Original Article

A Study on Electrocardiogram Changes in Hypothyroidism

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ABSTRACT

Background and Aim: Hypothyroidism is very common endocrinological disorder in Worldwide. Iodide uptake is a critical first step in thyroid hormone synthesis. The aim of study was to assess the electrocardiogram changes in the patients with hypothyroidism.

Materials and Methods: Total study samplings were 140 patients. The age group is between 20 years and 60 years. The study period was from October 2018 to September 2019. The investigations advised are T_3 T_4 TSH and 12 lead electrocardiogram. The inclusion criteria is patients who are known case of hypothyroidism and on L-thyroxine. The Exclusion criteria is pts who are on ß -Blockers, Hypertension, coronary artery disease and COPD and left sided pneumothorax.

Results: Hypothyroidism patients among 140 patients, females were 96 and males were 44. The age group is between 20 years and 60 years. The common age group in our study is 30 years to 40 years, after care full history talking and clinical examination 12 lead electrocardiograms was taken. The common ECG abnormalities noted were sinus bradycardia, T wave inversion and low voltage complexes and incomplete RBBB also noted.

Conclusion: Hypothyroidism is a common medical problem worldwide and in India also. After T_3 T_4 TSH estimations electrocardiogram is useful investigation in hypothyroidism. Coronary artery disease is common in hypothyroidism. By taking periodical ECG's can reduce the complications because of hypothyroidism.

Keywords: Hypothyroidism, electrocardiogram, low voltage complexes, pericardial effusion, bradycardia.

INTRODUCTION

Hypothyroidism is one of the common endocrinal disorders. It is more common in females than males thyroid gland produces 2 related hormones, thyroxine (T4) and tricodothyronine (T3). The normal thyriod gland is 12-20 grms in size highly vascular and soft in consistency.

Thyroid stimulating hormone (TSH) Stimulates thyroidgland production of T4 and T3. Iodide uptake is critical 1st step in thyroid hormone synthesis. [1]

Iodine deficiency is prevalent in many mountanious regions and in Central Africa, Central South America, South East Asian Countries like Srilanka, Bangladesh and India. The world health organization (WHO) estimates that about 2 billion people are iodine deficient, based on urinary excretion data. [2]

In India the commonly affected states are Meghalaya, Assam, Bihar, West Bengal, Himachal Pradesh, Nagaland. It is estimated that more than 71 million population is affected with goitre in the country.[3]

Iodine deficiency remains a common cause of Hypothyroidism worldwide. Autoimmune Hypothyroidism hesitates thyroiditis, Drugs like amiodarone, lithium and amyloidosis, sarcoidosis.

The main clinical features includes fatigue, Dryskin, Hair loss, lack of concentration constipation, weight gain, poor appetite, Dryspnea, Hoarseness of voice manosshagia, parasthesias, impained hearing, bradycardia, puffiness of face, serious cavity effusions.

The 12 lead electrocardiogram is used in our study the normal electrocardiogram is composed of P wave, QRS complex and T wave. The QRS complex is often but not always three separate waves, The Q waves, R waves and S waves.

These are 2 types of electrocardiographic leads 1) frontal plane leads 2) horizontal plane leads. Frontal plane leads consists of standard leads I,II,III and leads AVR, AVL and AVF. The horizantal plane leads consists of lead V_1 V_2 V_3 V_4 V_5 V_6.[4, 5]

The purpose of study was to assess the electrocardiogram changes in the patients with hypothyroidism.

MATERIALS AND METHODS

Total samplings were 140 paients; 94 were females and 46 were males. The study was been carried out Department of General Medicine, GEMS Medical College, Srikakulam, Andhra Pradesh during from October 2018 to September 2019. The age group is between 20 years and 60 years.

The inclusion criteria : Patients who were diagnosed as hypothyroidism and were on levo thyroxine.

Exclusion criteria

The patients with COPD with emphysema, where low voltage complexes are seen and patients who are on ß-Blockers where Bredycadia is present and other disease like hypertension, coronary artery disease and left sided pneumothorax.

