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**STUDY ON THE RELATIONSHIP OF HYPOTHYROIDISM AND HYPERTENSION IN  
FEMALES**

**MARY CHANDRIKA. A<sup>1\*</sup> AND SUMATHI K<sup>2</sup>**

**1:** Assistant Professor, Department of Biochemistry, Sree Balaji Medical College and Hospital,  
Chrompet, India

**2:** Associate Professor, Department of Biochemistry, Sree Balaji Medical College and Hospital,  
Chrompet, India

**\*Corresponding Author: Dr. A. Mary Chandrika: E Mail: [chandrikabiochem@gmail.com](mailto:chandrikabiochem@gmail.com)**

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**ABSTRACT**

According to recent findings hypothyroidism due to decrease in functioning of thyroid gland, leads to significant increase in blood pressure. It is important to closely monitor blood pressure in hypothyroid patients. This case-control study was done after getting Ethical clearance from the institution. It consisted of 20 cases of hypothyroid females of 20-40 years and 20 age and sex matched healthy euthyroids as control group attending outpatient department of Sree Balaji Medical College and Hospital, Chennai, Tamil Nadu. This study was undertaken to evaluate increase in blood pressure in female hypothyroid patients and compare it with age /sex matched controls. After obtaining informed consent from the subjects, venous blood samples were collected by standard aseptic techniques. Serum was separated; FT<sub>3</sub>, FT<sub>4</sub> and TSH levels were determined using Chemiluminescence immunoassay (CLIA) techniques. Blood pressure was recorded in both case and control groups. Hypothyroid females had elevated blood pressure when compared to the control group. Significant p value <0.01 is noted.

**Keywords: Hypothyroid Females, Blood Urine, Hypertension**

## INTRODUCTION

Hypothyroidism is one of the secondary cause of hypertension. The prevalence of hypertension in patients with hypothyroidism is around 5-50%. Increase in blood pressure is  $\geq 140$ mmHg systolic and  $\geq 90$ mmHg diastolic blood pressure. The prevalence of hypertension in hypothyroid patients is approximately three times that of age-matched euthyroid subjects [1].

### AIM

To study the increase in blood pressure in hypothyroid individuals.

### OBJECTIVE OF THE STUDY

To evaluate increase in blood pressure in female hypothyroid patients and compare it with age sex matched controls. To find the incidence of hypertension in hypothyroid females.

### MATERIALS AND METHODS

This case-control study was done after getting Ethical clearance from the institution. It consisted of 20 cases of hypothyroid females of 20-40 years and 20 age/ sex matched healthy euthyroids as control group attending outpatient department of SreeBalaji Medical College and Hospital, Chennai, Tamil Nadu. They were divided into two groups according to their age. Group I (20-30 years), Group II (31-40 years). This study was undertaken to evaluate increase in blood

pressure in female hypothyroid patients and compare it with age /sex matched controls. After obtaining informed consent from the subjects, venous blood samples were collected by standard aseptic techniques. Serum was separated and serum FT<sub>3</sub>, FT<sub>4</sub> and TSH levels were determined using Chemiluminescence immunoassay (CLIA) techniques. Blood pressure was recorded in both case and control group. Data analysed using SPSS package.

### Inclusion Criteria:

Case group – female hypothyroid patients of age group 20-40 years.

Control group – Healthy female euthyroids of age group 20-40 years without any other medical illness.

### Exclusion criteria:

1. Renal disease
2. Individuals on steroid use
3. Pre-existing liver disease,
4. Known diabetes mellitus patients

### RESULTS

Systolic blood pressures were found to be  $131.4 \pm 6.2$  (20-30 years),  $138.6 \pm 9.8$  (31-40 years) systolic for hypothyroid subjects and  $110.4 \pm 6.2$  (20-30 years),  $113.2 \pm 8.6$  (31-40 years) in control subjects (Table 1). Diastolic blood pressures were  $78.6 \pm 9.2$  (20-30 years),  $88.2 \pm 10.4$  (31-40 years) for

hypothyroid subjects and  $71.4 \pm 5.6$  (20-30 years),  $76.4 \pm 6.4$  (31-40 years) for control subjects (**Table 2**). This study shows that 20% of 20-30 years and 30% of 30-40 years female hypothyroids had developed systemic hypertension. 10% of 20-30 years and 15%

of 31-40 years female euthyroids had hypertension. Significant p value of  $<0.001$  is noted and confidence interval is found to be 95%. Hypothyroids are more prone to develop hypertension than euthyroids.

