ASSESSMENT OF SERUM LEPTIN LEVELS AMONG PRETERM LABOR WOMEN AND ITS CORRELATION WITH SOME MATERNAL AND NEONATAL DEMOGRAPHIC AND ANTHROPOMETRIC PARAMETERS

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ABSTRACT

The preterm labor is one of the commonly encountered obstetrical problems which are associated with adverse perinatal and neonatal outcomes. This study aimed to assess serum leptin levels in pregnant women with preterm labor and its correlation with maternal age, gestational age, parity, BMI.

The current prospective case-control study was carried out in Al-Emammein Al-Kadhimein Medical City /Baghdad/Department of Obstetrics and Gynecology, during the period from 1st of October 2016 to the 30th of September 2017 on (120) pregnant women with a gestational age (27-36) weeks who were divided into two groups; the first group (case group) included (60) pregnant women with preterm labor, while the second group included (60) pregnant women without preterm labor as a control group. The levels of serum leptin were measured by the enzyme linked immune sorbent ELISA kit method.

The results in this study showed that the mean serum maternal leptin levels was highly significantly lower (P=0.001) in women with preterm labor (7.05 ± 5.02) ng/ml in comparison with its levels in the control group (14.93 ± 8.01) ng/ml. The levels of serum leptin among preterm pregnant women were shown to be not significantly correlated with maternal age (r=0.24, P=0.065), parity (r=0.084, P=0.525) and body mass index (BMI) (r=0.167, P=0.201), while they were shown to be highly significantly correlated with gestational age (r=0.565, P=<0.001) and birth weight (r=0.483, P=<0.001).

It can be concluded from our study that maternal serum leptin levels are significantly lower in women with preterm labor in comparison to its levels in normal pregnancies, and maternal serum leptin levels were not significantly correlated with maternal age, parity and BMI, while they were highly significantly correlated with gestational age and birth weight.

Keywords: Serum leptin, Preterm labor, Maternal age, Gestational age, Parity, BMI

I. INTRODUCTION

Preterm labor is delivery before 37 completed weeks gestation. The incidence of it in developed world is 7-10%. There has been gradual rise in the incidence associated with assisted reproduction causing multiple pregnancies and an increased tendency to obstetric intervention [1]. It is a serious health problem associated with neonatal mortality and morbidity [2].

Preterm birth is subdivided on the basis of gestational age into: Extreme preterm <28 weeks, Very preterm 28-<32 weeks, Moderate or Late preterm 32 -<37 completed weeks of gestation [3,4].

The main causes of preterm labor include delivery for maternal and fetal complications, spontaneous un-explained labor with intact membranes accounts 40-45%, and idiopathic preterm premature rupture of membranes (PPROM) [5]. The risk factors associated with preterm labor are previous premature birth, non-medically indicated inductions and cesarean births, multiple gestations, short inter-pregnancy interval, race, younger than 17 or older than 40 years, low socioeconomic status, unmarried, low education, substance abuse, work environment,
stress, anxiety or depression, preconception underweight, genetics, pre-existing infections, diseases or obstetric conditions, short stature. short cervix and uterine abnormalities [6].

The most frequently used and clinically reliable method for predicting preterm labor is the measurement of the cervical length using the trans-vaginal ultrasound between 20-23 weeks of pregnancy, and a measurement <25 mm considered a strong predictor for the risk of preterm labor [7].

Leptin is a cytokine hormone that is derived from the adipose tissue and expressed in the hypothalamus. Leptin or obesity protein play a role in regulation energy intake and expenditure [8]. Leptin plays important roles in the reproductive function with plasma leptin concentration rising in pregnant women peaking during 3rd trimester with elevated plasma level occur after completion of organogenesis [9]. Serum leptin concentrations are elevated throughout human pregnancy. Increases in the first trimester before any perceptible increase in body weight due to progressive gestation, imply that factors other than increased adiposity modulate levels. Leptin concentration rise along with estrogen and are correlated in early pregnancy with those of HCG [10].

The placenta is a major source of leptin production during pregnancy and leptin has important role in the placenta including: the nutrients delivery to the fetus, angiogenesis, vascular smooth muscle growth in chorionic villi and immunomodulation [11,12].

