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The implications of pre-pregnancy overweight in the pregnancy outcomes and further development

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Abstract

While the contribution of maternal gain to birth weight is well described, the increasing prevalence of overweight and obesity in pre-pregnant women may be a particular issue. The average body mass index (BMI) is increasing among all age categories and women enter pregnancy at higher weights. Most of the women who are overweight (25-30 BMI) or obese (≥ 30 BMI) present a greater risk of adverse reproductive health outcomes compared to normal weight status (19.8-25 BMI). Therefore, obesity not only has direct implications for the health of a pre-pregnant women but also impacts on the weight of the child in infancy and beyond. Further inside to identify the strategy of prevention the overweight and birth outcomes is presented.
Keywords: *body mass index, obesity, overweight, pre-pregnancy*

1. Introduction

Nutritional status before pregnancy period on birth outcomes is of great public health importance and a clear association was showed by many epidemiological studies[1].

Both pre-pregnancy and antenatal periods offer opportunities for contact with health professionals and is considered an ideal time to intervene for mothers which are more motivated to make changes that could optimize their outcome[2]. Clinicians should identify appropriate weight management interventions that are effective and safe before and during pregnancy. At present, many reviews and guidelines are limited in their recommendations having in the view the small number of defined studies[1]. To add even more potential interactions to our thinking, they have not been able to identify the best intervention that optimizes the outcomes before pregnancy[3].

Guidelines from the Institute of Medicine provide reference ranges for optimal weight gain in pregnancy for normal weight, overweight, and obese women based more on observational evidence[4].

As such, pre-pregnancy weight may influence the prevalence and severity of obesity as a key time to target a weight control or weight loss strategy to help the rapidly growing obesity epidemic[5].

Before the first pregnancy, women who are overweight or obese tend to retain or gain more weight after pregnancy than average weight women[6] despite larger newborns[7] and wider variability in gestational weight gain. Both weight gain before or during pregnancy not only affects the current pregnancy but may also be a primary contributor to the future development of obesity in women during midlife and beyond[8,9].

This review focused on the implications associated with overweight and obesity, presenting updated information on the weight trends among women prior to pregnancy and review prevention studies including postpartum period.

2. Pre-pregnancy BMI implicated in the pregnancy and post-pregnancy period

As a marker of nutritional status, a woman body mass index (BMI, kg/m^2) before enter to pregnancy, if low (<19.8 BMI), could reflect many chronic nutritional deficiency whereas a high BMI (25-30) may reflects an imbalance between energy intake, presenting different variations of adiposity[10].

Both effects on birth outcomes differ, with BMI above the normal range of 19.8 to 25[10] being associated with a number of adverse reproductive health outcomes. Additionally, gestational diabetes[11], pregnancy induced hypertension and/or pre-eclampsia[12], birth defects[13], large for gestational age or macrosomia (>4500 g)[14], cesarean sections[15], prolonged labor[16], infertility[17] and recently postpartum anemia[18] have all been associated with pre-pregnancy overweight, yet the exact mechanisms have not been identified. Among women who become pregnant, the shift towards higher pre-pregnancy weight also appears evident[19].

Strikingly, overweight and obese women before enter to pregnancy, are more likely to gain excessive gestational weight and keep it on after delivery[20,21]. In affluent countries, women retain some weight with each successive pregnancy, gaining more weight comparing with their non-pregnant counterparts[22,23]. These observations beg the far larger and more im-

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portant question of how and when to intervene in order to optimize reproductive and individual health.

Interestingly, with the shift in body weight that has occurred globally, more recent research examined the effect of overweight and obesity on birth outcomes. Growing body of evidence showed that obesity world wide (≥30 BMI) now exists at a prevalence of 15–20% accounting between 2 and 7% of the total health care costs[24].

Moreover, thirty percent of adolescent girls aged between 12 and 19 years are considered overweight or at risk before pregnancy, based on a BMI status[25]. Furthermore, excessive weight gain at younger ages was associated with earlier menarche[26].

It is worth keeping this analogy in mind, that younger overweight and obese girls reaching reproductive capacity perpetuate obesity if left untreated, both through the influence of maternal weight on fetal origins and maternal to child developmental interactions.

