Serum Thyroid Hormone Levels in Preeclampsia Women in Gorgan

Arash Rafeeinia, Hanieh Teymoori and Abdoljalal Marjani

Etiology of preeclampsia is clearly unknown. The aim of this study was to assess thyroid hormone levels in mild and severe preeclampsia women and compare them with healthy pregnant women. This study was done on 50 healthy pregnant and 50 preeclampsia women in the third trimester in the Sayyad Shirazi educational Hospital, Gynecology Department of Golestan University of Medical Sciences, Iran, 2014. There were significant differences in T4 level among mild preeclampsia and healthy pregnant women. There were also significant differences in T4 and T3 levels between severe, mild preeclampsia women and healthy pregnant women. We observed a significant positive correlation between systolic and diastolic blood pressure and thyroid hormones. Serum T3 and T4 levels were significantly increased with development of preeclampsia. There is association between thyroid hormone abnormalities and hypertension. The difference of our study with other findings could be related to different geographical areas, races and diets. Variation of thyroid function in later in life may develop in preeclampsia women. Thus, it suggests that thyroid function test may necessary to screen preeclampsia women during pregnancy and after parturition.

Key words: Thyroid hormones, preeclampsia, gorgan
INTRODUCTION

There are an association between preeclampsia and a high incidence of maternal and fetal mortality (Cunningham et al., 2010). Preeclampsia happens after 20 weeks pregnancy and shows various disorders such as hypertension, edema and proteinuria (Pankaj et al., 2008). Liver, kidney and brain are the most affected organs in preeclampsia women (Duha and Konar, 2001). It is reported that preeclampsia influences 0.4-2.8% of all pregnancies in developed and developing countries (Villar et al., 2003). The most risk of preeclampsia usually occurs in women younger than 20 years (Brooks, 2005). Prevalence of preeclampsia is seen more in developing countries. This can be because of poverty, malnutrition, micronutrient deficiencies, early marriage, early child birth and lack of antenatal care (Khatoon, 1992). Many studies indicated a relationship between of thyroid hormone levels and development and severity of preeclampsia (Raofí et al., 2014). Etiology of preeclampsia is not completely clear. Studies on preeclampsia patients have been revealed that 16.7 and 43.7% of subjects were sub-clinical and overt cases of hypothyroidism during pregnancy (Davis et al., 1988). There is usually an association between pregnancy and very mild hyperthyroxinemia. Preeclampsia women show high incidence of hypothyroidism that might correlate with the severity of preeclampsia (Lao et al., 1988, 1990; Kaya et al., 1994). Different studies have shown that mean serum TSH (thyroid-stimulating hormone) were significantly elevated and free T3 (triiodothyronine) and T4 (thyroxin) were without alterations in preeclampsia women (Kumar et al., 2005) whereas other studies showed increased level of TSH and decreased levels of T3 and T4 in preeclampsia women in comparison with normal pregnant (Mostaghel et al., 2008; Kharb et al., 2013; Raofí et al., 2014). Some investigators reported no change in serum TSH in pregnancy, while some found significant increases in TSH during pregnancy. Ashoor et al. (2010) showed serum TSH increased whereas T3 and T4 decreased with gestational age. Some other study showed that serum levels of free T4 and TSH were increased in women with severe preeclampsia when compared with mild preeclampsia and normal pregnancy (Larijani et al., 2004). Studies have shown that hypertensive disorders may cause of maternal and fetal morbidity and mortality. There are many other complications such as renal failure, disseminated intravascular coagulation, cerebrovascular bleeding, intrauterine growth retardation, abrupton placenta, premature delivery and stillbirths that may cause also maternal and fetal morbidity and mortality (Duley, 2009; Steegers et al., 2010). Some findings have indicated an elevated risk of hypertensive disorders in mothers with hypothyroidism (Ashoor et al., 2010; Mannisto et al., 2013; Wilson et al., 2012) or hyperthyroidism (Mannisto et al., 2013), while some of other studies did not show any associations (Casey et al., 2005; Cleary-Goldman et al., 2008; Karakosta et al., 2012; Mannisto et al., 2010). Most of these studies did not control some factors like thyroid autoimmunity, smoking, Body Mass Index (BMI), ethnicity, socioeconomic status and parity. Many studies have revealed that a small change in function of thyroid can affect on pregnancy complications (Medici et al., 2013; Shields et al., 2011; Taylor et al., 2013). Some recent studies indicated that a little change in thyroid function can influence on complications of pregnancy (Medici et al., 2013; Shields et al., 2011; Taylor et al., 2013). It is reported that women with preeclampsia may show an increased risk for decreased thyroid functioning later in life (Levin et al., 2009). Therefore, the aim of this study was to assess thyroid hormones in mild and severe preeclampsia women and healthy pregnant women.

