A STUDY ON THYROID DYSFUNCTION AMONG PATIENT UNDERGOING AMIODARONE THERAPY IN TERTIARY CARE CENTRE

Dissertation Submitted to

THE TAMIL NADU DR.M.G.R.MEDICAL UNIVERSITY

Chennai

In partial fulfilment of the regulations

For the award of the degree of

M.D. BRANCH – I

(GENERAL MEDICINE)

CHENGALPATTU MEDICAL COLLEGE& HOSPITAL

THE TAMIL NADU DR.M.G.R.MEDICAL UNIVERSITY

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CERTIFICATE

This is to certify that the dissertation titled **"A STUDY ON THYROID DYSFUNCTION AMONG PATIENT UNDERGOING AMIODARONE THERAPY IN TERTIARY CARE CENTRE"** is a bonafide work of **Dr.S.MURUGARAJAN** in partial fulfilment of the requirements for **M.D.BRANCH-I (GENERAL MEDICINE)** examination of **THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY** to be held in April 2017. The period of study was from January 2016 to June 2016.

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Date:

Place :

THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY

DECLARATION BY THE CANDIDATE

I,**Dr.S.Murugarajan**, hereby declare that this dissertation titled **"A STUDY ON THYROID DYSFUNCTION AMONG PATIENT UNDERGOING AMIODARONE THERAPY IN TERTIARY CARE CENTRE"** is a bonafide and genuine research work done by me at **CHENGALPATTU MEDICAL COLLEGE&HOSPITAL**from January 2016 – June 2016 under the direct guidance and supervision of **Dr.Shaik Sulaiman Meeran M.D.,**Professor, Department of General Medicine, Chengalpattu Medical College and Hospital, Chengalpattu. This dissertation is submitted to the Tamil Nadu Dr. M.G.R. Medical University in partial fulfilment of the University regulations for the award of MD degree in General Medicine Examination to be held in April 2017.

Date: Signature of the Candidate

Place: **DR.S.MURUGARAJAN**

INSTITUTIONAL ETHICAL COMMITTEE

CHENGALPATTU MEDICAL COLLEGE, CHENGALPATTU

Title of Work	:	A study on thyroid dysfunction among Patient undergoing amiodarone therapy in tertiary Care centre.
Principal Investigator	:	Dr.S.Murugarajan
Designation	:	2nd Year Post Graduate in General Medicine
Co-Investigators	:	1.Dr.K.Manickam,MD,. Professor Department of Medicine 2.Dr.R.Mohan Doss,MD,. Associate Professor Department of Biochemistry
Department	:	General Medicine

The request for an approval From the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 07.01.2016 at the Medical Education Unit, Government Chengalpattu Medical College, Chengalpattu at 11.00 PM.

The Members of the committee, the Secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

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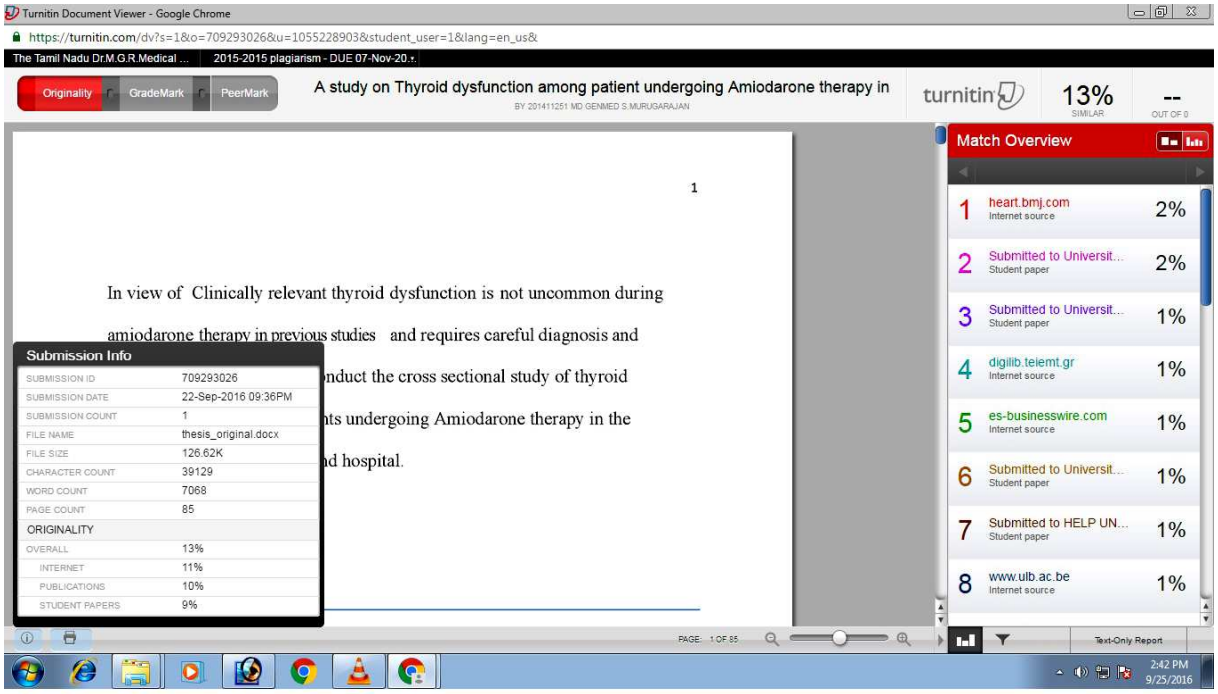
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For granting me permission to utilize the resources of this institution

for my study

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I would like to thank my wife and my family for their moral support.

Last but not the least; I am grateful to all those patients who were

subjects for the study, without whose co-operation this work would not have been possible.

I bow my head in respect before God Almighty.

Date: **Signature of the Candidate**

Place: **Dr.S.Murugarajan**

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ABBREVIATIONS

TSH	-	Thyroid stimulating hormone
FT3	-	Free tri-iodo thyronine
FT4	-	Free Tetra-iodo thyronine
AIT	-	Amiodarone induced Thyrotoxicosis
AIH	-	Amiodarone induced Hypothyroidism
CFDS	-	Colour flow Doppler Sonography
Auto Ab	-	Auto antibody
RAIU	-	Radio active Iodine uptake

INTRODUCTION

In view of Clinically relevant thyroid dysfunction is not uncommon during amiodarone therapy in previous studies and requires careful diagnosis and treatment,it was decided to conduct the cross sectional study of thyroid dysfunction among the patients undergoing Amiodarone therapy in the chengalpattu medical college and hospital.

AIMS AND OBJECTIVES

1. To find out the prevalence of Thyroid dysfunction among patient undergoing amiodarone therapy

2. To find out the associated risk factors with Thyroid dysfunction among patient undergoing Amiodarone therapy

REVIEW OF LITERATURE

AMIODARONE

Amiodarone is the potent anti-arrythmic agent. It is used in a variety of cardiac condition ranging from atrial fibrillation, supra ventricular tachycardia to Wolf Parkinson White syndrome and ventricular tachy arrythmias. When compared to other class of anti-arrhythmic drug, amiodarone is unique in nature, it appears to be very much useful in patients with significant left ventricular dysfunction, the reason being, it does not affect the ejection fraction much. Also its pro-arrhy thmogenic effect when compared to other class of Anti arrhythmic is comparatively low. Hence we can conclude its use is relatively safe in a wide variety of Patient.

The structural property of Amiodarone is very much similar to that endogenous thyroid Hormones. It is chemically a Benzo furanic derivative. Its structural formula is almost similar to that of T4. It contains large amount of Iodine by Nature. Approximately 37% Weight of Amiodarone is by Iodine weight[13]. Usually the maintenance Dose –daily ranged from 200-600 mg per day and this calculates to amount 7-21 mg lodide are available each day. This results in enormous rise in the urinary iodide excretion and serum lodide as well.

Actually the daily Iodide requirement for an average Men or Women comes around 150-200 mcg and if we consider the previous calculation there is

50-100 fold excess of Iodide added daily. In the human body, the Amiodarone is distributed in several tissues starting from liver, adipose tissue, lung and kidney, heart, skeletal muscle , thyroid and Brain and after distribution it is slowly released from there as well[15]

Amiodarone is slowly cleared from the body in such a way that its elimination half life around 50 days (+/-) 23 days[15]

Metabolism of Amiodarone involved three different pathways and the significant among them would be Dealkylation and 75% eliminated by Bile and feces.

Side effect of Amiodarone therapy:

There are various complication of Amiodarone therapy in the body. These include the following...

1. Corneal microdeposits
2. Anorexia, Nausea
3. Greyish discoloration
4. Liver function test - Abnormalities
5. Thyroid dysfuntion

   hypothyroidism/ hyper thyroidism
6. Ataxia, tremors, peripheral Neuropathy
7. Pulmonary fibrosis

8. Epididymitis
9. Conduction abnormalities
    a) Heart block
    b) Sinus bradycardia
10. Gynaecomastia

* Toxic hepatitis is rare.

AMIODARONE & THYROID

Thyroid hormone is secreted from thyroid gland. These hormones are atmost Importance not only for regular function of almost all body organs and also for In vitro development of fetus in particular central nervous system.