3. Obesity and rating the evidence

Obesity represent a significant health issue for women especially before pregnancy, suggesting a rate of approximately 34% of pregnant women having a BMI in excess [25-30][27], although more recent data indicates this to be increasing further, approaching 50%[28].

Many studies on dietary, physical activity and weight interventions focus on individuals who are already obese or experiencing co-morbidities such as heart disease, diabetes or cancer. Contrary, only a limited number of interventions have focused on weight loss or maintenance of optimal weight in the reproductive health issue. On one end of the area, interventions such as gastric bypass and lap-band surgeries have been successful among obese women of younger ages, achieving adequate weight gain[29,30].

Dietary and lifestyle interventions before pregnancy are effective in reducing gestational weight gain without any adverse effect on the risk of infants small for gestational age. Therefore, these interventions were already associated with the greatest reduction in weight gain before and during pregnancy[31].

Elegant work from the Cedergren and contributors has shown a reduction in the risk of large for gestational age infants among women with less than 8 kg gestational weight gain, which appeared to be at the expense of an increase in the proportion of small infants at the opposite end of the birth-weight spectrum[32]. In contrast, this finding has not been demonstrated into a randomized trial where, for women with gestational diabetes, treatment with dietary and exercise advice was associated with a significant reduction in the incidence of macrosomia without any increase in the risk of small for gestational age infants[33].

While the restriction of weight gain in pregnancy increases the incidence of spontaneous preterm birth in women with a normal BMI, this has not been showed in overweight or obese women[34,35].

There is an extensive body of literature related to defining the problems and potential complications associated with obesity during pre-pregnancy and pregnancy, still limited information was available related to effective interventions that may be implemented to improve maternal, fetal and infant health outcomes[35]. This will be discussed in the following section for the women who should be counseled prior to conception and during pregnancy and encouraged to make lifestyle change.

4. Clinical implications and postpartum period

Pregnancy has been shown to be implicated in the development of obesity in women having normal weight before this period[36]. Controlling weight before and during this state is not only important to prevent future implications of obesity for the women herself, but also to improve the health of the neonate[37].

Many clinical interventions should begin with obesity counseling training, starting in pre-pregnancy period and ending in postpartum period. Some findings found that the existence of a combination of a paucity of nutrition, lack of knowledge of how to counsel women, and lack of resources and personnel to assist with obesity management to be the cause. The data reported from a study found that only 12% of pediatricians reported high efficacy in obesity counseling, although 39% stated that physicians were important healthcare providers that could have a more strategic contribution[38].

The postpartum period showed to have a significantly contribution to both overweight and obesity through pregnancy weight retention. Olson and contributors found that over 25% of women participating in a cohort study experienced major weight gain, defined as 4.55 kg or more, at only one year postpartum[20].

Postpartum overweight, exercise frequency, and food intake were all associated with weight change from early pregnancy till one year postpartum. Into another study comprising 40 overweight women being in postpartum period which received a 12-week structured or self diet including physical activity, the structured intervention group had significant weight loss (7.3 kg), showing a decrease in percent body fat (6%) and no change in fat free mass, whereas the self diet group had no significant change at one year postpartum[39].

5. Conclusion remarks and future outlook

Therefore a high pre-pregnancy BMI is associated with a high risk pregnancy and neonatal outcome, the best strategy is to prevent obesity from occurring in the first place. However, prevention requires a cle-

ar understanding of its etiology, especially obesity which was showed to be a chronic disease to develop from a complex interaction of environmental factors including epigenetic factors during *in utero* life. Our findings inform behavior change strategies for meeting pre-pregnancy weight recommendation in respect to clinical implications in overweight and obesity prevention, treatment and optimal weight maintenance. Thus the recent discoveries in the field of obstetrics have opened a door to search for the consequences of overweight and obesity before pregnancy.

Taken together, better understanding the relationship between maternal nutrition and birth outcomes may provide a basis for developing interventions that will improve birth outcomes and long-term quality of life. A critical goal for all childbearing age women is to make behavior changes to achieve good nutritional status especially before conception, which may lead to improved birth outcomes. ■

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