MATERIALS AND METHODS

This study was done on 50 healthy pregnant and 50 preeclampsia women in the third trimester in the sayyad shirazi educational Hospital, Gynecology Department of Golestan University of Medical Sciences, Iran, 2014. The study was approved by Ethical Committees of the Research Deputy of University of Medical Sciences Systolic and diastolic blood pressure was measured by using a standard mercury manometer with women in sitting position, from their right hands. Definition of 1-preeclampsia (n = 50), 2-mild preeclampsia (n = 35) and 3-severe preeclampsia (n = 15) women were as follow:

- A blood pressure higher than 130/85 mmHg and proteinuria with 1+ or greater by dipstick
- A blood pressure higher than 160/110 mmHg and proteinuria with 1+3+ by dipstick
- A blood pressure higher than 160/110 mmHg or proteinuria greater than 3+ by dipstick (Bolte et al., 2001)

Preeclampsia was diagnosed by a gynecologist. All three groups were age, body mass index and gravidity matched. Blood pressure higher than 140/90 mmHg on at least two occasions 6 h apart and/or proteinuria were inclusion criteria for preeclampsia women (Weinstein, 1982). Healthy pregnant group had T3 (triiodothyronine), T4 (thyroxin) and TSH (thyroid-stimulating hormone) values and blood pressure within normal range. Our exclusion criteria were history of diabetes mellitus, chronic hypertension, renal, cardiovascular, liver disease, endocrine disorder, any
chronic illness, twin pregnancies, preexisting thyroid disease, thyroid medication usage and fertility treatment. Ten milliliter blood sample was provided from all subjects. T3, T4 and TSH were measured using commercial kits and Elisa (Model: Statfax-2100, USA). The results were shown in Mean±standard deviation. Statistical analyze of data was carried out by SPSS-16 version. Comparison of thyroid hormones between preeclampsia (mild and severe) and healthy women (differences between groups) was performed using independent sample t-test. Correlations between parameters were done by Pearson correlation test. p-value<0.05 was considered significant.

RESULTS

Fifty woman with the diagnosis of preeclampsia and 50 healthy pregnant women were taken part in this study. The mean age of the preeclampsia and healthy pregnant women were 26.54±3.74 and 26.47±4.50 years, respectively.

The mean gestational age was 31.24±3.49 and 30.17±3.10 weeks in preeclampsia and healthy pregnant women. The mean TSH of preeclampsia and healthy pregnant women were 2.30±1.47 and 1.82±1.32 µIU dL⁻¹, respectively and there was no significant difference between the two groups (p = 0.097). The mean T4 of preeclampsia and healthy pregnant women were 5.03±3.04 and 5.02±2.01 µg dL⁻¹, respectively and there was no significant difference between the two groups (p = 0.98).

The mean T3 of preeclampsia and healthy pregnant women were 4.0±1.45 and 3.90±1.26 µg dL⁻¹, respectively and there was no significant difference between the 2 groups (p = 0.74) (Table 1). No significant differences were considered in TSH and T3 levels among mild preeclampsia and healthy pregnant women but there were significant differences in T4 level (p = 0.005).

There are significant differences in T4 and T3 levels when severe, mild preeclampsia women and healthy pregnant women with each other (Table 2). Correlations between thyroid hormones and systolic and diastolic blood pressure are shown in Table 3. We observed a significant positive correlation between systolic and diastolic blood pressure and thyroid hormones. There were no correlations between TSH and systolic blood pressure.

