

C Comparison of serum levels of thyroid-stimulating hormone in preeclampsia and non-preeclampsia pregnant women referring to Karaj Kamali Hospital in 2018

Comparación de los niveles séricos de hormona estimulante de la tiroides en preeclampsia y mujeres embarazadas sin preeclampsia que acudieron al Hospital Kamali de Karaj en 2018

281

Maryam hashemnegad¹, Banafsheh Mashak², Mahnaz Jahani Jalalideh³, Mina Ataei^{4*}, Kouros Kabir M.D⁵, Hedieh Ahmadian⁶

¹Assistant Professor of Obstetrics and Gynecology, School of medical sciences, Alborz University of Medical Sciences, Karaj, Iran; <https://orcid.org/0000-0001-7895-9885>

²Assistant Professor of Anesthesiology, School of medical sciences, Alborz University of Medical Sciences, Karaj, Iran; <https://orcid.org/0000-0002-6974-6279>

³Gynaecologist, Qazvin University of Medical Sciences, Qazvin, Iran; <https://orcid.org/0000-0002-5361-0051>

⁴Assistant Professor of Obstetrics and Gynecology, Non-communicable Diseases research center, Alborz University of Medical Sciences, Karaj, Iran; <https://orcid.org/0000-0002-3813-2292>

⁵Associate professor of Community Medicine, Social determinant of Health Research Center, Alborz Department of Community Medicine, School of Medicine, Alborz University of Medical Sciences, Karaj, Iran; <https://orcid.org/0000-0003-0883-8820>

⁶Student Research Committee, Alborz University of Medical Science, Karaj, Iran; <https://orcid.org/0000-0002-4148-6399>

*Corresponding Author: Mina Ataei, Assistant Professor of Obstetrics and Gynecology, Non-communicable Diseases research center, Alborz University of Medical Sciences, Karaj, Iran. EMAIL: ataee.mina@yahoo.com

Abstract

Introduction: As there is no reliable criterion for early diagnosis of preeclampsia up to present date, this study was conducted to compare the serum levels of thyroid-stimulating hormone in preeclampsia and non-preeclampsia pregnant women and the use of thyroid-stimulating hormone (TSH) as a predictive factor in preeclampsia.

Method: In this case-control study, 45 non-preeclampsia pregnant women and 45 preeclampsia pregnant women in the third trimester of pregnancy referred to Kamali Hospital of Karaj were examined. A skilled person took 10 cc of venous blood of the subjects and the mean serum TSH levels of both groups were compared by using SPSS, version 22, software.

Results: The mean serum TSH level was 2.55 ± 1.13 and 3.08 ± 1.23 , respectively, in non-preeclampsia pregnant women and preeclampsia pregnant women, the relationship was statistically significant ($P = 0.013$). Besides, the prevalence of preterm delivery in preeclampsia pregnant women was higher than that in non-preeclampsia pregnant women ($P = .000$). The mean weight of neonates in preeclampsia pregnant women was lower than that in non-preeclampsia pregnant women ($P = .000$).

Conclusion: This study revealed that measuring serum TSH levels in the third trimester of pregnancy could be a predictor of preeclampsia.

Keywords: Thyroid-stimulating hormone, Pregnant women, Preeclampsia.

Resumen

Resumen: introducción: Como no existe un criterio seguro para el diagnóstico precoz de preeclampsia hasta la fecha, este estudio se realizó con el objetivo de comparar los niveles séricos de hormona estimulante de la tiroides en mujeres embarazadas con preeclampsia y sin preeclampsia y el uso de este medicamento. La hormona estimulante (TSH) como factor predicativo en la preeclampsia.

Método: en este estudio de casos y controles, se examinaron mujeres embarazadas sin preeclampsia y mujeres embarazadas con preeclampsia en el tercer trimestre del embarazo derivadas al Hospital Kamali de Karaj. Un experto tomó 10 cc de sangre venosa de los sujetos y se compararon los niveles medios de TSH sérica de ambos grupos utilizando el software SPSS, versión 22.

Resultados: el nivel medio de TSH en suero fue de 2.55 ± 1.13 y 3.08 ± 1.23 , respectivamente, en mujeres embarazadas sin preeclampsia y en mujeres embarazadas con preeclampsia, la relación fue estadísticamente significativa ($p = 0.013$). Además, la prevalencia del parto prematuro en mujeres embarazadas con preeclampsia fue mayor que en mujeres embarazadas sin preeclampsia ($p = .000$). El peso medio de los neonatos en mujeres embarazadas con preeclampsia fue menor que en mujeres embarazadas sin preeclampsia. ($P = .000$)

Conclusión: Este estudio demostró que la medición del nivel sérico de TSH en el tercer trimestre del embarazo podría ser un predictor de preeclampsia.

