

Cardiovascular Derangements in Thyroid Disorders

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Abstract

Introduction: Thyroid disorders like hypothyroidism completely disrupts the cardiovascular physiology especially weakening the myocardial contractility. Reduced myocardial activity weakens heart pump and reduces cardiac output and decreased ejection fraction, and ultimately manifests in various forms of sign and symptoms of cardiovascular origin.

Materials and Methods: From February 2013 to May 2013, 22 patients were involved in the study, (19 females and 3 males), age ranging from 32 to 68 years. They were known to have thyroid disorders. The data was evaluated statistically analyzed.

Results: 69.5% of the participants had mild elevation while 20.9% of them had marked elevation. 44.2% had hypertension, and that 68.4% of them were having diastolic hypertension, while 31.6% had systolic type. 36.4% patients were having history of ischemic heart disease while 63.4% patients showed no such thing. 28.9% patients had atrial fibrillation while 71.1% patients were free from that. Cardiomegaly was present in 26.80% and absent in 73.20% of cases. Along with these findings marked change in lipid profile was also noted.

Conclusion: We concluded the study with the fact that, thyroid disorders have great influence on cardiovascular hemodynamics, manifesting itself in various sign and symptoms of cardiovascular derangements.

Keywords: Bradycardia, Cardio vascular, Myocardium and Atrial fibrillation

INTRODUCTION

Cardiovascular hemodynamics is very much influenced by thyroid gland hormones.¹ Decreased secretion of thyroid hormones effects myocardial contractility, effecting its motor like function.² Altered hemodynamics predisposes to individual for serious outcomes.³ Serious outcomes may manifest individually or in the form of amalgamation of different cardiovascular phenomenon, mentioned below:

1. Dyspnea on exertion
2. Bradycardia
3. Alteration in blood pressure, especially diastolic
4. Features of pulmonary edema
5. Myxedema
6. Altered lipid profile
7. Radiographic findings may show cardiomegaly, etc.

The aim of this observational study is to see different impact of thyroid disorders (especially hypothyroidism), in different strata of the population in western UP region,

and to recognize the most targeted population and to advise them, how to avoid and take care of cardiovascular manifestations in this condition.

MATERIALS AND METHODS

This study was conducted in the Department of Medicine, TMMCRC, Moradabad, India on 22 patients, from Feb 2013 to May 2013, and all of them were newly diagnosed to have hypothyroidism. Institutional ethical and review committee approval were taken before proceeding for the study and patient informed consent was also taken as per research protocol of the institution. They were 3 males and 19 female.

All values were taken and retaken by authors of the study to avoid any mistake and all values were inserted in pie diagram to get an overview of values which can be well seen and understood. Values obtained in this study also compared and detailed discussion on that was done on statistical ground.

RESULTS

22 patients were participated in this study; they were newly diagnosed to have primary hypothyroidism. 19 females and 3 males were involved in the study.

Thyroid Stimulating Hormone (TSH) Reading

In this group, 69.5% of the participants had mild elevation while 20.9% of them had marked elevation (Figure 1).

Hypertension

In this group, (44.2%) were having hypertension, and that 68.4% of them were having diastolic hypertension, while 31.6% were having systolic type (Figure 2).

Heart Diseases

In this group only (36.4%) patients were having history of ischemic heart disease, while (63.4%) patients showed no such thing (Figure 3).