Thyroid hormonogenesis requires appropriate supply of iodide is crucial . Initial step involves entry of Iodine into the thyrocyte, the next step involves oxidation of Iodide. Further step involves organification process by which Iodine is attached to tyrosine residue of thyroglobulin molecule at the apical membrane of thyrocyte . Later coupling reaction takes place, in which monoiodo thyronine attached with another monoiodo thyronine to form DIT, like which Tri iodo (T3) and tetra iodo thyronine (T4) is synthesized. These are stored in **in the follicle and process of pinocytosis** Thyroid hormone is cleaved from thyroglobulin and secreted into the circulation. Thus in the circulation, T3 , T4 , rT3 are secreted from thyroid gland.

Thyroid gland is the only source of T4 incontrast to that 80% of T3 generated by Deiodination of T4 in the Peripheral tissue (predominantly) liver. T3 is the biologically active form but present in lower concentration in the blood.

Thyroid stimulating hormone (TSH) is the hormone, secreted from the pituitary in response to various stimuli. In turn, TSH, stimulate the thyroid

gland hormonogenesis and secretion. As a feedback control, the circulating T4 and T3 in turn inhibit TSH to maintain its concentration within normal limit.

Inside the tissue T4 enter and converted to T3 by deiodidinase enzyme activity and T3 acts at cellular Nuclear receptor. This further change the cellular transcription and translational and ultimately protein synthesis and thus celluar function.

Thyroid dysfunction:

Thyroid dysfunction is broadly divided into Hypothyroidism and Hyperthyroidism. Further more it is Subdivided into Subclinical hypothyroidism and Subclinical hyperthyroidism.

Name of the condition	**TSH**	**FT4**	**FT3**
Hypothyroidism	Elevated	Decreased	Normal/Decreased
Subclinical hypothyroidism	Elevated	Normal	Normal
Thyrotoxicosis	Decreased	Elevated	Elevated/high normal
Subclinical thyrotoxicosis	Decreased	Normal	Normal

Amiodarone And Thyroid

(A) Serum T4 and T3

Amiodarone inhibits Type I 5' deiodinase[18-20] which removes an atom of iodine from the outer ring of T4 to synthesis T3 in the peripheral tissues[18-20] ,especially liver .This result is Increased serum T4 concentration and decresed serum T3 concentration[9-12]

Amiodarone also inhibits at the cellular entry in preventing the thyroid hormone entry inside the cell[22] this mechanism also helps to understand the rise is T4 concentration in these subjects.

Thus we can understand that amiodarone does not affect the pharmaco distribution of T3 or its removal from plasma but its effect on T3 (via) different mechanism . we can conclude that serum T4 concentration will be at the upper limit of normal range . some times it may be rised slightly. This rise is initially 40% of pre treatment value , Used within 2months of amiodarone therapy and then reduce to upper limit of normal range.

The serum T4 concentration among patients on moderated dosage of oral amiodarone like 200 mg/day is usually towards the upper limit of reference range. With higher daily dosage of amiodarone the T4 concentration will also be elevated slightly above the reference range .

Serum T3 concentration initially fall during amiodarone therapy and returns back for lower reference range but some times will be below normal .

Free T4 and Free T3 :

Thyroid binding globulin level will not be influenced by amiodarone therapy and hence FT4, FT3 will be always parallel that of total T4 and total T3.

TSH LEVEL :

Amiodarone enters the pituitary gland and inhibits intracellular type 25'deiodinase activity. This results in the reduced 5' deiodination of T4 to T3 and intra pituitary T3 levels fall. As a result TSH levels will start rising in the serum. This rise is usually transient in nature as the FT4 rises and over come the less FT3 production. This rise In TSH will not cross usually beyond the 20 mu/l level.

Another hypothesis is desethylamiodarone (DEA) which is the metabolite of amiodarone binds to the intra pituitary T3 receptor which act like T3 ANTAGONIST .

On the other hand , suppression of TSH to lower level of reference range or even undetectable during treatment of amiodarone in patient which reflect subclinical episode of amiodarone induced destructive thyroiditis and thyrotoxicosis.

AMIODARONE INDUCED THYROTOXICOSIS

- It is otherwise labeled as AIT or thyrotoxicosis
- Much more common in male[67-71]
- Frequently occur in iodine deficient geographical condition[62-64]
- Studies failed to prove association between incidence of thyrotoxicosis and dosage of amiodarone[44]
- Usually acute in onset[69].
- May occur after several months even if drug is discontinued.
- Remissions are spontaneous in nature.
- Amiodarone has antiadrenergic property and so the usual clinical manifestation of thyrotoxicosis are absent and are detectable via laboratory parameters.

In general arrhythmias in particular, atrial arrhythmia recurrent in nature should arouse the onset of thyrotoxicosis among the patients under going chronic amiodarone therapy.

The pathogenesis of amiodarone induced thyrotoxicosis is complex and incompletely studied and only few studies completely analysed it in detail.

Excess thyroid hormone synthesis induced by the amiodarone iodine load is the main hypothesis. level of iodine inside the thyroid tissue is high and it has been studied by the x-ray flourescence and concluded iodine content is markedly rised among the amiodarone patients developed thyrotoxicosis ,irrespective of the presence of intrinsic abnormality in the thyroid gland if any[75]

It was found that iodine organification step is not affected in amiodarone induced thyrotoxocosis as evident by negative perchlorate discharge test[76,77]

Further more it was found that iodine content of thyroid tissue becomes normal after the patient becomes Euthyroid while recovering from Amiodarone induced thyrotoxicosis[69] when the patient already having thyroid disorder (as latent Grave's disease) and coming from geographical area of iodine deficient and this subgroup population when undergone excess iodine load as amiodarone treatment will usually associated with excessive thyroid hormone synthesis. It's also confirmed by the study of RAIU which showed elevated RAIU among these subgroup and also assay of serum IL – 6 concentration which is a surrogate marker of thyroid destructive process is usually normal stating that there is no active destructive process among this subgroup. This is Type -1 AIT occurs because of excessive hormonogenesis and this patients are not associated with TRab[79]

The other subgroup population develop hyperthyroidism among amiodarone therapy who have no abnormality in thyroid gland detected on clinical examination or ultrasonographically, usually due to subacute thyroid destructive process occurring within thyroid gland.The pathological examination of thyroid gland showed there is gland damage with follicular cell swelling,cytoplasmic vacuolization and onset of fibrosis.

It is proved by experimental study that RAIU activity very low and serum IL -6 concentration are markedly elevated[78] and further proved by the absence of vascularity observed in colour flow Doppler sonography (CFDS pattern).

If the destructive process is in progress the patient will land up in hypothyroidism in future[89].

Types of AIT :

condition	**Type I**	**Type II**
1. Goiter/prior Thyro Auto Ab	Often present	Usually absent
2. RAIU	Normal /increased	Low/decreased
3. Serum IL-6	Normal / slightly raised	Highly elevated
4. CFDS pattern	I-III	0

5. Response to Thionamide	+	-
6. Perchlorate response	+	-
7. Response to glucocorticoids	-	Yes (+)
8. Subsequent Hypothyroidism	-	+/-

In conclusion amiodarone induced thyrotoxicosis exist in two major form . Type 1 Amiodarone induced thyrotoxicosis usually occurs in a previous abnormal thyroid gland and is because of excessive hormonogenesis induced by excessive iodine exposure.

Type-2 Amiodarone induced Thyrotoxicosis usually occurs due to the destruction of thyroid gland and release of preformed thyroid hormones from the storage. Mixed forms may exist in reality. Still as a clinician, we should try to identify the forms if possible as both are important in the treatment decision.

DIAGNOSIS OF AMIODARONE INDUCED THYROTOXICOSIS :

Clinical features

- Usually not evident as amiodarone has anti- adrenergic effect
- Consider the possiblity if a patient develops recurrent arrhythmia, worsening angina who already taking therapy for longer time.

Biochemical parameters :

S.No.	Condition	TSH	FT4	FT3
1.	Subclinical thyrotoxicosis	0.03-0.35	High Normal/ raised	Low normal
2.	Thyrotoxicosis	< 0.03	Raised/ high normal	Raised/ normal

In conditions like sick euthyroid syndrome, a non-thyroidal illness, will mimick subclinical thyrotoxicosis but further investigation with serum sex hormone binding globulin or serum ferritin ,both are increased , indicating a marker of Increased intracellular FT3.

But if those above investigations are not feasible by an investigator then we can repeat the serum TSH ,FT4,FT3 after 6 weeks.

TREATMENT OF AMIODARONE INDUCED THYROTOXICOSIS:

a) Management of Throtoxicosis when Amiodarone can be stopped:

If amiodarone started for simple arrhythmia , which is not life threatening, then it can be replaced by another class of anti-arrythmic therapy.

Withdrawal of amiodarone needs monitoring :

i) Worsening of thyrotoxic symptoms should be anticipated as amiodarone drug and its metabolite have Anti-adrenergic property and its withdrawal have rebound phenomenon. ()

ii) **Patients with Type I thyrotoxicosis should be managed as follows** –

1) Withdrawal of amiodarone
2) Thiourea derivatives , carbimazole to block the excessive hormone synthesis . High doses of carbimazole 40-60 mg daily in divided doses should be given.
3) Propylthiouracil : usually started at the dose of 100-150 mg Q6th hourly , is also claimed to be very useful as it inhibits peripheral 5” deiodinase activity .