II. PATIENTS AND METHODS

The present prospective case-control study included 120 pregnant women who attended to the department of obstetrics and gynecology at Al-Imammein Al-Kadhimein Medical city, Baghdad, Iraq during the period from the 1st of October 2016 to the 30th of September 2017. It was approved by ethical committee of Arabic Board for Medical Specialties of Obstetrics and Gynecology.

All the participants were told about the nature of the study and only those who agreed to participate in the study were included. Verbal consent was obtained from all pregnant women in the study.

The 120 pregnant women were divided into the case group (60 pregnant women with spontaneous preterm labor), and the control group (60 pregnant women with uncomplicated pregnancy) who matched for age, parity, gestational age and BMI. Women with singleton viable pregnancy, maternal age 15-36 years, parity of 0-6, gestational age 27-36 weeks were included in this study, while women with multiple pregnancies, preeclampsia, congenital fetal anomalies, cervical incompetence, uterine anomalies, diabetes, PCOS, PPROM, vaginal infections were excluded.

Full history was taken from each woman (age, parity, previous history of preterm birth). The gestational age was confirmed by the 1st day of the last menstrual period, and early ultrasound scan. Complete examination included review of the vital signs, abdominal and pelvic examination. ultrasound scans for fetal wellbeing.

The body mass index (BMI) was calculated by dividing the maternal weight in kilograms by the square of height in meters (kg/m2). Weight of newborn in preterm labor group was also measured after labor.

From each woman, 5 ml of venous blood was taken and centrifuged to obtain serum, which is stored at -80°C until use. The specific human leptin kit (LDN, GERMANY) using enzyme linked immune-sorbent assay (ELISA) uses SANDWICH-ELISA was used for quantitative measurement of serum leptin concentrations.

III. STATISTICAL ANALYSIS

The statistical analysis of this study was performed using the statistical package for social sciences (SPSS) 20.0. The independent sample t-test was used for comparison between two groups. Analysis of variance was used for comparison among groups. Chi-square test or Fisher exact test was used to estimate the association between variables. The lower level of accepted statistical significant difference is bellow or equal to 0.05.

IV. RESULTS

Results in table (1) showed that there were no significant differences in mean maternal age, gestational age, parity and BMI between the case group (preterm labor women) which were (24.68 ± 5.15) years, (32.03 ± 2.52) years,
(1.48) and (23.27± 3.43) respectively in comparison with their means in the control group which were (24.45 ± 5.07) years, (31.93 ± 2.46) years, (1.22) and (23.38± 3.32) respectively.

Table (1): Comparison between mean maternal age, gestational age, parity and BMI between the case and control groups

<table>
<thead>
<tr>
<th>Study groups</th>
<th>Case group</th>
<th>Control group</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean maternal age (years)</td>
<td>(24.68 ± 5.15)</td>
<td>(24.45 ± 5.07)</td>
<td>0.803 (NS)</td>
</tr>
<tr>
<td>Mean gestational age (years)</td>
<td>(32.03 ± 2.52)</td>
<td>(31.93 ± 2.46)</td>
<td>0.826 (NS)</td>
</tr>
<tr>
<td>Mean parity</td>
<td>1.48</td>
<td>1.22</td>
<td>0.319 (NS)</td>
</tr>
<tr>
<td>Mean BMI (Kg/m²)</td>
<td>(23.27± 3.43)</td>
<td>(23.38± 3.32)</td>
<td>0.850 (NS)</td>
</tr>
</tbody>
</table>

Results in table (2) showed that the mean leptin levels were highly significantly lower in the case group (7.05±5.02) ng/ml when compared with the control group (7.05±5.02) ng/ml (P =< 0.001).

Table (2): Comparison of maternal serum leptin levels between the study groups

<table>
<thead>
<tr>
<th>Serum Leptin (ng/ml)</th>
<th>Study groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Case group</td>
</tr>
<tr>
<td>Mean</td>
<td>7.05</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>5.02</td>
</tr>
<tr>
<td>Minimum</td>
<td>1.38</td>
</tr>
<tr>
<td>Maximum</td>
<td>22.45</td>
</tr>
<tr>
<td>Median</td>
<td>6.46</td>
</tr>
<tr>
<td>P value</td>
<td>0.001**</td>
</tr>
</tbody>
</table>

** Highly significant P =<0.001

In this study, it was shown that the levels of serum leptin among preterm pregnant women were shown to be not significantly correlated with maternal age (r=0.24, P=0.065), parity (r=0.084, P=0.525) and body mass index (BMI) (r=0.167, P=0.201), while they were shown to be highly significantly correlated with gestational age (r=0.565, P=<0.001) and birth weight (r=0.483, P=<0.001) as illustrated in table (3).