The blood samples were send to labaratory for routine heamoglobin, random blood sugar, lipid profile, T_3T_4 TSH and X-ray Chest PA were taken up to rule out COPD in old age patients. After careful history and clinical exmination the 12 leads electrocardiogram were taken. The data was computerized and analyzed systemically.

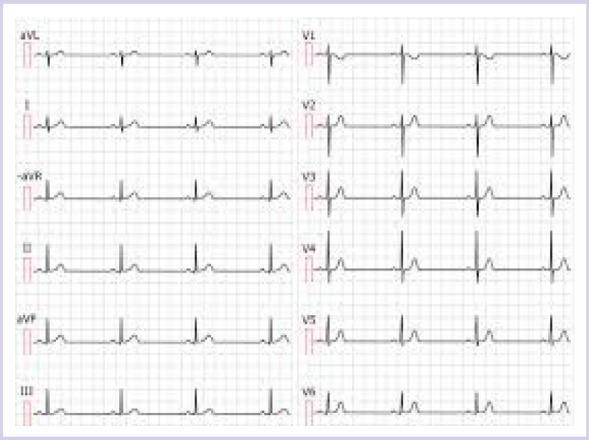

Figure 1: Sinus bradycardia.

Figure 2: Sinus bradycardia single intervel .

Figure 3: Low Voltage complexes.

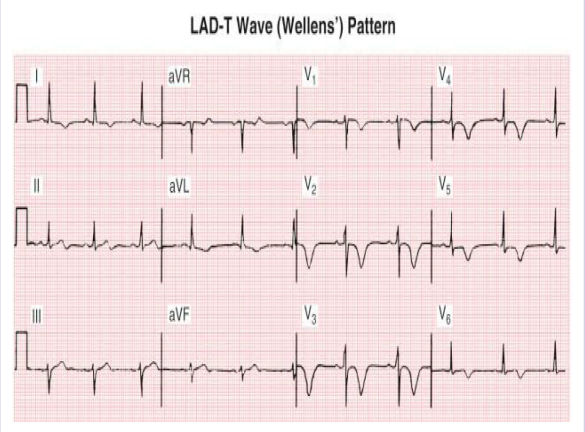

Figure 4: T wave pattern.

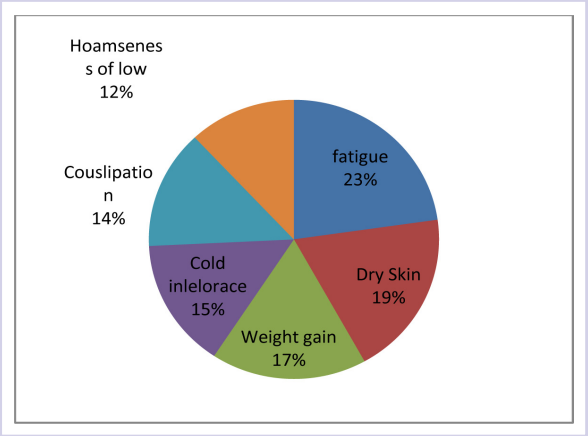

Figure 5: Clinical features of males.

Ethics Approval

The study protocol was approved by the Institutional Ethics Committee, GEMS Medical College, Srikakulam and informed written consent was obtained from all the study subjects enrolled in the study.

RESULTS

The study includes total 140 patients, 94 are females and 46 are males. The common age group is between 20 years and 60 years (Table 1).

After, careful history taking and clinical examination the blood samples were sent for CBP, RBS, T_3T_4TSH then 12 leads ECG was taken to all the patients. The common age group is between 20 years and 40 years.