4) Potassium perchlorate :mechanism of action appears to block the Iodide uptake and results in reduced intrathyroidal iodine content. Usually started at the dosage – 0.5 g every 12^{th} hourly.

5) General considerations :

- All anti thyroid drugs need to continue for 3-6 months
- Watch for development of thyrotoxicosis ,as it has been documented that these patients are still hyperthyroid upto 6-9 month even after withdrawal of drug.
- In patients with Thyrotoxicosis type II , with No symptoms of hyperthyroidism , may be the candidate for stopping amiodarone therapy.
- Role of steroid in Type II thyrotoxicosis has been studied in detail and it should be considered in all patients with symptoms of thyrotoxicosis or worsening of arrhythmia.
- Oral prednisolone is the preferred drug , started at 40-60mg daily is used and tapered gradually over 3-6 months.
- Usually the recovery will be faster by the steroids
- Anti-thyroid drugs or Radio Iodine treatment are not effective in type II thyrotoxicosis.

- Mixed form of thyrotoxicosis also been reported in patients undergoing Amiodarone therapy. These patients are better referred to endocrinologist opinion at the earliest.

b) Management of Thyrotoxicosis when Amiodarone cannot be stopped:

Amiodarone cannot be stopped particularly because of following reasons:

i) Withdrawal may aggravate thyrotoxic symptoms

ii) Worsen the cardiac status of the patient

iii) Other modalities of treatment like ablation therapy, implantable defibrillator therapies may not be available or affordable by the patient.

iv) Alternative class of Anti-arrythmic have been failed previously before the initiation of amiodarone.

General concensus of treatment when Amiodarone cannot be stopped:

1) Continuation of amiodarone
2) Initiate Anti-thyroid drugs for Thyrotoxicosis
3) Radioactive Iodine may be useful
4) Maintain TSH concentration to recover to normal level
5) Surgical management options like Subtotal thyroidectomy or Near total thyroidectomy may be considered.
6) Plasmapheresis: may be useful in severe thyrotoxicosis , tried in various studies and found successful .

AMIODARONE INDUCED HYPOTHYROIDISM

a. Epidemiological studies revealed that Amiodarone Induced hypoythroidism is more common than Amiodarone induced thyrotoxicosis in Iodine sufficient areas[62].

b. In countries with low or intermediate iodine intake , the incidence of Amiodarone induced hypothyroidism is as low as 6% [62].

c. Elderly aged patient or female patients are higher risk in developing Amiodarone induced hypothyroidism.

d. Dosage of Amiodarone – whether daily or cumulative is not a risk factor for the development of hypothyroidism in contrast to Amiodarone induced thyrotoxicosis[64].

e. Presence of Autoimmune Thyroid disorder Is the predominant risk factor for the development of Amiodarone induced Hypothyroidism.

f. Female sex and presence of Autoimmune thyroid disease as evidenced by Anti-thyroid peroxidase antibodies or Anti-thyroglobulin antibodies constitute relative risk of 13.5% for the development of Hypothyroidism[25,44,62].

Pathogenesis :

Those patients who developing hypothyroidism are unable to escape from the Acute wolff-chaikoff effect after an Iodine load[125] and inability to perform normal thyroid hormone synthesis.

It is hypothesized that subtle defect already exist in thyroid hormone synthesis in these patients and they are not able to escape from the inhibitory effect of Iodine.

Amiodarone is a potent and persistent inhibitor of TSH-mediated cAMP production inside the cell.

Iodine also induce non-specific change in the thyroid follicle which favours the development of Hypothyroidism in Hashimoto's thyroiditis.

But incontrast , patients who don't have Thyroid Auto antibodies and who doesn't have thyroid abnormality will have minimal defect in the Iodine organification and thus defect in Thyroid hormone synthesis. These Amiodarone induced Hypothyroidism may spontaneously remit[120,123,127,128].

Clinical features :

a. Non specific symptoms like Lethargy
b. May have weight gain, apathy, coarse skin and other manifestations.

Diagnosis :

Condition	TSH	FT4	FT3
Hypothyroidism	>20 mU/L	Normal/ decreased	Normal / decreased
Subclinical Hypothyroidism	>4.3-20 mU/L	Normal/increased	Normal/increasing

Only lowT3 or FT3 are an unreliable indicator of Hypothyroidism as it can occur in Euthyroid patients undergoing Amiodarone therapy.

Treatment

Options include :

a. If possible stop Amiodarone treatment. Many patients recover within 4 months of withdrawal of amiodarone (). Recovery is much quicker if

coadministerd with potassium perchlorate – dosage regimen 1 g daily for 5 weeks.

b. Scientific reasons behind this potassium perchlorate administration and faster recovery is, potassium perchlorate will inhibit thyroid iodide uptake. As a result, Iodide from the thyroid gland will slowly come out and its intrathyroidal concentration falls subsequently, which in turn decreases or abolishes the inhibitory effect of iodide on hormone synthesis.
c. Potassium perchlorate causes side effects like Aplastic anemia, Gastro intestinal upset, rash, nephrotic syndrome .So it is not useful to recommend as universal treatment.
d. Final option is , continue amiodarone and add levothyroxine (T4); adjust the dose based on target TSH value.

Treatment of subclinical Hypothroidism :

a. Combination of moderately raised TSH(>4.3 – 20 mU/L) and high Normal or elevated FT4 concentration indicate subclinical hypothyroidism.

b. It is recommended to do thyroid auto-antibodies among this subgroup. If thyroid auto-antibodies are present start with thyroxine replacement.

c. If the patient doesn't have anti-thyroid antibodies, but have symptoms of hypothyroidism, it is worthwile to start Thyroxine Repalcement and follow up after 3 months and decide to continue further.

d. If the patient doesn't have anti-thyroid antibodies and no symptoms of hypothyroidism, do frequent follow up. Get Endocrinology opinion for further management.

MATERIALS AND METHODS

STUDY SETTING:

Patients attending cardiology out patient department in Chengalpattu Medical College and Hospital , Chengalpattu.

ETHICAL APPROVAL:

Institutional ethical committee approval was obtained to conduct the study

STUDY GROUP:

Patient with Heart disease on amiodarone therapy.

STUDY DESIGN :

Cross sectional study.

POPULATION TO BE STUDIED: 200

DURATION OF STUDY: 6 months (January 2016 – June 2016)

CONSENT :

All the patients were given written informed consent

INCLUSTION CRITERIA:

All patients with Heart disease on treatment with amiodarone therapy for more than 3 months are included in the study.

EXCLUSION CRITERIA:

1. Patient admitted for serious comorbid illness like Acute Myocardial infarction, sepsis, surgery,trauma,or any other life threatening illness.
2. Patient on amiodarone treatment for less than 3 months.
3. Patient not given consent for this study.

MATERIALS TO BE USED:

- Blood samples for Thyroid profile- TSH, FT4,FT3.

METHOD OF COLLECTION OF DATA:

SAMPLE SIZE:

200 cases will be studied.

PROTOCOL OF THE STUDY

For every case selected, detailed clinical history , symptoms and signs of Hypothyroidism , details of the drugs taken including Amiodarone dosage, duration and other cardiac drugs or any other drugs taken,indication for which those drugs prescribed, associated comorbid illnesses like Diabetes Mellitus, Systemic Hypertension, Hyperlipidemia, Bronchial Asthma, Chronic Kidney

disease, pre existing Thyroid disease, family History of Diabetes Mellitus, Hypertension, Thyroid Illness, geographical area from which patient residing, Dietary history including Iodine intake and results of routine investigations like Complete Blood count, Electrocardiography, X ray chest, Renal function test, Liver Function Test, Urine Routine examination, Blood sugar will be prospectively recorded in the semi-structured proforma. Also In all cases, blood for Thyroid Profile, TSH, FT3,FT4 will be taken by performing venipuncture and estimation will be done in Clinical Biochemical Laboratory, Biochemical Department at chengalpattu medical college hospital, Chengalpattu.

The following investigations were done to all patients included in the study:

1.Thyoid Profile

TSH, FT3, FT4

2.Renal Function test

Sugar

Urea

Creatinine

Electrolytes

3. Liver function test

Total bilirubin

Direct bilirubin

SGOT

SGPT

Alkaline Phosphatase

Total protein and Albumin

4. Complete blood count including Total count, differential count, ESR

5. Xray chest Posteroanterior view and Electrocardiography.

Estimation of Thyroid Hormones

Thyroid Profile estimation- In co-ordination and technical guidance with the Department of biochemistry, TSH, FT4, FT3 were measured by using chemiluminesence immune-assay and reports will be analysed by comparing with the standard reference value.

Reference values as Follows :

FT3 - 1.4 - 4.2 pg/ml

FT4 - 0.8 -2.0 ng/dl

TSH - 0.4 -4.2 microIU/ml

STATISTICAL TEST :

Risk Factor analysed with Chi-square test, Test of significance is done by P value.

Prevalence will be given by Percentage.

