

A Comparative Study of Thyroid Function Tests (serum T₃, T₄ and TSH) in Normal Pregnancy and Preeclampsia

Yadav Monika¹, Mathur Ranjana², Om Prakash³

¹M.Sc (Medicine) Biochemistry, Senior Demonstrator, Department of Biochemistry, Dr. S. N. Medical College, Jodhpur, India

²MD Biochemistry, Senior Professor & Head, Department of Biochemistry, Dr. S. N. Medical College, Jodhpur, India

³M.Sc (Medicine) Biochemistry, Senior Demonstrator, Department of Biochemistry, Dr. S. N. Medical College, Jodhpur, India

Abstract: *The physiological changes in thyroid gland during pregnancy have been suggested as one of the pathophysiologic causes of preeclampsia. The aim of this study was comparison of serum levels of Tri-iodothyronine (T₃), Tetra-iodothyronine (T₄, Thyroxine) and Thyroid stimulating hormone (TSH) in normal pregnancy and preeclampsia. In this case-control study, 25 normal pregnant women and 25 cases of preeclampsia in third trimester of pregnancy were evaluated. They were compared for serum levels of Total T₃, Total T₄ and TSH. The mean age was not statistically different between two groups (p=0.58). Preeclamptic pregnant females showed a significant difference in serum T₃ (p=0.0211) while a non-significant relationship in serum T₄ (p=0.99) and serum TSH (p=0.37), when the results were compared with the normal pregnant females. Estimation of serum thyroid function tests is simple, reliable, economic and sensitive that can now be considered as an adjunct in the management of preeclampsia.*

Keywords: Tri-iodothyronine (T₃), Tetra-iodothyronine (T₄, Thyroxine) and Thyroid stimulating hormone (TSH), Preeclampsia (PE)

1. Introduction

Pregnancy is the condition of having a developing embryo or fetus in the body after successful conception. The pregnant women experiences physiological changes to support fetal growth and development [1].

Preeclampsia is a multisystem disorder of pregnancy which is characterized by hypertension (Blood pressure >140/90mmHg) with proteinuria (urinary protein excretion of >300mg/L in 24hrs specimen) after 20 weeks of gestation in previously normotensive, non-proteinuric pregnant women [2].

PE frequently occurs in primigravidae (70%). It is more often associated with obstetrical-medical complications such as multiple pregnancies, pre-existing hypertension, diabetes etc. The onset is usually insidious [3].

Thyroid function tests (serum T₃, T₄ and TSH) are done to assess functional status of thyroid gland.

Pregnancy is associated with significant but reversible changes in thyroid function studies [4]. In normal pregnancy serum total T₃ and T₄ increases significantly during the first half of gestation and reach their plateau values by 20 weeks while increase in TSH is not commonly observed [5].

During PE serum total T₄ was significantly lower, serum TSH was significantly higher and serum total T₃ was similar to control (normal pregnant) [6].

Thus, the primary objective of this study is to delineate the usefulness of thyroid function tests in patients with preeclampsia.

2. Materials and Methods

The study was conducted on 25 pregnant females having PE attending the Ante Natal Clinic, Department of Gynaecology and Obstetrics, Umaid Hospital for women and children, Jodhpur (Rajasthan). Results were compared to age matched 25 normal pregnant females. Subjects included in this study were in their third trimester of pregnancy.

A thorough clinical and symptomatic examination of all the patients was done under the guidance of the treating gynecologist and the evidence of symptoms to confirm the presence of PE, were recorded in a proforma. The clinical course and the complications, if present, in relation to the disease were also recorded. Following investigations were performed in all the subjects included in this study in clinical laboratories, Department of Biochemistry, Dr. S. N. Medical College, Jodhpur (Rajasthan):

- Serum T₃, Serum T₄ and Serum TSH by Enzyme Linked Fluorescent Assay (ELFA) Method.

3. Results

The present study had been conducted on 50 pregnant females of same age group (19-35 years), comprising of 25 clinically established preeclamptic pregnant females and equal number of normal pregnant women.

The mean Systolic Blood Pressure (SBP) and Diastolic Blood Pressure (DBP) of preeclamptic pregnant females was 148.12 ± 15.71 and 97.36 ± 10.69 mmHg respectively while 112.96 ± 8.81 and 67.16 ± 9.39 mmHg in normal pregnant females respectively. A statistically high significant difference (p<0.0001) was observed in SBP and DBP

($t=10.06$ and 11.18 respectively) when results were compared with normal pregnant.

