Prepregnancy Body Mass Index and Pregnancy Weight Gain in Rural Regions of Guilan Province, Iran

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Abstract
Maternal nutritional status and weight gain throughout pregnancy affect the outcome of pregnancy. The objective of this study was to determine prepregnancy body mass index and total weight gain during pregnancy in women from rural areas of Guilan province, Iran. Prenatal and obstetrical records of 480 pregnant women who attended rural health centers between 2002 and 2003 including prepregnancy weights and pregnancy weight gains were analyzed. Prevalence of prepregnancy underweight and obesity was 7.9% and 27.3%, respectively. Total pregnancy weight gain was 9.3±4.1 kg. More than 40% of women did not meet the international recommendation regarding weight gain for their prepregnancy body mass index. Maternal height and body mass index were related to low birth weight. More than one third of women in rural areas of Guilan province did not meet the international recommendation regarding pregnancy weight gain. The inclusion of nutritional education in the existing health education programs in local health centers of the Province would be of value in meeting the international recommendation regarding weight gain during pregnancy.


Keywords ● Pregnancy ● body mass index ● weight gain ● Iran

Introduction

Pregnancy is a critical period. A healthy pregnancy is without health complications from the time of conception to the delivery of a healthy newborn. Intrauterine factors play essential roles in children's health. Birth weight is accepted as a single parameter that is directly related to the health and nutrition of a mother. It is an important determinant of the chances for a newborn to survive and experience healthy growth and development. Previous studies showed that healthy nutrition prior and during pregnancy was more important than the quantity and quality of nutrition during neonatal period in decreasing neonatal death. Maternal nutritional status and weight gain during pregnancy have a significant effect on the risk of pre-term birth. Appropriate eating habits during pregnancy play an important role in the development of the fetus.

Prior to pregnancy, all women should strive for appropriate body weights. A woman who fails to gain adequate weight during pregnancy is most likely to give birth to a baby with low
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birth weight. On the other hand, obese women are urged to attain healthy weights before pregnancy. The infant of an obese mother may be larger than normal. Also, obese pregnant women more often suffer from gestational diabetes, hypertension, and infections after the birth than do women of normal weights.

Various recommendations about weight gain during pregnancy have been made. According to the guidelines for weight gain during pregnancy, provided by Institute of Medicine (IOM), pregnancy weight gain is related to prepregnancy body mass index (BMI). Weight gain within the suggested range for each pre-pregnancy body mass category is associated with more favorable outcome than the weight gain above or below that range. Prepregnancy low weight women need more weight gain throughout their pregnancies. Pregnancy weight gain lower than IOM recommendation has accompanied by premature delivery and low birth weight infants, whereas pregnancy weight gain higher than the IOM recommendation leads to infants with high birth weight and weight gain higher than the IOM recommendation for total pregnancy weight gain. The levels of education were categorized based on the years of schooling as low education (<5 years), intermediate education (5-12 years) and high education (>12 years). Working status of subjects was considered as housewife or employed. Newborns with low birth weight (LBW) and normal birth weight (NBW) were defined as those with a body weight at birth of less than 2500 grams and more than 2500 grams, respectively. Birth weight more than 4000 grams was considered as high birth weight (HBW).

Statistical analysis

Data are shown as mean±SD. Pearson correlation coefficient test was used for the detection of association between total pregnancy weight gain, prepregnancy BMI, and prepregnancy weight. For comparison between prepregnancy BMI and type of delivery and birth weight Chi-square test was used. Total pregnancy weight gains in four groups of subjects were compared by analysis of variance test. Multiple logistic regression analysis was used to assess the association between birth weight and certain maternal variables such as age, height, parity, working status, educational level, and prepregnancy BMI. A Ps0.05 was considered statistically significant. We used spss ver. 11.5 for analysis of data.