Table 1: Age wise Distribuion

Sl. No.	Age in Years	No. of Females (n=94)	No. of Males (n=46)
1	20 -29 years	24 (25.50%)	18 (39.13%)
2	30 -39 years	29 (30.20%)	15 (32.60%)
3	40 -49 years	19 (28.89%)	9 (19.56%)
4	50 -60 years	21 (22.25%)	4 (8.69%)

The major clinical feature are fatigue, generalized weakness, Dryskin, Weight gain are around 72% in our study the sudies conducted by Kumar BS et al shows almost results(68.75%) [6]. Prevalance of thyroid disorder and metabolic syndrome in adult patients. The Electrocardiogram abnormalities noted in the descending order are Bradycardia (72.65%) in females and (69.56%) in males.

The low voltage complexes are (63.82%) in females and

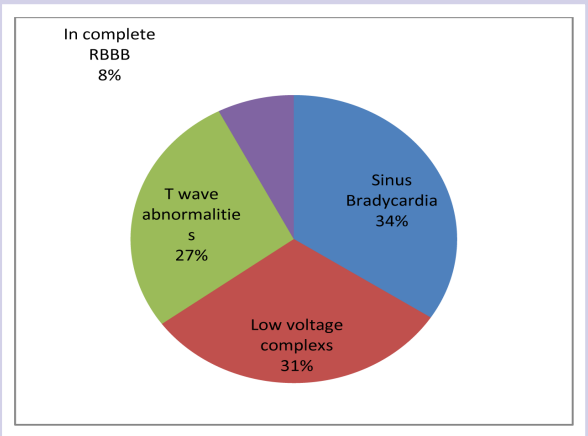

Figure 6: Clinical features of females.

The ECG abnormalities were sinus bradycardia the range is 50 beats/mnt to 58 beats/min. Low voltage complexes; incomplete RBBB and T wave abnormalities.

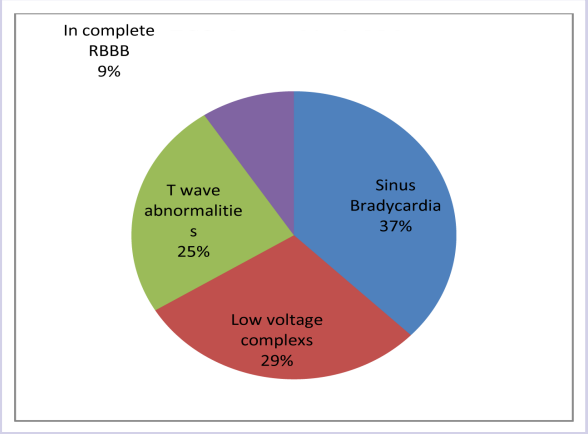

Figure 7: ECG abnormalties in Males.

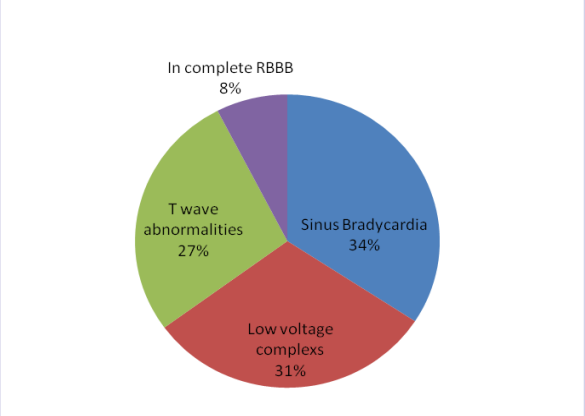

Figure 8: ECG abnormalties in Females.

Table 2: Low voltage complexs

Sl. No.	ECG abnormalities	Females	Males
1	Bradycardia	73 (77.65%)	32 (69.56%)
2	Low voltage & complexes	60 (63.82%)	25 (54.34%)
3	T waves Abnormalities	55 (58.51%)	23 (50.0%)
4	Other	7 (7.56%)	4 (8.46%)

complexes (54.95%) in females and (59.65%)in males[7] (Table 2).