CONFLICT OF INTEREST:

NONE

RESULTS AND DISCUSSION

Population characteristics:

We conducted the study for the total number of 200 patients out of which 24 number of subjects were aged less than 20 years , 63 subjects were 20-40 years age group, 72 subject were 40-60 years age group, 35 subjects belongs to 60-80 years and 6 subjects were more than 80 years . Predominant number of patients belong to 40-60 years comes to around 36% of the study. Next major subgroup belongs to 20-40 years of age which accounts for 31.5% .

Table 1. Age category of the studied population

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid				
LESS THAN 20	24	12.0	12.0	12.0
20-40YEARS	63	31.5	31.5	43.5
40-60 YEARS	72	36.0	36.0	79.5
60-80 YEARS	35	17.5	17.5	97.0
>80 YEARS	6	3.0	3.0	100.0
Total	**200**	**100.0**	**100.0**	

Sex Distribution:

Among these 200 patients studied , male patients were 108 in number (54%) of the study and female subjects were 92 (46% of the study). Among these 108 male subjects, majority of them between 40-60 years (42/108, 38.9%), and 60-80 years (30/108, 27.8%), whereas more than 80 years accounts for 3.7% (4/108) and less than 20 years accounts for 4.6%(5/108). 20-40 years male population corresponds to 27 subject (25% of the total male population).

Among the 92 female , 36 subjects belong to the age group 20-40 years(39.1%), 30 subjects belong to 40-60 years (32.6%), 19 subjects belong to less than 20 years of age (20.7%), 5 belong to 60-80 years (5.4%) and 2 subject more than 80 years (2.2%).

Age – sex category was analysed using chi-square test and pearson chi square value is 28.88 and degree of freedom is 4 and p value comes around p-0.00 ($p< 0.05$) which is statistically significant.

Table 2. showing Sex of the population

Sex

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	108	54.0	54.0	54.0
	FEMALE	92	46.0	46.0	100.0
	Total	**200**	**100.0**	**100.0**	

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
sex * AGECAT	200	100.0%	0	.0%	200	100.0%

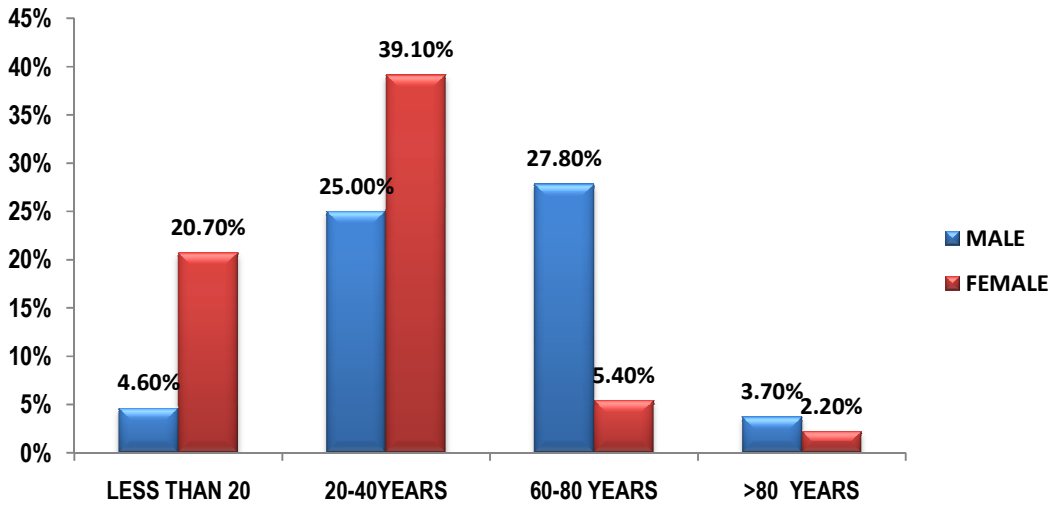
Table 3. Showing Age Sex Category of the population

SEX * AGECAT Crosstabulation

			AGECAT					
			LESS THAN 20	**20-40 YEARS**	**40-60 YEARS**	**60-80 YEARS**	**>80 YEARS**	**Total**
Sex	MALE	Count	5	27	42	30	4	108
		% within sex	4.6%	25.0%	38.9%	27.8%	3.7%	100.0%
	FEMALE	Count	19	36	30	5	2	92
		% within sex	20.7%	39.1%	32.6%	5.4%	2.2%	100.0%
Total		Count	24	63	72	35	6	200
		% within sex	12.0%	31.5%	36.0%	17.5%	3.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	**28.881[a]**	**4**	**.000**
Likelihood Ratio	31.217	4	.000
Linear-by-Linear Association	25.644	1	.000
N of Valid Cases	200		



Age sex category – Bar diagram (fig 1.)

Salt Intake :

Among the 200 patients we enrolled ,93/200 subjects were using Iodised salt comes to around 46.5% and 107/200 subjects were using deiodised salt by 53.5%

Table 4 showing Salt intake of the population

Salt

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	IODISED	93	46.5	46.5	46.5
	DEIODISED	107	53.5	53.5	100.0
	Total	200	100.0	100.0	

Amiodarone Dosage :

Out of 200 subjects studied 200 mg was taken by 141 (70.5%), 300mg was taken by 46 subjects comes to around 46% and 400 mg by 13 subjects, comes to around 6.5%.

Table 5. showing Dosage Frequency

Dosage

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid 200	141	70.5	70.5	70.5
300	46	23.0	23.0	93.5
400	13	6.5	6.5	100.0
Total	**200**	**100.0**	**100.0**	

Comorbidity :

Among 200 subjects studied Diabetes mellitus was present predominantly as a comorbid illness. 46 subjects were Diabetes Mellitus and corresponds to 23%. Hypertensive subjects were 26 corresponds to 13%. Both diabetes and hypertensive combined comorbid illness present in 13 subjects and this corresponds to 6.5%

On the otherhand, No comorbid illness was documented in 115 subjects comes to around 57.5%.

Table 6 showing Comorbidity Frequency

Comordidity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	DIABETES	46	23.0	23.0	23.0
	HYPERTENSION	26	13.0	13.0	36.0
	DIABETES& HT	13	6.5	6.5	42.5
	NO MORBIDITY	115	57.5	57.5	100.0
	Total	**200**	**100.0**	**100.0**	

Thyroid function analysis :

FT3:

Out of 200 population studied, normal FT3 comes to 180 subjects, increased in 14 subjects and decreased in 6 subjects which correspond to 90%, 7%, 3% respectively.

Table 7 Showing FT3 Frequency

FT3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NORMAL	180	90.0	90.0	90.0
	INCREASED	14	7.0	7.0	97.0
	DECREASED	6	3.0	3.0	100.0
	Total	**200**	**100.0**	**100.0**	

FT4 :

Out of 200 population studied, normal FT4 found in 168 subjects (84%), in 27 subject increased FT4 (13.5%), decreased in 5 subjects (2.5%).

Table 8 showing FT4 Frequency

FT4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NORMAL	168	84.0	84.0	84.0
	INCREASED	27	13.5	13.5	97.5
	DECREASED	5	2.5	2.5	100.0
	Total	**200**	**100.0**	**100.0**	

TSH :

Out of 200 subjects studied normal TSH were documented in 144 (72%), increased in 26 (13%), decreased in 30 subjects (15%).

Table 9 showing TSH frequency

TSH

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NORMAL	144	72.0	72.0	72.0
	INCREASED	26	13.0	13.0	85.0
	DECREASED	30	15.0	15.0	100.0
	Total	**200**	**100.0**	**100.0**	

Table 10 showing Prevalence of Thyroid Dysfunction

OUTCOME

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SUBCLINICAL HYPOTHYRIODISM	19	9.5	9.5	9.5
	CLINICAL HYPOTHYROIDISM	5	2.5	2.5	12.0
	THYROTOXICOSIS	17	8.5	8.5	20.5
	SUBCLINICAL THYROTOXICOSIS	13	6.5	6.5	27.0
	NORMAL	146	73.0	73.0	100.0
	Total	**200**	**100.0**	**100.0**	

Prevalence :

Based on the above observation , it was found that subclinical hypothyroidism present in 19 subjects (9.5%), clinical hypothyroidism present in 5 subjects (2.5%), thyrotoxicosis present in 17 subjects (8.5%), subclinical

thyrotoxicosis present in 13 subjects (6.5%) and normal subjects were 146 in number (73%).

