



## **Sera Brain Natriuretic Peptide Concentrations in Patients with Hyperthyroidism and Hypothyroidism in Babylon Governorate, Iraqi**

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**Abstract :** The thyroid gland is endocrine gland that normally positioned in the lower face of the neck. Cardiovascular alteration that coexistence with thyroid gland diseases could be trigger off the secretion of brain natriuretic peptide(BNP) from heart. Serum BNP levels are also affected by thyroid status, which was mostly related to stimulatory result of thyroid hormones secretion of BNP. Serum BNP, T4 and T3 were determined by ELISA technique. Serum levels of hormone found to be significantly elevated in hyperthyroidism patients ( $p<0.01$ ) and significantly decreased in hypothyroidism patients( $p<0.01$ ) compared with control group. The results revealed a significant positive correlation between both of T3,T4 and BNP level in patients with hyperthyroidism, while there was no weighty relation between the corresponding thyroid hormones and BNP level in patients with hypothyroidism.

**Keywords :** Brain natriuretic peptide(BNP); thyroid diseases.

### **Introduction:**

The butterfly-shaped gland that situated in the lower anterior of the neck was called the thyroid gland. Its function to synthesis thyroid hormones that are secreted into the blood and passed to all the tissue. Thyroid hormones function is help the body utilize energy, remain warm, regulatethe brain, muscles, heart and organs to work as they should<sup>1</sup>.

Hyperthyroidism is the overproduction of thyroid hormones while hypothyroidism is inability of the thyroid gland to secrete adequate level of thyroid hormone cover the metabolic load of the body. Uncontrolled hypothyroidism lead to elevate blood pressure, impaired lipid metabolism, impairment of cognition, infertility, and neuromuscular abnormality<sup>2</sup>.

Thirty two amino acids are composed brain natriuretic peptide (BNP),it is a cardiac neuro-hormone, top secret from ventricles. Probrain natriureticpeptide (proBNP) is prohormone sliced into the biologically dynamic form BNP and amino terminal portion of NT-proBNP. BNP, NT-proBNP peptides discovered into plasma<sup>3</sup>.The incentive for the BNP secretion is rise ventricular tension according to sodium and H<sub>2</sub>O, extension in addition to increase ending diastolicvolume. It is well known that increase level of natriuretic peptides are the organize of neurohumoral, immune system, decrease of blood pressure and plasma quantity during coordinated action of the brain, kidneys and blood vessel<sup>4</sup>. Rise of heart beats, enlarge of left ventricular end-diastolic volume (LVEDV),total blood volume and cardiac output in hyperthyroid apply the "stress" of the cardiac wall and could be probable increase level of the secretion of BNP, and later enlarged serum NTproBNP concentration<sup>5</sup>.

Thyroid disturbance is common. Current estimation proposes that it affects 9% to 15% the womanly population and a lesser proportion of males. This gender-specific occurrence about results from the fundamental autoimmune mechanism for the most form of thyroid disorders, take in both Hashimoto's and Graves' disease, though old age, especially further than the eighty years old, the prevalence of disease in men and women appeared the same<sup>6</sup>.

This study discover the relationship between BNP level, thyroid hormones in Iraqi patients with hyperthyroidism, hypothyroidism. Previous studies found increased serum levels of BNP in both hyperthyroidism and hypothyroidism. No previous study elucidate the relationship between BNP, T3 and T4 In this study we tried to determine the relation between BNP and thyroid hormones level in various cases of thyroid dysfunction.

## Methods and Patients

This study was conducted in Babylon Maternity and Pediatric Teaching Hospital and Biochemistry Department, College of Medicine, niversity of Babylon. Serum brain natriuretic peptide, T4 and T3 were determined by enzyme- linked immunosorbent assay (ELISA).

From all patient the historyinclude:age, residence, smoking, and relatives, drug, surgical history, no drugs were given to those patients that may hinder with the parameter. Thirty sex Iraqi patients with primary hyperthyroidism and primary hypothyroidism. Twenty two subjects who are apparently healthy were enrolled in this study.

Control group include twenty two healthy subjects (with the same age, gender of the patients group).This group hasno history of diabetes mellitus, inflammatory, hypertension and not smoking. Data were expressed as mean  $\pm$  SD done by using SPSS version 18. Student's F-test was used to determine the normality of the distribution of all variables and the significant differentiation between the groups was established by Pearson relationship analysis. Less than 0.05 P values are considered as difference.

## Results and Discussion

Table- 1demonstrates that the results with significant raise in the concentration of BNP in patients with hyperthyroidism group in comparison with normal group( $P < 0.01$ )and significant reduce in the concentration of BNP in patients with low level of thyroid hormone comparison among those of normal subject ( $P < 0.01$ ).

In hyperthyroidism and hypothyroidism, cardiac functions were significantly changed.The special effects of hyperthyroidism contain hemodynamic change in heart such as low systemic vascular resistance also raise in cardiac output, heart rate, blood amount, pressure and impair heart contractility. These deviations lead to ventricular expanse and pressure overload, which might be a reason for concomitant rise in BNP concentrations. T3 and T4 encouraged liberate of BNP from both cultured a trial and ventricular myositis a dose-dependent mode<sup>7</sup>.

