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RESEARCH ARTICLE

ELECTROCARDIOGRAPHIC CHANGES IN HYPOTHYROID PATIENTS WITH SPECIAL REFERENCE TO QT DISPERSION BEFORE AND AFTER TREATMENT WITH L-THYROXINE

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Abstract

Hypothyroidism is one of the commonly occurring endocrine abnormalities. It can cause various cardiovascular manifestations, one of which is malignant ventricular arrhythmias. So, if we study the markers of risk of these arrhythmias i.e QT dispersion in these hypothyroid patients and start with L-thyroxine therapy as early as possible, we can prevent these patients from developing ventricular arrhythmias and hence prevent sudden cardiac death in these patients.

We conducted a study on newly detected 50 overt hypothyroid patients to find out the marker of arrhythmias i.e prolongation of QT dispersion in these patients and hence evaluate the effect of L-thyroxine on QT dispersion after 6 weeks.

The hypothyroid patients were diagnosed by biochemical function test. Thereafter thorough clinical history, physical examination and necessary investigations were done. Then QT dispersion was calculated from the ECGs of these patients. These newly detected hypothyroid patients were then started on L-thyroxine therapy according to the TSH levels. These patients were again followed after 6 weeks of treatment and ECG was repeated to calculate QT dispersion. Hypothyroid patients showed increased QT cmax, QT cmin, QTc, QT dispersion and corrected QT dispersion interval before treatment and all these variables decreased after treatment.

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Introduction

Cardiovascular disorder affects a large proportion of the population. Hypothyroid state is a major cause of cardiovascular disorder as the heart is a target organ for the thyroid hormones. QT Dispersion reflects regional variation in myocardial repolarisation, increased QT Dispersion has been linked to occurrence of malignant ventricular arrhythmias and sudden cardiac death. There is evidence that these abnormalities improve with L-Thyroxine treatment demonstrating that early initiation of L-Thyroxine therapy can help prevent malignant ventricular arrhythmias.¹

So this study was carried out to study QT dispersion in newly diagnosed hypothyroid patients and then comparing the QT dispersion in these patients after 6 weeks of treatment L-Thyroxine.

MATERIAL AND METHODS:

The study was conducted on 50 patients with hypothyroidism. All these patients underwent standard 12 lead ECG for determination of QT dispersion. After the initiation of L- Thyroxine therapy, ECG tracing were repeated on same set of patients after six weeks to observe QT Dispersion.

Inclusion Criteria: Patients with newly detected Hypothyroidism.

Exclusion Criteria: Patients with heart disease, on drugs which prolong QT interval, electrolyte imbalance, history of raised intracranial pressure, post surgery hypothyroidism, post radiation hypothyroidism, patients already taking L-Thyroxine, subclinical hypothyroidism.

