary	12 (48)	11 (45.9)	
Secondary	4 (16)	1 (4.2)	
High school	2 (8)	4 (16.2)	
University	2 (8)	0 (0)	
Area of residence			0.59
Urban	16 (64)	18 (75)	
Rural	9 (37.5)	6 (25)	
Occupational status			0.82
Employee	11 (44)	9 (37.5)	
Unemployed (housewives)	14 (56)	15 (62.5)	
Pre-pregnancy weight			0.14
Overweight (BMI \geq 25.0 29.9)	17 (68)	16 (66.7)	
Obese (BMI \geq 30)	8 (32)	8 (33.3)	
Pre-pregnancy weight, Mean (SD)	27.8 (3.2)	29.4 (2.8)	0.82

n: number, %: percentage, SD: standard deviation, BMI (kg/m²): body mass index (kilogram per meter square) Chi-Square and T-test applied.

Table 2: Effect of lifestyle intervention counselling on gestational weight gain and postpartum weight retention in the intervention group as compared to control group

Variables	Intervention group (n=25)	Control group (n=24)	P. value
Weight gain (Kg) mean (SD)			
12-16 week	1.71 (0.73)	2.34 (0.89)	
16-20 week	3.91 (0.52)	7.23 (0.68)	
30-34 week	6.61 (0.71)	9.04 (0.74)	
Total	12.23 (1.96)	18.64 (2.31)	0.002
Weight gain according to the recommended level of IOM guidelines n (%)			
Below the recommendation (inadequate weight gain)	5 (20)	1 (4.2)	0.001
Met the recommendation (adequate weight gain)	13 (52)	0 (0)	
More than recommendation (excessive weight gain)	7 (28)	23 (95.8)	0.001
6-8 weeks of postpartum weight retention			
Total weight retention, lbs., mean	2.7 (4.9)	4.1 (4.4)	0.001
Subjects at or below pre-pregnancy weight	18 (72)	7 (29.1)	0.003
Gestational diabetes n(%)	0 (0)	6 (25)	0.82
Maternal mortality	0 (0)	0 (0)	

n: number, %: percentage, SD: standard deviation, kg: Kilogram, lbs.: pound, IOM: institute of medicine, P value: Chi-square and Fisher's exact test.

5. Discussion

This study is the first attempt to test a theory-based lifestyle counselling intervention program in our health care setting and in Pakistan to avoid excessive weight gain during pregnancy and encourage postpartum weight loss in overweight and obese women. In this study, lifestyle interventions (diet and exercise) have significant results on weight control in pregnant women. Recently, similar finding was also reported by Hajian et al and stated that pregnant women in the individual counselling intervention group had lower weight gain comparing to non-intervention group. 20 According to the previous published metanalysis [26], case-control randomized experiment [27], a quasi-experimental [28] and randomized controlled trial [29] studies revealed the significant effects of counselling, education and lifestyle modification programmes on weight control in overweight and obese pregnant women. However, some studies reported contradictory findings on the effects of lifestyle changes on obese and overweight women [21, 30]. Kunath et al reported that lifestyle advices provided by qualified healthcare professionals was not effective in reducing GWG and pregnancy complications in their study participants [21]. Similarly, Althuisen et al stated that lifestyle counselling during pregnancy had no effect on avoiding excessive weight gain [30]. The inconsistency in the findings may be due to differences in standard treatment between countries, methodological variation between studies and sample size differences.

In this study, lifestyle intervention group gained an average less total weight gain as compared to control group. The intervention group women gained 6.41 kg less than the control. Previous studies have also documented similar results. [22, 26] The IOM guidelines reflect the current standard and are also used in various studies [5, 20-23, 26-28]. In our study, more than half of the participants (52%) in intervention group met the IOM weight gain recommendations. A study conducted United States 22 and Iran 20 reported that 31.2% and 5% of the participants met the IOM

weight gain criteria. Additionally, the intervention group in our study were less likely to gain exceeded weight according to IOM recommendations during pregnancy compared to control group (28% vs. 95.8%). These finding was consistent with Herring et al (37% vs. 66%) 5 and Liu et al (56.3% vs. 63.2%) 22 studies. It is evident from the literature lifestyle modification counselling are effective for the control gestation weight and should be included in medical practices for the better patient care.

The observed postpartum retention weight in intervention group were also significantly more likely to be at or below their early pregnancy weights as compared to control group. Similar findings were reported by Herring et al, Hajian et al, and Liu et al. [5, 20, 22] Most of the participants (72%) were able to return to pre-pregnancy weight or lower in this study. Herring et al and Liu et al also revealed that, 56% and 50% of the participants in intervention group returned to pre-pregnancy weight or lower in terms of postpartum weight retention respectively. [5, 22] Inconsistence findings were reported by Kunath et al and Althuisen et al and found that lifestyle intervention was not effective for reducing weight retention after postpartum. [21, 30] Although the lifestyle counselling intervention showed positive results in reducing GWG and postpartum weight loss in our study. Previous published literature also supported our study findings [5, 21, 22, 26-28].

Like any other study, this research had also limitations. The small sample size and a single center-based study are the main limitation. There is no study that examined the lifestyle intervention for overweight and obese women in Pakistan, which limited our ability to compare our results with similar studies of a similar population and socioeconomic level, thus our data may not be generalized. However, despite the limitation our study also has strengths. This was a first randomized study to test a theory-based lifestyle counselling intervention program in our setting. This study will provide important baseline data for the health authorities and researchers to further investigate the determinants of weight gain in different

health care setups and special populations.

6. Conclusion

This study observed that the lifestyle counselling intervention had a statistically significant impact on the prevention of weight gain or postpartum weight loss in overweight or obese pregnant women. The counselling intervention are effective in pregnant women as revealed in this study and also in previously published studies. However, the observed effects are needed to be confirmed in further large randomized studies. There is also needed to formulate regional evidence-based guidelines for health care professionals involved in prenatal and antenatal care. Furthermore, weight control management during pregnancy and postpartum should be prioritized across country with organized and specific actions to minimize the adverse effects of obesity and associated complication.

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