A raised cardiac output, totality blood volume, left ventricular end-diastolic volume (LVEDV) and heart rate in hyperthyroid status exerts the "stress" of the cardiac and could be potential stimuli for the emission ofBNP, and later levels raise of the BNP<sup>8,9</sup>.

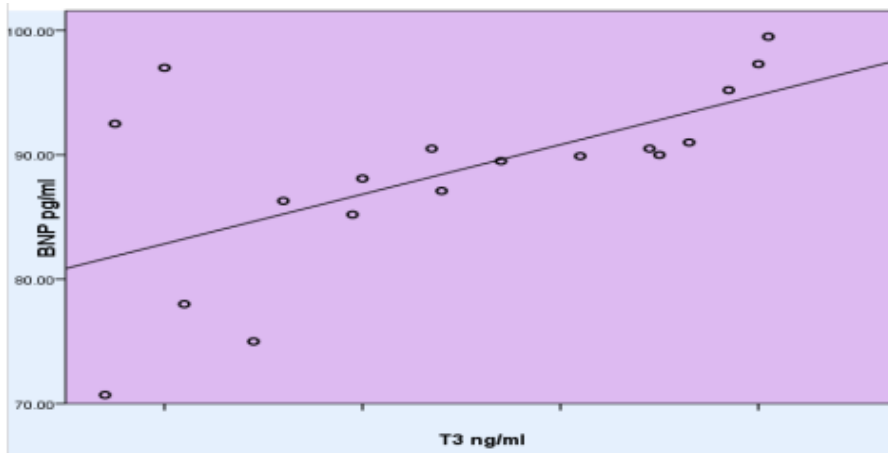
Table (2) reveals a significant linear correlation between BNP and both T3 and T4 while there is no significant correlation between those parameters in patients with hypothyroidism. This can be attributed to the changes in the peripheral T4 to T3 in patients with hypothyroidism which may lead to changes in cardiac functions ,hemodynamic factors which are induced by the concomitant increase of thyroid hormones while those changes were not significant in patients with primary hypothyroidism. Therefore the measurement of BNP is mined important in patients with primary hyperthyroidism compared with the cases of hypothyroidism. Future studies are needed to further elucidate the effects of different treatment regimens of hyperthyroid patients on BNP levels of the corresponding patients<sup>10-12</sup>.

**Table (1):-Biochemical changes of hyperthyroidism and hypothyroidism and control.**

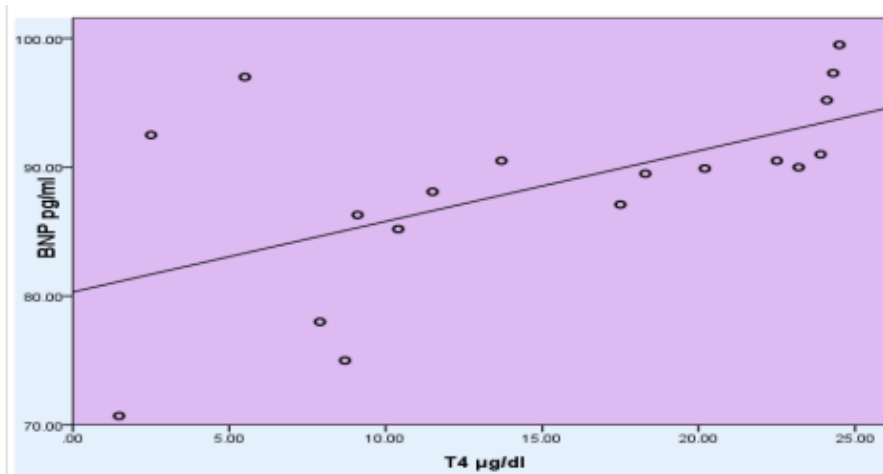
	<b>Hypothyroidism n=18</b>	<b>Control group n=22</b>	<b>Hyperthyroidism Group n=18</b>
BNPpg/mlMean± SD Range	49.27±5.67 (40.1-59.2)	65.2±1.5 (62-66.9 )	88.5±7.5 ( 70 -99.5)
TotalFT <sub>4</sub> µg/dlMean± SD Range	2.05 ± 0.99 (0.56-3.399)	7.1 ±1.1 (4.47-9.05)	14.9 ±8.02 (1.48-24.5)
TotalFT <sub>3</sub> ng/mlMean± SD Range	0.41 ± 0.2 (0.11-0.70)	1.46 ±1.09 (0.96-7.67)	4.8 ±2.32 (1.40-8.10)

**Table (2): Correlation amongBNP, T3,T4 in patients with hyperthyroidism**

			<b>Hyperthyroidism</b>		<b>Hypothyroidism</b>	
<b>BNP</b>	<b>vs</b>	<b>T3</b>	<b>r</b>	<b>p</b>	<b>r</b>	<b>p</b>
<b>BNP</b>	<b>vs</b>	<b>T3</b>	<b>0.611</b>	<b>0.01</b>	<b>0.05</b>	<b>0.82</b>
<b>BNP</b>	<b>vs</b>	<b>T4</b>	<b>0.58</b>	<b>0.01</b>	<b>0.07</b>	<b>0.7</b>



**Figure (1): Correlation between T3 and BNP in patients with hyperthyroidism(r=0.611) (p<0.01) .**



**Figure (2): Relationship among T4 and BNP in patients with hyperthyroidism(r=0.58) (p<0.01) .**

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