Table (3): Correlation of maternal leptin levels with maternal age, gestational age, parity, BMI and birth weight

<table>
<thead>
<tr>
<th>Serum leptin level (ng/ml)</th>
<th>Case group</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal age</td>
<td>Person correlation</td>
<td>0.24</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.065</td>
</tr>
<tr>
<td>parity</td>
<td>Person Correlation</td>
<td>0.084</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.525</td>
</tr>
<tr>
<td>BMI</td>
<td>Person Correlation</td>
<td>0.167</td>
</tr>
<tr>
<td></td>
<td>P value</td>
<td>0.201</td>
</tr>
<tr>
<td></td>
<td>Person Correlation</td>
<td>0.565**</td>
</tr>
</tbody>
</table>
The results in the current study showed that there were no significant differences between the case group and the control group for maternal age, parity, gestational age, and BMI. These findings may be attributed to the fact that both the case and the control women were matched for maternal age, parity, gestational age and BMI, so there was no statistical significant difference between the two groups regarding those parameters.

In this study, it was found that in preterm labor group the mean maternal serum leptin levels was (7.05 ± 5.02) ng/ml in comparison with its levels in the control group (4.12-35.5) ng/ml. Leptin levels were significantly lower in preterm labor group at (P=0.001). This result agrees in part with what was found by (Fakor et al. 2016) [13] who reported that maternal serum leptin levels were highly significantly lower in women with preterm labor, in comparison with the control group. Shroff et al. (2013) [14] in their study found that maternal serum leptin levels in term pregnancies was significantly higher than preterm group.

Laird s. et al. (2001) [15] observed that maternal serum leptin levels were slightly higher in term pregnancies in comparison to preterm group and the differences were statistically not significant and this could be attributed to small number of preterm group in their study.

Leptin suppresses myometrium contractions in vitro by preventing the remodeling of contraction during labor and inhibits apoptosis, which is important to change the myometrium from proliferative to a contraction state [16,17].

Other researches have been involved to use leptin as a tocolytic agent in preventing preterm labor [18].

In this study, it was shown that the levels of serum leptin among preterm pregnant women were shown to be not significantly correlated with maternal age, parity and body mass index, while they were shown to be highly significantly correlated with gestational age and birth weight. This result goes with what was found by Khalil et al. (2013) [19] who detected no significant correlation with parity.

Maternal leptin levels were not significantly correlated with BMI, the same was found by Wang et al. (2011) [20] who concluded that higher levels of leptin seen in pregnancy were not related to increasing maternal fat mass.

V'asquez et al. (2015) [21] found that a state of leptin resistance occurs during pregnancy as a compensatory mechanism to control fetal and placental growth and to ensure the maternal energy balance.

Yang et al. (2005) [22] and F.Savinoet al. (2016) [23] found that maternal serum leptin levels were positively correlated with BMI.

Leptin levels were significantly correlated with gestational age (r=0.565, P<0.001) this goes with a study done by Hauguel-de Mouzon S. et al. (2006) [24] who found that maternal leptin level shows 2-3 folds increasing during normal singleton pregnancy. While Hedley et al (2009) [25] and Verhaeghe et al. (2006) [26] found no correlation between maternal leptin level and gestational age.

Leptin levels were significantly correlated with birth weight of preterm infants, a result which agrees with what was found by Maria Weyermann et al. (2006) [27] and Trevino-Carzae et al. (2013) [28]. However, Ishart et al. (2008) [29] and Kim et al. (2008) [30] found no correlation between maternal serum leptin levels and birth weight.

Palchevska et al. (2012) [31] found higher leptin levels in neonates who were born at term pregnancy, unlike preterm neonates with low leptin levels.

REFERENCES

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