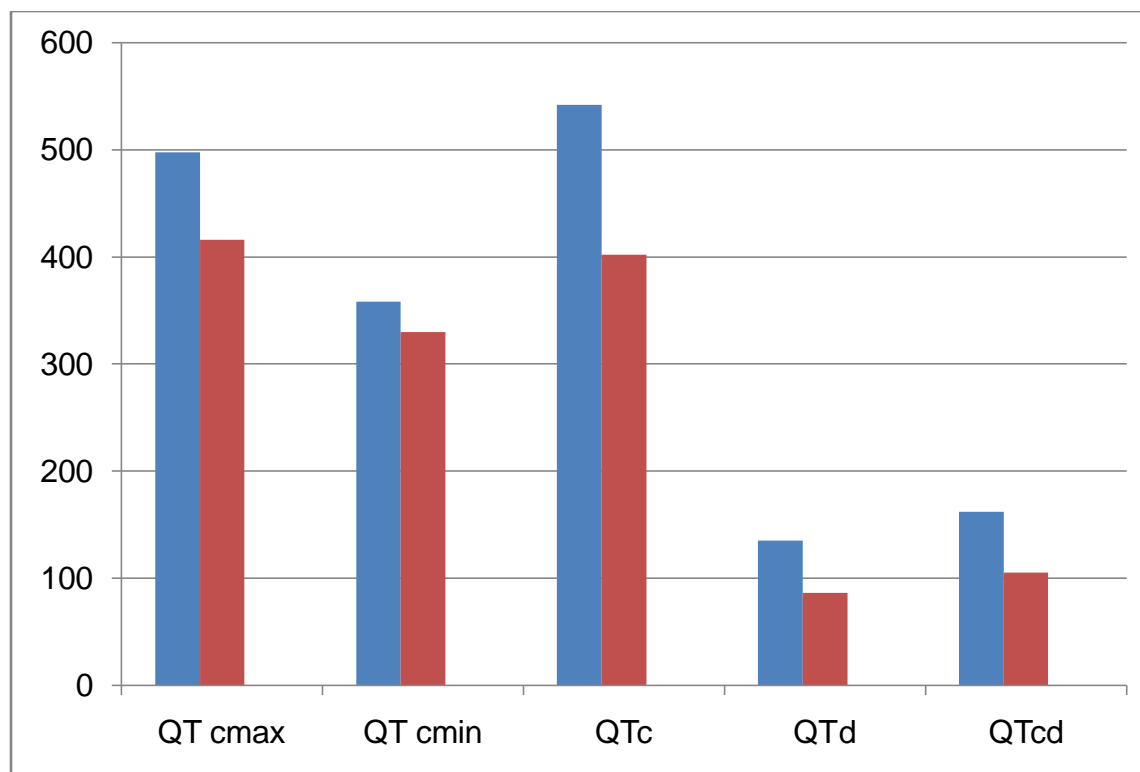
RESULTS

1. Age of the patients varied from 18 to 80 years with the mean age of 44.08 years and male to female ratio of 1:9.
2. The mean TSH level in hypothyroid patients was 46.06+/-41.23.
3. QT cmax before and after treatment was done. QT cmax before treatment was 497.6+/-75.87 milliseconds. It decreased to 416.26+/-69.45 milliseconds after treatment.
4. Mean QT cmin before treatment was 358.4+/- 74.48 milliseecs and after treatment was 330.76+/- 65.75 milliseecs.
5. Corrected QT interval before treatment was 542.84+/-174.79 milliseecs and after treatment it decreased to 402.42+/-89.76 milliseecs giving significant p value (p value.000).
6. QT dispersion before treatment was 135+/-46.64 milliseecs and after treatment decreased to 86.70+/-36.63 milliseecs. This difference was found to be statistically highly significant (p value .000).
7. Corrected QT dispersion before treatment was 162.06+/-54.16 milliseecs and after treatment decreased to 105.44+/-40.20 milliseecs and was statistically significant (p value .000).

Table 1: Showing all the variables before and after treatment with L-thyroxine. It has been seen that all the variables decreased after treatment with L-thyroxine.

VARIABLE(milliseecs)	BEFORE TREATMENT	AFTER TREATMENT
QT cmax	497.6+/-75.87	416.26+/-69.45
QT cmin	358.4+/-74.48	330.76+/-65.75
QTc	542.84+/-174.79	402.42+/-89.76
QTd	135+/-46.64	86.70+/-36.63
QTcd	162.06+/-54.16	105.44+/-40.20

Figure 1: QT Variables before and after treatment with L-THYROXINE



DISCUSSION:

In our study there were 45 females and 5 males with a male to female ratio of 1:9 i.e females predominantly had hypothyroidism. This was consistent with findings of other studies.² The mean age group of the patients was 44.08±16.49 but study by S C Aggarwal et al (2004) showed the mean age of the patients to be 33.1 which is lower as compared to our study.³ This difference could be due to difference in the sample size of our study as compared to the aforesaid studies as well as due to difference in the age group of the patients attending our hospital.

Mean TSH levels in hypothyroid patients was 46.06±41.23 uIU/ml.²

QTc decreased significantly after treatment with L-thyroxine for six weeks. Kyoung Hee Kweon et al (2007) reported QTc 434±32 msec before treatment and 417±23 millisecond after treatment.¹

Darshan N et al (2013) showed that hypothyroid patients showed a highly significant increase ($p < 0.0001$) in mean QTd in respect to control group as reported in our study.⁴ QTd decreased significantly after treatment in our study as well as in study done by Armagan et al (1999).⁵

Corrected QT dispersion before and after treatment was 162.06±54.16 milliseconds and 105.44±40.20 milliseconds and this was found to be statistically significant with a p value of .000. This was supported by study done by Kyoung Hee Kweon et al (2007) in which QTcd (49±23 vs. 32±14 msec, $p = 0.005$) decreased significantly after treatment with L-thyroxine.¹

CONCLUSION:

Thus to conclude all the hypothyroid patients should be screened for the presence of the cardiovascular effects in the form of ECG changes especially QT dispersion and should be started L-thyroxine therapy as early as possible to prevent occurrence of arrhythmias and sudden cardiac deaths.

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