**Table 1: Thyroid Profile in Hypothyroid and Euthyroid female Subjects**

| HYPOTHYROID CASES       |                         |             | EUTHYROID CONTROLS      |                         |             |
|-------------------------|-------------------------|-------------|-------------------------|-------------------------|-------------|
| FT <sub>3</sub> (µg/dl) | FT <sub>4</sub> (ng/dl) | TSH (µU/ml) | FT <sub>3</sub> (µg/dl) | FT <sub>4</sub> (ng/dl) | TSH (µU/ml) |
| 2.8±0.1                 | 76.24±2.6               | 106.8±5.6   | 8.5±0.1                 | 126.7±1.8               | 2.8±0.1     |

**Table 2: Incidence of hypertension on female hypothyroids and euthyroids is given below**

| S. No | Age (Years)       | HYPOTHYROID CASES   |                          |                           | EUTHYROID CONTROLS  |                          |                           | P Value | Confidence Interval |
|-------|-------------------|---------------------|--------------------------|---------------------------|---------------------|--------------------------|---------------------------|---------|---------------------|
|       |                   | No of Hypertensives | Systolic Pressure (mmhg) | Diastolic Pressure (mmhg) | No of Hypertensives | Systolic Pressure (mmhg) | Diastolic Pressure (mmhg) |         |                     |
| 1.    | Group I<br>20-30  | 4(20%)              | 131.4±<br>6.2            | 78.6±<br>9.2              | 2(10%)              | 110.4±<br>6.2            | 74.4±<br>5.6              | < 0.001 | 95%                 |
| 2.    | Group II<br>31-40 | 6(30%)              | 138.6±<br>9.8            | 88.2±<br>10.4             | 3(15%)              | 113.2±<br>8.6            | 76.4±<br>6.4              |         |                     |

## DISCUSSION

Triiodothyronine is the biologically active form of thyroid hormone derived from 5'-monodeiodination of thyroxine in all tissues outside of the thyroid gland, particularly the kidney, liver, and skeletal muscle. The basal metabolic rate is affected by fT3 via altering oxygen consumption, substrate requirements and tissue thermogenesis [2]. T3 directly increases cardiac contractility, leading to widened pulse pressure [3, 4]. There are many mechanisms for hypertension in hypothyroidism Increase in peripheral vascular resistance and arterial stiffness and

blood vessel vasoconstriction. The vasoconstriction may be due to the absence of vasodilatory thyroid hormone effects on the vascular smooth muscle, or may be the result of neither circulating nor epinephrine levels with a decrease in the number of vascular beta-adrenergic receptors. Change in autonomic nervous function due to hypothyroidism may cause hemodynamic changes. Decreased metabolism of nor epinephrine, increased secretion rate of nor epinephrine leads to increased plasma epinephrine levels in hypothyroid patients [5]. High serum prolactin and TSH level in

hypothyroidism leads to decreased dopaminergic activity in central nervous system which results in [6]. It is seen that females with symptoms of hypothyroidism will develop elevated blood pressure and associated arterial stiffness. So it is important to monitor blood pressure in hypothyroid patients.

### CONCLUSION

In this study it is clearly seen that hypothyroid patients has got increased chance for developing hypertension. So it is necessary to check blood pressure in hypothyroids regularly and treat hypothyroidism effectively to prevent from hypertension and other cardiovascular problems.

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### CONFLICTS OF INTEREST

No conflicts of interest are declared by the authors.

### LIMITATIONS OF THE STUDY

This study has involved a small number of subjects and the results must be confirmed in a large sample.

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