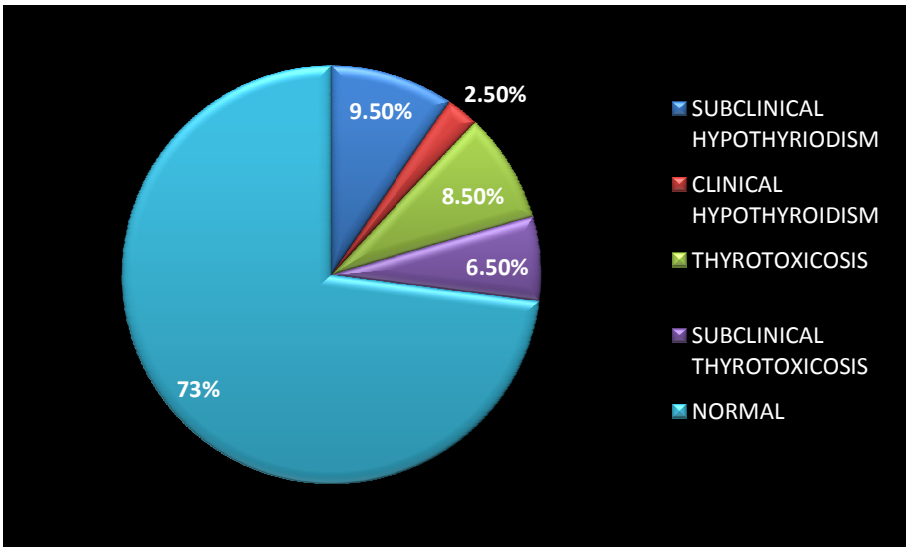


Fig 2 showing prevalence of thyroid dysfunction

Prevalence from our study as follows:

1. Suclinical Hypothyroidism 9.5%
2. Clinical Hypothyroidism 2.5%
3. Thyrotoxicosis 8.5%
4. Subclinical thyrotoxicosis 6.5%

Overall prevalence of thyroid dysfunction corresponds to 27% among the 200 population studied.

Overall incidence of Amiodarone induced Thyrotoxicosis ranging from 1 to 23% and Amiodarone induced Hypothyroidism ranging from 1% to 32% - published in various studies[11]

Symptom analysis :

The following symptoms are present in the patient ; palpitation present in 5 subjects (25%), weight loss present in 4 subjects (2%), Dyspnoea were present in 9 subjects(4.5%), lethargy present In 4 subjects (2%), and No symptoms in 178 subjects (89%).

So predominantly No symptoms, and if symptoms present Dyspnoea is the commonest symptom. When analysed with cross table, Dyspnoea present in both Hypothyroidism and hyperthyroidism. 2 subjects with hypothyroidism and 7 subjects with hyperthyroidism were present with Dyspnoea. Palpitation present in 5 subjects only with hyperthyroidism (100%). Lethargy in 4 subjects only with Hypothyroidism(100%). No symptoms present in 18 subjects with hypothyroidism(10.1%) and 14 subjects with Hyperthyroidism(7.9%). with chi-square test , pearson chi-square value is 1.199E2, with degree of freedom 8, with p value corresponds to 0.00($p<0.05$) which is statistically significant.

Table 11 FREQUENCY OF SYMPTOMS

clinical sympyoms

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	PALPITATION	5	2.5	2.5	2.5
	WT LOSS	4	2.0	2.0	4.5
	DYSPNOEA	9	4.5	4.5	9.0
	LETHARGY	4	2.0	2.0	11.0
	NORMAL	178	89.0	89.0	100.0
	Total	**200**	**100.0**	**100.0**	

Table 12 Symptoms cross tab analysis

CLINICAL SYMPYOMS * HYPOHYPER

Crosstab

	clinical sympyoms	HYPOHYPER			
		HYPOTHYROIDISM	**HYPERTHYROIDISM**	**NORMAL**	**Total**
PALPITATION	Count	0	5	0	5
	% within clinical sympyoms	.0%	100.0%	.0%	100.0%
WT LOSS	Count	0	4	0	4
	% within clinical sympyoms	.0%	100.0%	.0%	100.0%
DYSPNOEA	Count	2	7	0	9
	% within clinical sympyoms	22.2%	77.8%	.0%	100.0%
LETHARGY	Count	4	0	0	4
	% within clinical sympyoms	100.0%	.0%	.0%	100.0%
NORMAL	Count	18	14	146	178
	% within clinical sympyoms	10.1%	7.9%	82.0%	100.0%
Total	Count	24	30	146	200
	% within clinical sympyoms	12.0%	15.0%	73.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	**1.199E2[a]**	**8**	**.000**
Likelihood Ratio	86.406	8	.000
Linear-by-Linear Association	24.676	1	.000
N of Valid Cases	200		

a. 11 cells (73.3%) have expected count less than 5. The minimum expected count is .48.

Hawthorne et al, reported eight case of Amiodarone induced hypothyroidism with lethargy , Dry skin, Cold intolerance as the predominant symptoms[123]. In our study , lethargy is the predominant symptom with a Amiodarone induced hypothyroidism.

Martino E et al(ref) reported worsening tachyarrhythmia or angina is the common symptom in Amiodarone induced thyroxicosis in his study – Amiodarone , a common source of Iodine induced thyrotoxicosis[62].

Harjai KJ et al[11], in the study effects on amiodarone on thyroid function and **Iducia souza C et al[12],** in the study Amodarone induced thyroid

dysfunction, reported that mostly Amiodarone induced thyrotoxicosis is asymptomatic because of Amiodarone Antiadrenergic property.

In our study also out of 30 subjects with hyperthyroidism , 14 subjects were Asymptomatic and among symptomatic **dyspnoea is common presentation** which may be angina equivalent. P value corresponds to 0.00 ($p<0.05$) which is **statistically significant**.

Indication of Amiodarone :

Out of 200 subject studied Supraventricular tachycardia accounts for 77 patient; among 77 subjects 20 developed hyperthyroidism (26%), 9 developed hypothyroidism (11.7%), 63 person were dilated cardiomyopathy , out of which 10 developed hypothyroidism(15.9%), 9 developed hyperthyroidism (14.3%).

39 subjects were Atrial fibrillation , amomg which 5 developed Hypothyroidism (12.8%), none developed hyperthyroidism.

7 subjects were Wolf Parkinson White syndrome , out of which 1 develped hyperthyroism(14.3%), none developed Hypothyroidism.

14 subjects were ventricular tachycardia, out of which none developed thyroid dysfunction.

On chi-square test analysis, pearson chi-square value is 21.4, degree of freedom 8, p value corresponds to less than 0.006($p<0.05$) which is statistic ally significant.

Table 13 SHOWING INDICATION * HYPOHYPER cross tab analysis

Crosstab

	INDICATION	HYPOHYPER			Total
		HYPOTHYROIDISM	HYPERTHYROIDISM	NORMAL	
SVT	**Countn**	**9**	**20**	**48**	**77**
	% within indication	11.7%	26.0%	62.3%	100.0%
DCMP	Count	10	9	44	63
	% within indication	15.9%	14.3%	69.8%	100.0%
AF	Count	5	0	34	39
	% within indication	12.8%	.0%	87.2%	100.0%
WPW	Count	0	1	6	7
	% within indication	.0%	14.3%	85.7%	100.0%
VT	Count	0	0	14	14
	% within indication	.0%	.0%	100.0%	100.0%

Total	Count	24	30	146	200
	% within indication	12.0%	15.0%	73.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	**21.404[a]**	**8**	**.006**
Likelihood Ratio	30.527	8	.000
Linear-by-Linear Association	8.458	1	.004
N of Valid Cases	200		

a. 5 cells (33.3%) have expected count less than 5. The minimum expected count is .84.

From our study it can be informed that Amiodarone inferred thyroid dysfunction is common among supraventricular tachyarrhythmia when compared to ventricular tachyarrthia.

Co Morbid Illness Analysis :

Among 200 patient studied 24 patients developed hypothyroidism. Among these 24 subjects Diabetes mellitus alone present in 7 subjects. Diabetes and hypertension present in 3 subjects. No comorbid illness present in 14 subjects and nobody with hypertension developed Thyroid dysfunction.

Among 200 subjects 30 subjects were developed hyperthyroidism. 21 subjects were have no comorbid illness. 1 had Diabetes mellitus and hypertension . 8 subjects had Diabetes Mellitus alone. Patients with Hypertension have not developed hyperthyroidism.

So Diabetes Mellitus patient will appear to have more Risk factor for developing Thyroid dysfunction when compared to Hypertension. Statistical analysis shows P value p-0.04 ($P<0.05$) which is statistically significant.

COMORDIDITY * HYPOHYPER

Table 14 Comorbidity Crosstab Analysis

COMORDIDITY		HYPOHYPER			Total
		HYPOTHYROIDISM	HYPERTHYROIDISM	NORMAL	
DIABETES	Count	7	8	31	46
	% within comordidity	15.2%	17.4%	67.4%	100.0%
HYPERTENSION	Count	0	0	26	26
	% within comordidity	.0%	.0%	100.0%	100.0%
DIABETES& HT	Count	3	1	9	13
	% within comordidity	23.1%	7.7%	69.2%	100.0%
NO MORBIDITY	Count	14	21	80	115
	% within comordidity	12.2%	18.3%	69.6%	100.0%
Total	Count	24	30	146	200
	% within comordidity	12.0%	15.0%	73.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.208[a]	6	.040
Likelihood Ratio	19.688	6	.003
Linear-by-Linear Association	.244	1	.621
N of Valid Cases	200		

a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is 1.56.

Dosage Analysis :

Among 200 population studied 141 subjects were taking 200 mg. among 141 subjects 138 were normal , 1 developed hyperthyroidism(0.07%), 2 dveloped hypothyroidism (14%).

Among 200 population studied 46 subjects were taking 300 mg per day amiodarone . out of 46 , 7 were normal (15.2%). 20 developed (43.5%) hyperthyroidism, 19 developed (41.3 %) hypothyroidism. Among 200 subjects studied 13 subjects were taking Amiodarone in the dose 400 mg per day. Out of 13 1 found to be normal(7.7%). 9 were developed hyperthyroidism (69.2%), 3 developed hypothyroidism (23.1%).