Palabras clave: hormona estimulante de la tiroides, mujeres embarazadas, preeclampsia

Preeclampsia has particular importance since it is considered as one of the causes of maternal and fetal mortality and it is the main cause of hospitalization and preterm delivery¹. Early diagnosis of preeclampsia is one of the most important functions of prenatal care. With early diagnosis of this disease, maternal and fetal mortality rate decreases². No definitive method has yet been proven to diagnose this disease, and there is still no reliable criterion for early diagnosis of preeclampsia. There are several clinical, biophysical and biochemical tests to identify women at risk for preeclampsia. The results of recent studies suggested the negligible predictive value of them in early diagnosis of preeclampsia³. A few studies have been conducted on the level of thyroid-stimulating hormone and preeclampsia, but it is predicted that there is a correlation between preeclampsia and thyroid function⁴. Given what was stated above, this study was conducted to compare the serum levels of thyroid-stimulating hormone in preeclampsia and non-preeclampsia pregnant women and the use of thyroid-stimulating hormone as a predictive factor in preeclampsia.

This study was a case-control study. Convenience sampling method was used in this study and the sample size was measured based on comparing two means using the G power 3.1.2 software. According to $\alpha = 0.05$ (first type error), $\beta = 0.2$ (second type error) and $d = 0.6$ (effect size), 90 pregnant women in the third trimester of pregnancy referred to Kamali Hospital of Karaj were selected. According to the scientific criteria in the obstetrics and gynecology references, they were divided into two groups of 45 preeclampsia pregnant women and non-preeclampsia pregnant women (each group included 45 women). Diagnosis of the patient group was performed by a gynecologist based on the following criteria: pressure greater than or equal to 140 / 90 mmHg (two times at time interval of at least 6 hours), protein excretion in urine more than or equal to + 1 in a random sample of urine and the presence of non-gravity dependent edema. The control group included healthy pregnant women who referred to one of the obstetric clinics for follow-up during pregnancy and had none of the signs and symptoms of pregnancy toxicity. The research exclusion criteria included the occurrence of any of hypothyroidism diseases, Graves, autoimmune thyroiditis, chronic blood pressure, thyroid nodule toxicity, kidney diseases, use of drugs affecting the thyroid function such as levothyroxine and

anti-thyroid drugs, blood pressure-lowering drugs, blood sugar-lowering drugs, corticosteroids, diuretics and other drugs, such as amiodarone and lithium. In this study, 10 ml of venous blood was taken from each patient (control or patient) before delivery and serum TSH level was measured in both groups. Data were also collected through biographies, clinical examination, completion of the questionnaire and recording of the results of laboratory tests. The questionnaire contained personal and medical history including pregnancy status and signs and symptoms of preeclampsia.

Finally, the collected data were analyzed using SPSS, version 22, software and Student T-test. For more statistical tests, Chi-square, T-test and Mann-Whitney tests were used. P-values less than 5% were considered significant. The results were presented as mean \pm standard deviation and number (percent).

In this study, 45 healthy pregnant women without preeclampsia and 45 pregnant women with preeclampsia referring to the obstetric department of Kamali Hospital in Karaj were examined according to inclusion criteria from March to September 2018. The mean age of non- preeclampsia pregnant women was 29.2 ± 0.61 and the mean age of preeclampsia pregnant women were 28.1 ± 5.7 years, which did not show a significant difference ($P=0.76$). The mean gestational age in healthy women (non-preeclampsia pregnant women) was 39 ± 1.32 weeks and mean gestational age in preeclampsia pregnant women was 37 ± 1.95 weeks ($P=0.85$). Out of 45 pregnant women with preeclampsia, 33 cases (73.3%) had mild preeclampsia and 12 cases (26.7%) had severe preeclampsia.

The mean systolic blood pressure was 121 ± 7.44 in non-preeclampsia pregnant women and it was 149.7 ± 7.28 in preeclampsia pregnant women. The mean diastolic blood pressure was 75.00 ± 7.69 in non-preeclampsia pregnant women and it was 90.00 ± 11.94 in preeclampsia pregnant women. The mean serum TSH level was 2.55 ± 1.13 in non-preeclampsia pregnant women and 3.08 ± 1.23 in preeclampsia pregnant women ($P=0.013$) (Table 1).

Table 1. The mean serum TSH level in both groups of non-preeclampsia pregnant women and preeclampsia pregnant women

	Non-preeclampsia pregnant women	Preeclampsia pregnant women	P value
TSH (μ IU/ml)	13.1 ± 55.2	23.1 ± 08.3	013.0

According to the results, out of 45 non-preeclampsia pregnant women, 35 (77.8%) had a normal delivery and 10 (22.2%) had a cesarean delivery. Besides, out of 45 preeclampsia pregnant women, 26 (57.8%) had a normal delivery and 19 (42.2%) had cesarean delivery ($P=0.07$) (Table 2). Based on Table 2, the Chi-square test also showed a significant relationship between preeclampsia and preterm delivery ($P=0.000$), while no significant relationship was found between preeclampsia and IUFD ($P=0.500$) and gender of neonates ($P=0.522$). Besides, based on Table 2, Independent T-test showed that there was a significant relationship between birth weight and preeclampsia ($P=0.000$). According to the Mann-Whitney test, there was a significant relationship between preeclampsia and first minute Apgar ($P=0.003$).

