The association between Body Mass Index and the spontaneous abortion in the first trimester of pregnancy

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Abstract- Background: Pre-pregnancy Body Mass Index is believed to be an important indicator of pregnancy outcomes. Being underweight or overweight before pregnancy may affect negatively on pregnancy in multiple complications, and first trimester miscarriage is one of these negative complication. Because of there is not any search that has been studied this subject in Syria before, we planned to perform this study on a sample of women who experienced first trimester miscarriage.

Objective: evaluation the association between Body Mass Index and the first trimester miscarriage.

Material and methods: This prospective observational study was conducted at Department of Obstetric and Gynecology in Tishreen University Hospital in Lattakia, Syria and was started in February 2021 and ended in February 2022. We measured BMI of women prior to pregnancy, and we followed pregnant women during first trimester, then we contrasted two groups (the first included women who have experienced first trimester miscarriage, and the second included women who haven’t experienced it)

Result: The incidence of underweight, overweight and obesity was higher in group with miscarriage versus the group without it, p value =0.0001, 0.02, 0.001 respectively

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Index Terms- first trimester miscarriage, BMI, underweight, overweight, obesity.

I. INTRODUCTION

First Trimester)early pregnancy loss was described by national organizations as a nonviable, intrauterine pregnancy within the first trimester (up to 12+6 weeks using date of last menstrual period). [1] It is a wide terminology that includes embryonic pregnancy and pregnancy with embryo or fetus with negative cardiac activity.[1] The incidence rate of early pregnancy loss is high as 31% of pregnancies, while It decreases to 10% in clinically diagnosed pregnancies. [2] Chromosomal abnormalities are found in 60% of miscarriages, and the most frequent type is autosomal trisomy. [3] Maternal age, BMI and black ethnicity are risk factors of miscarriage. [3] This association is because advanced age increases in the frequency of embryonic trisomies, particularly trisomies on chromosomes 13, 14, 15, 16, 18, 20, 21, and 22. [3] Abnormal Body Mass Index have been shown to increase the risk of miscarriage in a number of studies. [4-5] Because there is not any Syrian search has been evaluated the association between BMI and early pregnancy miscarriage, we planned to study this subject on a sample of women in Tishreen University Hospital in Lattakia, Syria.

II. MATERIAL AND METHODS:

The current study has been designed to be prospective observational study including 270 women who recruited in the first trimester of pregnancy. Information regarding age, parity, previous abortion and smoking has been obtained from all participants. In addition, height and weight of each women was obtained in order to calculate pre-pregnancy Body Mass Index according to formula bmi=weight (kg)/height (m)². Then we followed them during this period, 210 women have not experienced miscarriage and 60 women have experienced it. We conducted this study at the Department of Obstetric and Gynecology in Tishreen University Hospital, Lattakia, Syria, from February 2021 to February 2022. We approved this study by institutional ethical approval committee and after obtaining verbal consent from all women subjected to the current study following full illustration of the purpose and methodology of current study. Data were then transferred into an SPSS (version 20) spread sheet for statistical analysis. Microsoft Office Excel 2010 was also used for this purpose. We expressed variables were as mean, standard deviation, whereas, categorical variables were expressed by number and percentage. To evaluate association between categorical variables, Chi-square and Fischer exact tests were used. Difference in mean between two groups was evaluated using independent sample t- test.
III. RESULT AND DISCUSSION:

Distribution of women in two study groups (women with first trimester miscarriage and women without miscarriage) according to BMI, previous abortion exhibited significant difference (p value 0.0001, 0.001) respectively. table 1-2

However, distribution according to the parity (nulliparous, multiparous) did not exhibit significant difference pvalue=0.6. (Table 3)

Distribution according to age exhibited significant difference (p value=0.005), especially age up to 35 year. (Table 4)

These results confirm that maternal age, previous spontaneous abortion are risk factors of spontaneous abortion. In addition confirming that abnormal pre-pregnancy BMI (underweight, overweight and obesity) has a significant risk of the early pregnancy miscarriage.

<table>
<thead>
<tr>
<th>BMI</th>
<th>Abortion group</th>
<th>Non abortion group</th>
<th>P value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;18.5kg/m2</td>
<td>4(6.7%)</td>
<td>7(3.3%)</td>
<td>0.0001</td>
<td></td>
</tr>
<tr>
<td>18.5-24.9kg/m2</td>
<td>26(43.3%)</td>
<td>155(73.8%)</td>
<td>Reference group</td>
<td></td>
</tr>
<tr>
<td>25-29.9kg/m2</td>
<td>18(30%)</td>
<td>31(14.8%)</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>&gt;30 kg/m2</td>
<td>12(20%)</td>
<td>17(8%)</td>
<td>0.001</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Search group</th>
<th>Abortion group</th>
<th>Non abortion group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous abortion</td>
<td>52(86.7%)</td>
<td>77(36.7%)</td>
<td>0.0001</td>
</tr>
<tr>
<td>No previous abortion</td>
<td>8(13.3%)</td>
<td>133(63.3%)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Search group</th>
<th>Abortion group</th>
<th>Non abortion group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nulliparous</td>
<td>20(33.3%)</td>
<td>72(34.3%)</td>
<td>0.6</td>
</tr>
<tr>
<td>Multiparous</td>
<td>40(66.7%)</td>
<td>138(65.7%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4

Multiple studies have studied the association between Body Mass Index and the risk of miscarriage. A large Chinese study that included 536 098 pregnant ladies, it was found that both obesity and underweight associated significantly with
miscarriage. [4] These findings support the finding of the current study. Another case-control study in Al-Diwania, Iraq on 100 pregnant women found the incidence rates of underweight and overweight were significantly higher in abortion group (study group) versus control group (women with uneventful pregnancies that is at near or full term), 10% versus 1.7% and 40% versus 23.3% respectively (p-value < 0.05). [6] We agree with Iraqi study that underweight and overweight are risk factors of spontaneous miscarriage. A systemic review and meta-analysis on association of pre-pregnancy underweight and miscarriage, in Spain 2016 found that the risk of clinical miscarriage increased slightly in underweight and overweight women, but was higher in obese women. [7] We agree with Spanish study. The exact mechanism of obesity that increase the risk of miscarriage is unknown. One mechanism is that obesity is associated with unfavourable milieu that affect endometrium, and oocyte. [8] One potential mechanism for oocyte organelle damage in obesity is lipotoxicity. [9] Also, chronic Immunological changes that are linked to obesity play a role in miscarriage. For example, elevated C-reactive protein (CRP) and interleukin-6 (IL-6) in obese women with miscarriage, [10-11] and this chronic inflammation causes impairing implantation and placentation, in addition to pregnancy complications [12].

On other hand, underweight women are prone to nutritional deficiencies that may increases maternal susceptibility to infection because of less optimum immune responses. [13] As well as, low leptin levels in underweight women play a role in increased miscarriage risk. [14]

Lastly we believe that we need more researches to study this correlation between pre-pregnancy BMI and first trimester miscarriage and its mechanisms. Also, we need to encourage women to modify their weight to be in the normal range as possible to maintain healthy reproductive system.

IV. CONCLUSION:

Abnormal Body Mass Index is an important risk factor of early pregnancy miscarriage.

REFERENCES


AUTHORS

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