Statistical analysis with chi-square analysis revealed p value is 0.00 ($p<0.05$) which is statistically significant.

DOSAGE * HYPOHYPER

Table 15 dosage Crosstab analysis

	DOSAGE	HYPOHYPER			Total
		HYPOTHYROIDISM	HYPERTHYROIDISM	NORMAL	
200	Count	2	1	138	141
	% within dosage	1.4%	.7%	97.9%	100.0%
300	Count	19	20	7	46
	% within dosage	41.3%	43.5%	15.2%	100.0%
400	Count	3	9	1	13
	% within dosage	23.1%	69.2%	7.7%	100.0%
Total	Count	24	30	146	200
	% within dosage	12.0%	15.0%	73.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	**1.575E2[a]**	**4**	**.000**
Likelihood Ratio	160.818	4	.000
Linear-by-Linear Association	103.709	1	.000
N of Valid Cases	200		

a. 2 cells (22.2%) have expected count less than 5. The minimum expected count is 1.56.

Duration analysis :

Among 200 patient were studied , 4 subjects taking 6 month duration, 2 subjects taking 8 month duration , 3 subjects taking 10 month duration, 75 subjects taking 12 month duration, 29 subjects taking 15 month duration , 3 subjects taking 16 moth duration, 39 subjects were taking 18 month duration, 1 subject taking 20 month duration, 29 subjects taking 24 months duration.

Out of 24 subjects with hypothyroidism predominant patient (10/24) were taking 12 month duration therapy. Among 30 subjects with hyperthyroidism, 15 patients were taking beyond 18 months duration.

Trip et al[44] observed that average duration of therapy before the occurrence of Amiodarone induced thyrotoxicois was about 3 years with probability rising after 18 months.

Marino et al[65] study, prospective analysis showed that Amiodarone induced thyrotoxicosis developed after 12 months.

Wiersinger et al[9] **and Braverman LE et al**[78] , studied in different periods and observed Amiodarone induced Hypothyroidism Was occurred very early on the treatment duration (3month – 12 month duration).

In our study also amiodaone induced hypothyroidism occurs predominantly within 15 months beyond which the prevalence decreases.

DURATION * HYPOHYPER

Table 16 Duration of Amiodarone Crosstab

DURATION		HYPOHYPER			Total
		HYPOTHYROIDISM	HYPERTHYROIDISM	NORMAL	
6	Count	1	0	6	7
	% within duration	14.3%	.0%	85.7%	100.0%
8	Count	0	0	2	2
	% within duration	.0%	.0%	100.0%	100.0%
10	Count	0	0	3	3
	% within duration	.0%	.0%	100.0%	100.0%
12	Count	10	8	57	75
	% within duration	13.3%	10.7%	76.0%	100.0%
14	Count	0	3	9	12
	% within duration	.0%	25.0%	75.0%	100.0%

15	Count	7	3	19	29
	% within duration	24.1%	10.3%	65.5%	100.0%
16	Count	0	1	2	3
	% within duration	.0%	33.3%	66.7%	100.0%
18	Count	5	8	26	39
	% within duration	12.8%	20.5%	66.7%	100.0%
20	Count	0	0	1	1
	% within duration	.0%	.0%	100.0%	100.0%
24	Count	1	7	21	29
	% within duration	3.4%	24.1%	72.4%	100.0%
Total	Count	24	30	146	200
	% within duration	12.0%	15.0%	73.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.504[a]	18	.557
Likelihood Ratio	20.304	18	.316
Linear-by-Linear Association	.039	1	.844
N of Valid Cases	200		

a. 21 cells (70.0%) have expected count less than 5. The minimum expected count is .12.

Sex Analysis :

Among 200 subjects studied , 108 subjects were male subjects . out of 108 male 16 developed hyperthyroidism, 8 developed hypothyroidism, among 92 female , 16 developed hypothyroidism , 14 developed hyperthyroidism.

Out of 24 hypothyroid patients 8 were male, 16 were female which appears to be in higher percentage but the value is 0.088 ($p < 0.05$) which is not significantly statistically.

SEX * HYPOHYPER

Table 17 Sex and Thyroid dysfunction Crosstab

			HYPOHYPER			Total
			HYPOTHYROIDISM	HYPERTHYROIDISM	NORMAL	
sex	MALE	Count	8	16	84	108
		% within sex	7.4%	14.8%	77.8%	100.0%
	FEMALE	Count	16	14	62	92
		% within sex	17.4%	15.2%	67.4%	100.0%
Total		Count	24	30	146	200
		% within sex	12.0%	15.0%	73.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.866[a]	2	.088
Likelihood Ratio	4.898	2	.086
Linear-by-Linear Association	4.292	1	.038
N of Valid Cases	200		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.04.

Salt intake analysis :

Among 200 subjects enrolled , 24 developed hypothyroidism. Out of 24 , 13 were in deiodised , 11 were in iodised salt intake category . Among 30 subjects who developed hyperthyroidism 25 subjects were consuming deiodised salt, 5 subjects were consuming iodised salt .

Statistical analysis in chi-square test showed, pearson chi-square value 13.0222, degree of freedom is 2 and p value is 0.001 ($p<0.05$) which is highly significant.

SALT * HYPOHYPER

Table 18 showing Iodine and thyroid dysfunction Crosstab

SALT		HYPOHYPER			Total
		HYPOTHYROIDISM	HYPERTHYROIDISM	NORMAL	
IODISED	Count	11	5	77	93
	% within salt	11.8%	5.4%	82.8%	100.0%
DEIODISED	Count	13	25	69	107
	% within salt	12.1%	23.4%	64.5%	100.0%
Total	Count	24	30	146	200
	% within salt	12.0%	15.0%	73.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.022[a]	2	.001
Likelihood Ratio	14.180	2	.001
Linear-by-Linear Association	3.596	1	.058
N of Valid Cases	200		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.16.

Martino et al study[62], Amiodarone induced thyrotoxicosis appears to occur more frequently in area with low iodine intake whereas Amiodarone induced Hypothyroidism occur more commonly in iodine significant areas.

In our study group, Amiodarone induced thyrotoxicosis occurs more frequently in deiodised salt intake subjects whereas Amiodarone induced hypothyroidism occurs equally but slightly higher in sufficient Iodine consuming individual.

Age Analysis :

Among 24 subjects developed hypothyroidism, patients were distributed uniformly from less than 20 years of age to 80 years of age. Predominant group involved is 40-60 years of age, 13 subjects in that age group developed hypothyroidism.

Among 30 subjects who developed hyperthyroidism, predominantly the patient age belong to 20-40 years and 40 -60 years developed hyperthyroidism corresponds to 11 subjects and 10 subjects respectively.

But the p value corresponds to 0.335 ($p > 0.05$) which Is statistically insignificant. So in our study amiodarone induced thyroid dysfunction will occur in all age group when compared to foreign studies.

AGECAT * HYPOHYPER

Table 19 age and thyroid sysfunction Crosstab

AGE CATEGORY		HYPOHYPER			Total
		HYPOTHYROIDISM	HYPERTHYROIDISM	NORMAL	
LESS THAN 20	Count	4	4	16	24
	% within AGECAT	16.7%	16.7%	66.7%	100.0%
20-40YEARS	Count	2	11	50	63
	% within AGECAT	3.2%	17.5%	79.4%	100.0%
40-60 YEARS	Count	13	10	49	72
	% within AGECAT	18.1%	13.9%	68.1%	100.0%
60-80 YEARS	Count	5	4	26	35
	% within AGECAT	14.3%	11.4%	74.3%	100.0%
>80 YEARS	Count	0	1	5	6

	% within AGECAT	.0%	16.7%	83.3%	100.0%
Total	Count	24	30	146	200
	% within AGECAT	12.0%	15.0%	73.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.082[a]	8	.335
Likelihood Ratio	11.169	8	.192
Linear-by-Linear Association	.040	1	.841
N of Valid Cases	200		

a. 6 cells (40.0%) have expected count less than 5. The minimum expected count is .72.

TSH * HYPOHYPER

Table 20 TSH Crosstab

			HYPOHYPER			
			HYPOTHYROIDISM	**HYPERTHYROIDISM**	**NORMAL**	**Total**
TSH	NORMAL	Count	0	0	144	144
		% within TSH	.0%	.0%	100.0%	100.0%
	INCREASED	Count	24	0	2	26
		% within TSH	92.3%	.0%	7.7%	100.0%
	DECREASED	Count	0	30	0	30
		% within TSH	.0%	100.0%	.0%	100.0%
Total		Count	24	30	146	200
		% within TSH	12.0%	15.0%	73.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	**3.821E2[a]**	**4**	**.000**
Likelihood Ratio	293.394	4	.000
Linear-by-Linear Association	105.883	1	.000
N of Valid Cases	200		

a. 4 cells (44.4%) have expected count less than 5. The minimum expected count is 3.12.