Results

The age, weight, height, and BMI of the women at the beginning of pregnancy were 26±6 years, 65±12.8 kg, 158±7.5 cm, and 26.2±5.2 kg/m², respectively. Mean parity was 1.7 and in 50.8% of subjects this pregnancy was the first one. Of them 4.6% had low education, 91% had intermediate education and 4.4% had high education. Only 4.6% of women were employed and the rest were housewives. The rates of women stratified based on BMI are shown in table 1.

| Table 1: The rate and number of women in rural areas of Guilan province, Iran based on body mass index (BMI) at the beginning of the pregnancy. |
|------------------|-----------------|
| **BMI categories** | **Rate (number)** |
| Underweight (<19.8) | 7.9 (38) |
| Normal weight (19.8-26) | 45.6 (219) |
| Overweight (26.1-29) | 19.2 (92) |
| Obese (>29) | 27.3 (131) |
| Total | 100 (480) |
The rates of newborns with LBW, NBW or high birth weight were 10.8%, 84.8% or 4.4%, respectively. The average of total pregnancy weight gains was $9.3 \pm 4.1$ kg (min=0, max=21kgs). Only one of the women didn't gain weight during the pregnancy. The pregnancy weight gains stratified according to the women's BMI are shown in table 2.

<table>
<thead>
<tr>
<th>BMI</th>
<th>PWG±SD(kg)</th>
<th>Min(kg)</th>
<th>Max(kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;19.8</td>
<td>11.6±3.4</td>
<td>3.7</td>
<td>21</td>
</tr>
<tr>
<td>19.8-26</td>
<td>10±4.0</td>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>26.1-29</td>
<td>7.6±3.3</td>
<td>0.5</td>
<td>16.5</td>
</tr>
<tr>
<td>&gt;29</td>
<td>8.2±3.7</td>
<td>0</td>
<td>17</td>
</tr>
</tbody>
</table>

The pregnancy weight gains in low weight women were higher than in obese ones. Pearson correlation test showed an inverse relationship between prepregnancy BMI and weight gain during pregnancy ($r=-0.26$, P=0.01). There was also negative relationship between prepregnancy weight and pregnancy weight gains ($r=-0.27$, P=0.01).

More than 40% of participants did not have appropriate weight gain during pregnancy. Low weight gain was more noticeable in women, who had normal or low body weight at the onset of their pregnancies. The low weight gain during pregnancy contributes to adverse health outcomes for both mothers and their newborns.

Neonatal weights at birth are directly related to the health and nutrition of mothers. Incidence of LBW varies from 3% in developed countries to 30% in developing countries. The rate of LBW in the present study was lower than some Asian and African countries. The rate of LBW in obese women was insignificantly lower than that in underweight women. Obese mothers had higher rate of Cesarean section than non-obese women. This finding is similar to some other previous studies.

This study also showed that the birth weight was inversely related to mother’s prepregnancy BMI and her height. However, other mothers' variables such as age, parity, working status, and educational level were not related to newborn weight. These findings are in agreement with previous reports indicating that variables such as maternal age and parity were not related to birth weight.

Discussion

Nutritional status and weight gain during pregnancy have significant impact on pregnancy outcome. This study showed 7.9% of women had low weight at the beginning of the pregnancy. The prevalence of under nutrition in the areas in which the study was performed was lower than that from some developing countries. An inverse association was confirmed between maternal BMI before pregnancy and total pregnancy weight gain. The pregnancy weight gain was higher in low weight women than in obese ones.

More than 40% of the participants except obese women did not have appropriate weight gain during pregnancy. Low weight gain was more noticeable in women, who had normal or low body weight at the onset of their pregnancies. The low weight gain during pregnancy contributes to adverse health outcomes for both mothers and their newborns.

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Conclusion

More than one third of women in rural areas of Guilan province did not meet the international recommendation regarding weight gain during pregnancy. The inclusion of nutritional education in the existing health education programs in local health centers of the Province would be of value in meeting the international recommendation regarding weight gain during pregnancy.

References

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