DISCUSSION

Hypothyrodism is very common endocrinal disorders. It is more common in females than males. The world wide male female ratio is 1:4. Iodine deficiency is one of the common cause of hypothyrodism. It is common in devaloping countries like, India, Srilanka, Bangaladesh, Nepal, In India most affected states are Himachal pradesh, Nagaland, Sikkim, Bihar and west bengal. Hypothyrodism is one of the risk factors for coronary artery disease.

Hyperlipidemia is commonly associated with hypothyrodism. Subclinical hypothyroidism is also common in females, especially during pregnency. In subclinical hypothroidism T_3T_4 levels remains normal and only TSH will be mildly elevated.

The common Findings in ECG are Bradycardia. Low voltage coplexes, T waves abnormalties and other like incomplete RBBB. The cause of bradycardia was unknown. The other causes of bradycardia are other hypothyrodism, obstractive jandice, sick sinus syndrome.

In our study was showed that bradycardia is seen in 77.65% in females and 69.56% in males.

Table 3: Different ECG Charges in relation to thyroid function tests.

Sl. No.	TFT (T3 T4 TSH)	Bradycardia No. of Cases	Low Voltage Complex No.of Cases	T No. of Cases
1	T3-65-85 (ngl/dl) T4-6-8 (mcgr/dl) TSH-25-30(micro l/unit/ml)	25	18	22
2	T3-50-65 (ngl/dl) T4-4-6 (mcgr/dl) TSH-45-63 (micro l/unit/ml)	37	29	30
3	T3-30-45 (ngl/dl) T4-2-4 (mcgr/dl) TSH- 65-85 (micro l/unit/ml)	43	38	33

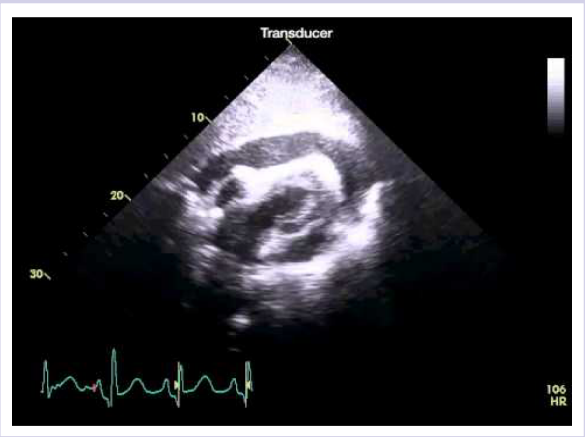

Figure 9: Pericardial effusion on 2D echocardiogram.

(54.34%) in males T waves abnormalities are seen in (58.51%) females and (50.05%) in males the studies conducted by venkataramana et al shows bradycardia in females (76.95%) in Males(63.35%) and low voltage

The study conducted by Karki et al found that 65.35% in femles and 59.78% in males.[8] The low voltage complexes are seen in 63.82% in females and 54.34% in males. The QRS complexes when less than 5 mm in amplitude in limb leads I, e $L_1 L_{11} L_{111}$ AVR, AVL, AVF and less than 10 mm amplitude in chest leeds I,e, V_1, V_2, V_3, V_4, V_5, V_6. The other causes of low voltage complexes are muscular body, obesity, emphysama, left sided pnecomothorax and percardial effusion.[9]

The study conducted by Madhu et al shows similar studies similar results.[9] The other common abnormalities in hypothyrodism are T wave inversion. In females it is seen in 58.51% and in males 50.82%. According to several studies, the most common wave, which will have changes is T wave, T inversion are also seen in after meals, anxiety, smoking, drinking, ice water and hyperventilation.

CONCLUSION

Hypothyroidism and Hyperthyroidsm are commonly seen in females than males. Cardic complications are commonly associated with these two disorders. Electrocardiogram is very much useful in ruling out severs bradycardia and pericardial effusion. So, along with T_3, T_4 TSH, ECG should be advised periodically to hypothyroidm pateints.

CONFLICT OF INTEREST:

The authors declared no conflict of interest.

FUNDING: None

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