FT4 * HYPOHYPER

Table 21 FT4 Crosstab

			HYPOHYPER			
			HYPOTHYROIDISM	**HYPERTHYROIDISM**	**NORMAL**	**Total**
fT4	NORMAL	Count	19	3	146	168
		% within fT4	11.3%	1.8%	86.9%	100.0%
	INCREASED	Count	0	27	0	27
		% within fT4	.0%	100.0%	.0%	100.0%
	DECREASED	Count	5	0	0	5
		% within fT4	100.0%	.0%	.0%	100.0%
Total		Count	24	30	146	200
		% within fT4	12.0%	15.0%	73.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.137E2[a]	4	.000
Likelihood Ratio	159.537	4	.000
Linear-by-Linear Association	55.002	1	.000
N of Valid Cases	200		

a. 5 cells (55.6%) have expected count less than 5. The minimum expected count is .60.

FT3 * HYPOHYPER

Table 22 FT3 Crosstab

			HYPOHYPER			
			HYPOTHYROIDISM	**HYPERTHYROIDISM**	**NORMAL**	**Total**
FT3	NORMAL	Count	16	18	146	180
		% within fT3	8.9%	10.0%	81.1%	100.0%
	INCREASED	Count	2	12	0	14
		% within fT3	14.3%	85.7%	.0%	100.0%
	DECREASED	Count	6	0	0	6
		% within fT3	100.0%	.0%	.0%	100.0%
Total		Count	24	30	146	200
		% within fT3	12.0%	15.0%	73.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	**1.070E2[a]**	**4**	**.000**
Likelihood Ratio	74.537	4	.000
Linear-by-Linear Association	53.621	1	.000
N of Valid Cases	200		

a. 5 cells (55.6%) have expected count less than 5. The minimum expected count is .72.

Table 23 showing the Mean value of FT3, FT4, TSH among the amiodarone patient- with normal thyroid function

Descriptives

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
FT3 NORMAL	146	2.6768	.82909	.06862	2.5412	2.8125	1.30	4.28
FT4 NORMAL	146	1.410	.4397	.0364	1.338	1.482	.8	2.2
TSH NORMAL	146	2.4856	1.15923	.09594	2.2960	2.6752	.40	4.61

CONCLUSION

Amiodarone induced thyroid dysfunction is common in our study group Prevalence from our study as follows:

1. Subclinical Hypothyroidism 9.5%
2. Clinical Hypothyroidism 2.5%
3. Thyrotoxicosis 8.5%
4. Subclinical thyrotoxicosis 6.5%

Overall prevalence of thyroid dysfunction corresponds to 27% among the 200 population studied.

1. Amiodarone induced thyrotoxicosis occurs predominantly in low iodine intake individual
2. Diabetes Mellitus when coexist with Amiodarone treated patients Thyroid dysfunction is more common
3. Thyroid dysfunction is common among supraventricular tacharrhythmia with amiodarone compared to ventricular tachyarrhythmia with amiodarone.
4. Dyspnoea is a common clinical symptom among thyroid dysfunction patient but asymptomatic patients are even higher suggesting to do screening thyroid function routinely in all individual.

5. As Amiodarone dosage increases the chance of thyroid dysfunction increases.
6. Duration of Amiodarone therapy in our study includes 24 months and hypothyroidism occurs predominantly within 15 months and hyperthyroidism occurs predominantly after 15 months.
7. Hypothyroidism is more common in female sex, whereas hyperthyroidism occurs almost equally in both sexes in our study.
8. Age is not a significant risk factor in the development of thyroid dysfunction although predominant subjects with hypothyroidism occurs in 40-60 years and predominant subjects with hyperthyroidism ocuurs in 20-60 years.
9. It is recommended to do thyroid function test in patients undergoing amiodarone therapy more than 3 months duration and follow up them if warrented.
10. In our study all the patient with hypothyroidism were started on levothyroxine treatment and all hyperthyroidism were started on antithyroid drugs and all of them referred to get Endocrinology opinion for further management.

Thyroid dysfunction is very common in our part of country; since our geographical area is mixed with iodine deficient and iodine sufficient population, it is very important to do thyroid function test among patient undergoing chronic Amiodarone Therapy; still larger studies are needed in this area as it is first study in our population ,to become it generalised.

PROFORMA

1.NAME :

2.AGE :

3.SEX :

4.OCCUPATION :

5.ADDRESS :

6.DIAGNOSIS :

7.DURATION OF AMIODARONE THERAPY :

8.DOSAGE OF AMIODARONE :

9. DETAILS OF OTHER DRUGS :

10. COMPLAINTS IF ANY :

11.PRE-EXISTING ILLNESS : THYROID/DIABETES MELLITUS/HYPERTENSION/ ANY OTHER ILLNESS.

12.PERSONAL HABITS : SMOKING / ALCOHOL / TOBACCO CHEWING/ ANY OTHER

13.DIETARY DETAILS : IODINISED SALT/ ANY DIET AFFECTING THYROID FUNCTION ETC.,

14. OTHER RELEVANT DETAILS :

15.THYROID PROFILE RESULT :

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PATIENT CONSENT FORM

STUDY DETAIL:

"A STUDY ON THYROID DYSFUNCTION AMONG PATIENT UNDERGOING AMIODARONE THERAPY IN TERTIARY CARE CENTRE"

STUDY CENTER:

CHENGALPET MEDICAL COLLEGE & HOSPITAL, CHENGALPET.

PATIENT NAME: **PATIENT AGE:**
IDENTIFICATION NUMBER:

I confirm that I have understood the purpose of procedure for the above study.
I have the opportunity to ask the question and all my questions and doubts have been answered to my satisfaction.
I understand that my participation in the study is voluntary and that I am free to withdraw at anytime without giving any reasons, without my legal rights being affected.
I understand that investigator, regulatory authorities and the ethics committee will not need my permission to look at my health records both in respect to the current study and any further research that may be conducted in relation to it, even if withdraw from the study, I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from the study.
I agree to take part in the above study and to comply with the instructions given during the study and faithfully cooperative with the study team and to immediately inform the study staff if I suffer from any deterioration in my health or wellbeing or any unexpected or unusual symptoms.
I hereby give consent to participate in this study.
I hereby give permission to undergo complete clinical examination and diagnostic test.

Signature/Thumb impression: **Place:**
Date:
Patient name and address:

Signature of the investigator: **Place:**
Date:
Study investigator's name:

<u>சுயஒப்புதல்படிவம்</u>

ஆய்வுசெய்யப்படும்தலைப்பு : "A STUDY ON THYROID DYSFUNCTION AMONG PATIENT UNDERGOING AMIODARONE THERAPY IN TERTIARY CARE CENTRE"

ஆய்வுசெய்யப்படும்இடம்:

பங்குபெறுபவரின்பெயர்:

பங்குபெறுபவரின்வயது: **பங்குபெறுபவரின்எண் :**

மேலேகுறிப்பிட்டுள்ளமருத்துவஆய்வின்விவரங்கள்எனக்குவிளக்கபட்டுள்ளது. நான்இவ்வாய்வில்தன்னிச்சையாகபங்கேற்கின்றேன்.எந்தகாரணத்தினாலோ, எந்தசட்டசிக்கலுக்கும்உட்படாமல்நான்இவ்வாய்வில்இருந்துவிலகிக்கொள்ள லாம்என்றும்அறிந்துகொண்டேன்.

இந்தஆய்வுசம்பந்தமாகவோ,
இதைசார்ந்துமேலும்ஆய்வுமேற்கொள்ளும்போதும்இந்தஆய்வில்பங்குபெறும்ம ருத்துவர்,
என்னுடையமருத்துவஅறிக்கைகளைபார்ப்பதற்குஎன்அனுமதிதேவைஇல்லைஎ னஅறிந்துகொள்கிறேன்.
இந்தஆய்வின்மூலம்கிடைக்கும்தகவலையோ,முடிவையோபயன்படுத்திக்கொள் ளமறுக்கமாட்டேன்.

இந்தஆய்வில்பங்குகொள்ளஒப்புக்கொள்கிறேன்.இந்தஆய்வைமேற்கொள்ளும் மருத்துவஅணிக்குஉண்மையுடன்இருப்பேன்என்றுஉறுதியளிக்கிறேன்.