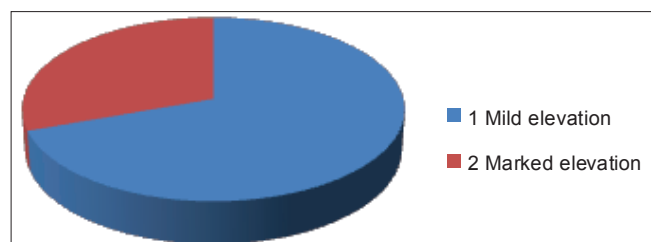


Figure 1: Level of TSH elevation

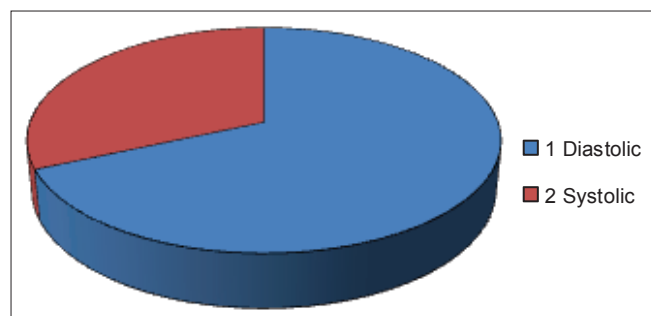


Figure 2: Comparison of elevation of systolic and diastolic blood pressures

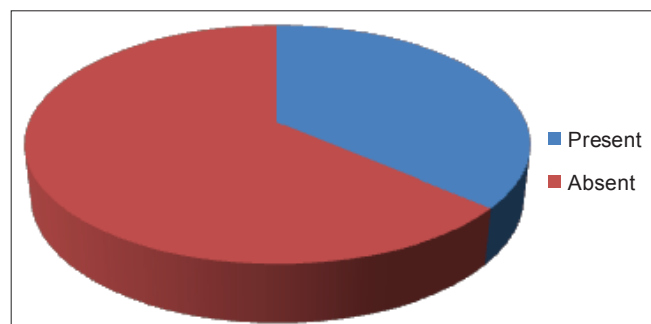


Figure 3: Percentage of patients showing history of IHD

Arrhythmias

By examining the electrocardiogram of the patients participating in the study, one can see that (28.9% patients) are having atrial fibrillation while (71.1%) patients are free from that sign (Figure 4).

Radiological Findings

In this group cardiomegaly as seen in X-ray was present in 26.80% and absent in 73.20% of cases (Figure 5).

Lipid Profile

Ranges of lipid profile of the patients of the study are shown in Table 1 that indicates elevation in total cholesterol, lipoprotein cholesterol and triglycerides levels over the normal ranges (Table 1).

DISCUSSION

Many researchers like González Víchez *et al.* 1998, Tielens *et al.* 2000 found that hypothyroidism occurs more commonly

Table 1: Lipid profile of patients

Type of cholesterol	Level
Total cholesterol	7.0 mmol/L
LDL	4.6 mmol/L
HDL	1.3 mmol/L

LDL: Low lipoprotein cholesterol, HDL: High-density lipoprotein

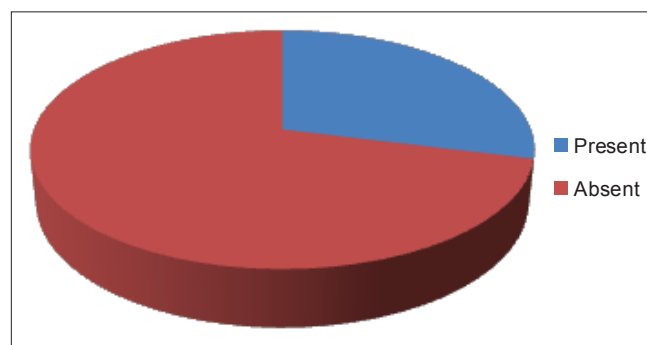


Figure 4: Percentage of patients showing arrhythmias

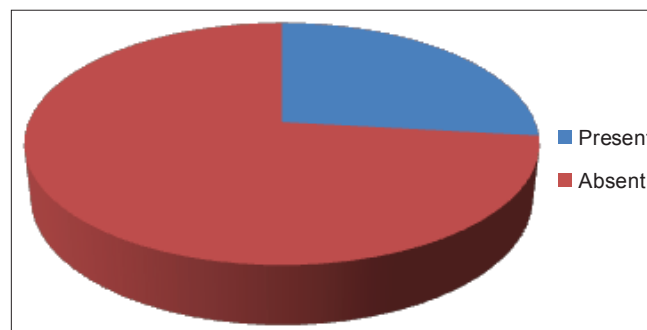


Figure 5: Percentage of patients showing cardiomegaly

in older population as compared to younger generation.^{4,5} and Bengel *et al.* 2000, Tielens *et al.* 2000 in another study found incidence of hypothyroidism more in females as compared to males (statistically significant).^{1,5} In the same manner.

Rodondi *et al.* 2005, Vargas *et al.* 2006 noticed the positive correlation between hypothyroidism and weight of the body.^{6,7}

In our study (69.5%) patients showed mild elevation in TSH level, while remaining had marked elevation, this shows that the hypothyroidism is associated with elevated TSH levels. This study of ours is in accordance with the studies of Ladenson 1990 and Ojamaa *et al.* 1996.^{8,3}

We could notice an increase in diastolic blood pressure in more percentage of patients as compared to systolic blood pressure, which well correlates with the observations of Bengel *et al.* 2000, Iervasi *et al.* 2007, Ladenson, who explained this phenomenon on the basis of stiffness of arteries and in turn increased vascular resistance.^{1,2,8}

Incidence of ischemic heart diseases as noted in this study (36.4%) of cases can be attributed to increased low-density lipoproteins and C-reactive proteins as also noted by.^{9,10}

Atrial arrhythmia in 28.9% of cases is due to the low levels of thyroid hormones that worsen the condition by increasing atrial fibrillation.^{2,7}

Cardiomegaly on chest X-ray (26.8%), attributed to deranged hemodynamics Klemperer *et al.* 1996; Ladenson 1990.^{8,11}

CONCLUSION

From our study we conclude that cardiovascular hemodynamics is greatly deranged in case of thyroid disorders, which manifest itself in the form of dyspnea on exertion, bradycardia, alteration in diastolic blood pressure, pulmonary edema, myxedema altered lipid profile and abnormal findings on radiological imaging. But a larger sample of patients will be more beneficial before we implement the results of this study in the general population.

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