Table 2. Results of pregnancy-gender, preterm delivery, and intrauterine death (IUFD), preterm delivery, and first minute Apgar and cesarean frequency

	Non-preeclampsia pregnant women	Preeclampsia pregnant women	P value
Gender N(%) male	24 (53.3 %)	28 (62.2 %)	0.522
Preterm delivery N (%)	2 (4.4 %)	22 (48.9 %)	0.000
IUFD N(%)	0 (0 %)	1 (1.1 %)	0.500
First minute Apgar Mean \pm SD	36.0 \pm 84.9	56.1 \pm 28.9	0.003
Birth weight (g) Mean \pm SD	23.466 \pm 3230	25.656 \pm 2700	0.000
Caesarean delivery N(%)	10 (22.2 %)	19 (42.2 %)	0.07

Discussion

In the present study, a significant difference was found between the mean serum TSH level in the two groups of preeclampsia and non-preeclampsia pregnant women, which strongly supported the hypothesis that thyroid dysfunctions could be one of the causes of preeclampsia. As a result, measuring serum TSH level in the third trimester of pregnancy could predict preeclampsia to reduce maternal and fetal complications. However, due to the small sample size, further studies are needed to confirm this hypothesis. In a study conducted by Kharb et al., the mean TSH in non-preeclampsia pregnant women was less than that of pregnant women with severe preeclampsia and the mean weight of neonates of preeclampsia women was less than the mean weight of neonates of non-preeclampsia women⁵. In the present study, the mean weight of neonates of preeclampsia pregnant women was lower than the mean weight of neonates of non-preeclampsia women. However, in the study conducted by Naghshineh et al, there was no significant relationship between neonatal weight and hypothyroidism and preeclampsia⁶.

Conclusions

A

dditionally, the results showed that the prevalence of preterm delivery in preeclampsia pregnant women was different from that in non-preeclampsia pregnant women⁷. In a study conducted by Swati et al., the results also showed that the mean serum TSH level in preeclampsia pregnant women was higher than the mean serum TSH level in non-preeclampsia pregnant women⁸. In a study conducted by Sardana et al, it was concluded that the mean serum TSH level in both preeclampsia pregnant women and non-preeclampsia pregnant women was higher than the mean serum TSH level in non-pregnant women⁹⁻¹⁰.

Acknowledgment: The researcher appreciated Clinical Research Development Center of Kamali Hospital in Alborz University of Medical Sciences.

References

- Fathnejad, A; Sahati, F; Sattarzadeh, N. Predictive value of state change test and body mass index in early diagnosis of preeclampsia. *Journal of Ardabil University of Medical Sciences* 2008;4:414-419
- Fahami, F; Bahadoran, P; Gahiri, A. The role of the state change test in predicting preeclampsia. *Isfahan Journal of Nursing and Midwifery*. 1998; 35: 9-37.
- Yari, A.; Rahimi Forushani, A., Zarati, H. Determining a Model for Early Prognosis of Preeclampsia. *Fertility and Infertility Journal*. 2009; 4: 261-267.
- Sogani S, Varma V, Dey Sarkar P. Estimation of thyroid hormones levels in preeclamptic pregnant women an early predictor of the disease. *Al Ameen J Med Sc*. 2015; 8(4):266-70.
- Kharb S, Sardana D, Nanda S. Correlation of Thyroid Functions with Severity and Outcome of Pregnancy. *Ann Med Health Sci Res*. 2013;3(1):43-6.
- Naghshineh, A.; Saeidi, Z. Evaluation of the relationship between hypothyroidism and preeclampsia in pregnant women in a sample of Iranian women. *Journal of Isfahan Medical School*; 2017;449: 1352-1357.
- Negro R, Schwartz A, Gismondi R, et al. Universal screening versus case finding for detection and treatment of thyroid hormonal dysfunction during pregnancy. *J Clin Endocrinol Metab*. 2010; 95(4):1699-707.
- Swati A, Arun K. Thyroid Hormone alteration in women with pre-eclampsia. *International Journal of Research in Medical Sciences*. 2016; 4(10):4520-3.
- Sardana D, Nanda S, Kharb S. Thyroid hormones in pregnancy and preeclampsia. *J Turkish-German Gynecol Assoc*. 2019; 10:168-71.
- Selvamurugan A, Muralidharan A, Tamilmani K, Manivasagam M. A Study in Corelation of Stature Assessment Using Practising Anthropometric Parameters Like Forearm Length, Sternal Notch to Upper Border of Pubic Symphysis and Tibial Length in Local Population by Using Bodies Subjected to Autopsy. *Indian Journal of Forensic Medicine & Toxicology*. 2019;13(3):60-2.
- Sonawane S, Peddewad R, Patil A, Manghani P. Trends and Outcomes of Acute Poisoning Cases in a Tertiary Care Teaching Hospital in Navi Mumbai. *Indian Journal of Forensic Medicine & Toxicology*. 2019;13(3):95-101.