Mean serum T_3 level in preeclamptic pregnant (1.83 ± 0.53 nmol/L) shows a significant relationship ($t=2.38$; $p=0.0211$) as compared to the normal pregnant (2.18 ± 0.54 nmol/L). (Table: 1, 2)

Mean serum T_4 level in preeclamptic pregnant (101.46 ± 116.69 nmol/L) shows a non-significant relationship ($t=0.0037$; $p=0.99$) as compared to the normal pregnant (101.47 ± 12.38 nmol/L). (Table: 3, 4)

Mean serum TSH level in preeclamptic pregnant (3.59 ± 2.57 μ IU/mL) shows a non-significant relationship ($t=0.91$; $p=0.37$) as compared to the normal pregnant (2.93 ± 2.54 μ IU/mL). (Table: 5, 6)

Table 1: Mean serum T_3 (nmol/L) of the groups studied:

S. No.	Group studied	Serum T_3 (Mean \pm SD) [Range]
1.	Preeclamptic pregnant	1.83 ± 0.53 [0.91-2.81]
2.	Normal pregnant	2.18 ± 0.54 [0.99-3.06]

Table 2: Statistical analysis of serum T_3 among the groups studied:

S. No.	Group compared	t - value	p - value
1.	Preeclamptic pregnant v/s normal pregnant	2.38	0.0211(S)

- S = Significant

Table 3: Mean serum T_4 (nmol/L) of the groups studied:

S. No.	Group studied	Serum T_4 (Mean \pm SD) [Range]
1.	Preeclamptic pregnant	101.46 ± 16.90 [66.29-135.02]
2.	Normal pregnant	101.47 ± 12.38 [75.07-135.0]

Table 4: Statistical analysis of serum T_4 among the groups studied:

S. No.	Group compared	t - value	p - value
1.	Preeclamptic pregnant v/s normal pregnant	0.0037	0.99(NS)

- NS = Non-Significant

Table 5: Mean serum TSH (μ IU/mL) of the groups studied:

S. No.	Group studied	Serum TSH (Mean \pm SD) [Range]
1.	Preeclamptic pregnant	3.59 ± 2.57 [0.71-10.19]
2.	Normal pregnant	2.93 ± 2.54 [0.30-11.4]

Table 6: Statistical analysis of serum TSH among the groups studied:

S. No.	Group compared	t - value	p - value
1.	Preeclamptic pregnant v/s normal pregnant	0.91	0.37(NS)

- NS = Non-Significant

4. Discussions and Conclusion

In this study, a significant correlation was observed when serum T_3 of preeclamptic pregnant was compared with normal pregnant. Results of this study were concordant with Sardana D *et al* (2009), [7].

Serum T_4 and serum TSH shows a non-significant relationship between the both groups studied and the results were matched with the study of Gulaboglu M *et al* (2010), [8] and Khadadem N *et al* (2012), [9].

Estimation of serum thyroid function tests (serum T_3 , T_4 and TSH) is simple, reliable, economic and sensitive that can now be considered as an adjunct in the management of preeclampsia. Hence they should be recommended to be included in the panel of routine investigations for proper management of PE to prevent serious complications and sequelae of disease.

References

- [1] Ekhaton CN and Ebonoyi MI (2012); Blood glucose and serum lipid profiles during pregnancy. African Journal of Diabetes Medicine; 20(1): 16-19.
- [2] Dhananjaya BS, Sendilkumaran D, Venkatesh G, Niranjana M and Sashiraj HK (2011); Thyroid stimulating hormone (TSH) level as a possible indicator of preeclampsia. Journal of clinical and diagnostic research; 5(8): 1542-1543
- [3] Dutta DC and Konar H (2011); Hypertensive disorders in pregnancy. Textbook of obstetrics. 7thEd. New Central agency: 219-224
- [4] Zaraghami N, Rohbani-Noubar M and khosorowbeygi A (2005); Thyroid hormones status during pregnancy in normal Iranian women. Indian journal of clinical Biochemistry; 20(2): 182-185
- [5] Glioner D (1997); The regulation of thyroid function in pregnancy: Pathways of endocrine adaptation from physiology to pathology. Endocrine reviews; 18(3): 404-433
- [6] Lao TT, Chin RK and Swaminathan R (1988); Thyroid function in preeclampsia. Br J Obstet Gynecol; 97: 71-74
- [7] Sardana D, Nanda S and Kharb S (2009); Thyroid hormones in pregnancy and preeclampsia. J Turkish-German Gynecol Assoc; 10(3): 168-171
- [8] Gulaboglu M, Borekci B and Delibas I (2010); Urine iodine levels in preeclamptic and normal pregnant women. Biol Trace Elem Res; 136(3): 249-257
- [9] Khadem N, Ayatollahi H, Roodsari FV, Ayati S, Dalili E and Shahabian M (2012); Comparison of serum levels of Tri-iodothyronine (T_3), Thyroxine (T_4) and Thyroid Stimulating Hormone (TSH) in preeclampsia and normal pregnancy. Iranian Journal of Reproductive Medicine; 10(1): 47-52

Author Profile



Monika Yadav received M.Sc. (Medicine) Biochemistry degree in 2013 and now working as senior demonstrator in Department of Biochemistry, Dr. S. N. Medical College, Jodhpur (Rajasthan)