**DISCUSSION**

Different factors may play an important role in development of preeclampsia. Etiology of preeclampsia is clearly unknown and it may happen at second or third trimester of pregnancy (Mehdi et al., 2009; Hasanzadeh et al., 2008). Some studies showed an association between the levels of thyroid hormones and development of preeclampsia. In present study, our findings showed that levels of TSH and T3 were higher in preeclampsia women and no changes in the level of T4 in preeclampsia women compared to healthy pregnant women (p>0.05) which was not in agreement with the finding of other study (Kumar et al., 2005; Lao et al., 1990; Skjoldebrand et al., 1986; Basbug et al., 1999). Several studies showed that there are a significant association between thyroid hormones and the development and severity of preeclampsia (Ipadeola et al., 2013; Osathanondh et al., 1976; Raoofi et al., 2014; Kumar et al., 2005). Various other studies with different findings are available with relation to T4 (Low and high levels of T4) and TSH levels (High levels of TSH) in preeclampsia women (Kumar et al., 2005; Tolino et al., 1985; Raoofi et al., 2014). Some studies have shown that there were no significant differences in TSH levels between preeclampsia and healthy women which is in agreement with our results (Qublan et al., 2003; Khaliq et al., 1999). In the present study, T4 level was significantly lower in mild preeclamptics when compared with healthy pregnant women (p<0.05), who are in agreement with findings of other studies (Qublan et al., 2003; Levin et al., 2009). Severe preeclampsia women showed significantly higher T4 and T3 levels compared to healthy ones (p = 0.0001 and p = 0.001). Qublan et al. (2003) showed that the thyroid function is not changed in severe preeclampsia. The increased level of TSH (not significant) in preeclampsia women shows an association with the risk for developing and severity of preeclampsia (Mostaghel et al., 2008). Many studies indicated that preeclampsia women showed significantly increased or no significant elevation level of TSH (Khaliq et al., 1999; Sardana et al., 2009). This alteration may occur as a result of association of increased level of TSH with thyroid peroxidase antibodies (Kaya et al., 1994). Thyroid dysfunction may change thyroid hormone secretion which can significantly increase T3 and T4 levels in severe

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**Table 1:** Clinical and biochemical characteristic of preeclampsia and healthy pregnant women

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Women with preeclampsia</th>
<th>Healthy pregnant women</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. (%)</td>
<td>50.00</td>
<td>50.00</td>
<td></td>
</tr>
<tr>
<td>Maternal age (years)</td>
<td>26.50±3.90</td>
<td>27.10±4.60</td>
<td>0.449</td>
</tr>
<tr>
<td>Gestational age (weeks)</td>
<td>31.24±3.49</td>
<td>30.17±3.10</td>
<td>0.355</td>
</tr>
<tr>
<td>Hypertensive (%)</td>
<td>100.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TSH (µIU dL⁻¹)</td>
<td>2.30±1.47</td>
<td>1.82±1.32</td>
<td>0.097</td>
</tr>
<tr>
<td>T4 (µg dL⁻¹)</td>
<td>5.03±3.04</td>
<td>5.02±2.01</td>
<td>0.980</td>
</tr>
<tr>
<td>T3 (µg dL⁻¹)</td>
<td>4.00±1.45</td>
<td>3.90±1.26</td>
<td>0.740</td>
</tr>
</tbody>
</table>
There are many suggestions such as endothelial dysfunction, decreased alteration of T4 to T3 and secretion. The mechanism of thyroid hormone dysfunction may occur in preeclampsia women. This may cause by pathological alterations and unusual secretion of thyroid tissue that may influence on T3 and T4 synthesis and secretion. The mechanism of thyroid hormone alterations is not exactly clear in preeclampsia women. There are many suggestions such as endothelial dysfunction, decreased alteration of T4 to T3 and placental dysfunction can show an important role in pathogens of preeclampsia (Kumar et al., 2005). We also studied the associations between thyroid hormones and high systolic and diastolic blood pressure levels in preeclampsia women. There were statistically significant associations between systolic blood pressure with T3 and T4 levels and diastolic blood pressure with TSH, T3 and T4 levels. These findings were in agreement with several studies (Larijani et al., 2004; Karakosta et al., 2012; Luewan et al., 2011; Mannisto et al., 2013, 2010; Sahu et al., 2010; Wilson et al., 2012), while, other studies did not show any associations between above mentioned parameters (Karakosta et al., 2012; Luewan et al., 2011; Sahu et al., 2010). Many studies have indicated that hypertensive disorders may elevate risk of maternal hypertension, ischemic heart disease, stroke, renal disease and mortality (Bellamy et al., 2007; Vikse et al., 2008; Williams, 2011). Thyroid hormone may affect hypertensive disorders onset in pregnant women. Increased level of thyroid hormone can cause endothelial cell dysfunction, which has an important role in the pathophysiology of hypertensive disorders during pregnancy (Steegers et al., 2010). Developed prediction model suggested by Poon et al. (2009). The model contains maternal history, uterine artery pulsatility index; mean arterial pressure, pregnancy-associated plasma protein-A and placental growth factor (Poon et al., 2009). It can suggest that the use of thyroid function test is practical for diagnose of thyroid function.

### CONCLUSION

The results of the present study suggest that there were no significant different in T3, T4 and TSH levels between preeclampsia and healthy pregnant women, but serum T3 and T4 levels were significantly increased with development of preeclampsia. There is association between thyroid abnormalities and pregnancy caused hypertension. The difference of our study with other findings could be related to different geographical areas, races and diets. Variation of thyroid functioning later in life may develop in preeclampsia women. Thus, it suggests that thyroid function test may necessary to screen preeclampsia women during pregnancy and after parturition.

### REFERENCES