பங்கேற்பவரின்கையொப்பம்: **சாட்சியாளரின்கையொப்பம்**

இடம்: **இடம்:**

தேதி: **தேதி :**

பங்கேற்பவரின்பெயர்மற்றும்விலாசம்:

ஆய்வாளரின்கையொப்பம்:

இடம்: **தேதி:**

MASTER CHART															
sno	age	sex	salt	duration months	dosage	comordidity	indication	clinical sympyoms	FT3	fT3	fT4	fT4	TSH	TSH	OUTCOME
1	54	M	I	12 MON	200	DM	SVT	NIL	1.83	N	1.90	N	3.23	N	NORMAL
2	60	M	D	18 MON	200	HT	DCMP	NIL	3.99	N	1.97	N	3.80	N	NORMAL
3	45	F	D	12 MON	200	NIL	SVT	NIL	1.67	N	0.86	N	3.78	N	NORMAL
4	35	F	D	18 MON	300	NIL	SVT	NIL	4.20	N	2.10	N	9.29	I	HYPO-SUB
5	87	F	D	15 MON	300	DM	SVT	PALPITATION	2.30	N	4.50	I	0.02	D	THYROTOXICOSIS
6	63	F	I	15 MON	400	DM	DCMP	NIL	3.99	N	1.99	N	8.59	I	HYPO-SUB
7	50	F	D	12 MON	200	NIL	AF	NIL	2.40	N	1.40	N	3.24	N	NORMAL
8	53	F	D	12 MON	300	NIL	AF	NIL	3.90	N	1.80	N	6.29	I	HYPO-SUB
9	50	F	I	14 MON	200	HT	DCMP	NIL	1.50	N	1.99	N	3.23	N	NORMAL
10	50	M	I	12 MON	200	DM	SVT	NIL	4.10	N	1.90	N	3.67	N	NORMAL
11	50	F	I	15 MON	300	NIL	DCMP	NIL	1.42	N	2.00	N	15.75	I	HYPO-SUB
12	43	M	D	24 MON	200	DM	DCMP	NIL	1.50	N	1.90	N	3.80	N	NORMAL
13	45	F	I	12 MON	300	DM	DCMP	DYSPNOEA	0.70	D	0.60	D	28.76	I	HYPO-CLI
14	38	M	I	14 MON	300	NIL	SVT	NIL	3.00	N	2.90	I	0.20	D	HYPER
15	30	M	I	6 MON	200	DM	DCMP	NIL	3.66	N	2.00	N	1.50	N	NORMAL
16	28	M	D	12 MON	200	NIL	SVT	NIL	1.90	N	1.20	N	5.47	I	HYPO-SUB
17	65	M	I	12 MON	300	NIL	SVT	NIL	4.60	I	1.90	N	5.46	I	HYPO-SUB
18	72	M	D	14 MON	300	NIL	SVT	DYSPNOEA	7.92	I	5.90	I	0.01	D	THYROTOXICOSIS
19	45	M	I	10 MON	200	NIL	AF	NIL	4.00	N	1.90	N	2.19	N	NORMAL
20	45	M	D	14 MON	200	NIL	SVT	NIL	2.04	N	1.60	N	2.31	N	NORMAL
21	65	M	I	12 MON	300	DM	DCMP	NIL	0.57	D	1.96	N	8.31	I	HYPO-SUB
22	66	M	D	18 MON	400	NIL	DCMP	NIL	4.00	N	7.30	I	0.30	D	SUBCLINI THYROTOX
23	24	M	I	12 MON	200	NIL	SVT	NIL	3.08	N	1.20	N	1.16	N	NORMAL
24	28	M	D	12 MON	200	NIL	AF	NIL	1.76	N	1.30	N	3.24	N	NORMAL
25	45	M	D	24 MON	200	DM	DCMP	NIL	1.80	N	1.50	N	4.21	N	NORMAL
26	62	M	I	18 MON	300	DM	DCMP	DYSPNOEA	0.40	D	0.00	D	23.83	I	HYPO-CLI
27	18	M	I	18 MON	300	NIL	WPW	DYSPNOEA	7.24	I	9.00	I	0.02	D	SUBCLINI THYROTOX
28	48	M	D	16 MON	200	NIL	WPW	NIL	2.60	N	1.00	N	0.89	N	NORMAL
29	57	M	I	6 MON	200	DM	DCMP	LETHARGY	1.37	N	2.10	N	12.82	I	HYPO-SUB
30	67	M	I	24 MON	200	DM	DCMP	NIL	2.30	N	1.90	N	1.74	N	NORMAL
31	32	M	I	18 MON	300	NIL	SVT	palpitation	7.38	I	6.90	I	0.01	D	THYROTOXICOSIS
32	58	M	I	12 MON	200	NIL	DCMP	NIL	2.90	N	1.20	N	2.65	N	NORMAL
33	61	M	D	12 MON	200	NIL	DCMP	NIL	2.67	N	1.55	N	3.42	N	NORMAL
34	60	F	D	18 MON	300	NIL	SVT	NIL	4.56	N	1.99	N	7.65	I	HYPO-SUB
35	25	F	D	18 MON	300	NIL	SVT	palpitation	9.39	I	9.40	I	0.07	D	SUBCLINI THYROTOX
36	66	F	I	18 MON	200	HT	DCMP	NIL	3.30	N	2.20	N	3.90	N	NORMAL
37	45	F	D	12 MON	200	HT	AF	NIL	2.98	N	1.22	N	0.74	N	NORMAL
38	60	F	I	24 MON	200	HT	WPW	NIL	3.13	N	1.76	N	0.89	N	NORMAL
39	38	F	D	24 MON	400	NIL	SVT	NIL	1.43	N	7.40	I	0.04	D	SUBCLINI THYROTOX
40	20	F	I	12 MON	200	NIL	SVT	NIL	2.89	N	1.23	N	2.30	N	NORMAL
41	60	F	D	15 MON	300	DM,HT	DCMP	LETHARGY	0.80	D	0.00	D	21.36	I	HYPO-CLI
42	32	F	D	12 MON	200	NIL	SVT	NIL	3.80	N	0.95	N	1.91	N	NORMAL

43	39	F	I	15 MON	200	NIL	SVT	NIL	2.20	N	1.89	N	1.90	N	NORMAL
44	40	F	D	12 MON	200	NIL	DCMP	NIL	2.67	N	1.11	N	2.18	N	NORMAL
45	35	F	D	15 MON	200	NIL	AF	NIL	1.79	N	1.89	N	0.78	N	NORMAL
46	55	F	D	15 MON	300	NIL	SVT	LETHARGY	0.70	D	0.00	D	24.49	I	HYPO-CLI
47	22	F	D	24 MON	200	NIL	SVT	NIL	3.22	N	1.33	N	3.03	N	NORMAL
48	19	F	D	15 MON	200	NIL	SVT	NIL	1.70	N	1.78	N	3.43	N	NORMAL
49	32	F	D	15 MON	200	NIL	SVT	NIL	1.43	N	0.90	N	3.87	N	NORMAL
50	24	F	I	12 MON	200	NIL	SVT	NIL	2.98	N	1.01	N	2.53	N	NORMAL
51	27	F	I	24 MON	200	NIL	SVT	NIL	3.13	N	0.91	N	3.13	N	NORMAL
52	28	F	D	12 MON	400	NIL	SVT	NIL	1.50	N	6.90	I	0.02	D	THYROTOXICOSIS
53	32	F	D	18 MON	200	NIL	WPW	NIL	2.20	N	1.22	N	1.42	N	NORMAL
54	34	F	D	12 MON	200	NIL	AF	NIL	3.10	N	0.98	N	0.90	N	NORMAL
55	19	F	I	18 MON	200	NIL	AF	NIL	2.27	N	1.45	N	4.20	N	NORMAL
56	29	F	D	12 MON	300	NIL	SVT	NIL	1.90	N	9.20	I	0.09	D	SUBCLINI THYROTOX
57	19	F	D	18 MON	200	NIL	WPW	NIL	3.12	N	0.99	N	1.68	N	NORMAL
58	60	M	I	12 MON	300	DM	DCMP	NIL	4.00	N	1.20	N	11.35	I	HYPO-SUB
59	85	M	I	12 MON	200	DM	DCMP	NIL	2.21	N	1.11	N	3.95	N	NORMAL
60	49	M	D	8 MON	200	DM	WPW	NIL	1.97	N	1.83	N	1.49	N	NORMAL
61	30	M	D	15 MON	200	NIL	WPW	NIL	1.84	N	1.76	N	1.78	N	NORMAL
62	78	M	D	24 MON	400	DM,HT	DCMP	WT LOSS	20.43	I	6.70	I	0.01	D	THYROTOXICOSIS
63	18	M	I	18 MON	200	NIL	SVT	NIL	1.89	N	1.78	N	3.60	N	NORMAL
64	46	M	D	18 MON	200	HT	VT	NIL	1.90	N	1.10	N	4.61	I	NORMAL
65	88	M	D	18 MON	200	HT	VT	NIL	3.01	N	0.85	N	4.14	N	NORMAL
66	40	M	I	12 MON	200	HT	SVT	NIL	2.06	N	0.92	N	1.01	N	NORMAL
67	49	M	D	24 MON	200	HT	VT	NIL	2.97	N	0.88	N	2.46	N	NORMAL
68	48	M	D	12 MON	300	DM	DCMP	NIL	1.80	N	7.30	I	0.04	D	SUBCLINI THYROTOX
69	80	M	D	12 MON	200	DM,HT	DCMP	NIL	1.40	N	1.20	N	1.87	N	NORMAL
70	37	M	I	15 MON	200	NIL	AF	NIL	1.60	N	0.93	N	3.07	N	NORMAL
71	41	M	I	24 MON	200	NIL	VT	NIL	3.97	N	0.82	N	1.78	N	NORMAL
72	46	M	I	12 MON	200	DM	DCMP	NIL	2.10	N	1.92	N	1.89	N	NORMAL
73	70	M	I	24 MON	200	HT	DCMP	NIL	4.28	N	1.45	N	1.98	N	NORMAL
74	19	F	I	20 MON	200	NIL	DCMP	NIL	2.26	N	2.00	N	2.15	N	NORMAL
75	56	M	D	12 MON	200	NIL	VT	NIL	3.13	N	0.90	N	1.79	N	NORMAL
76	34	M	D	12 MON	200	NIL	SVT	NIL	1.96	N	0.83	N	1.44	N	NORMAL
77	46	F	D	24 MON	300	DM	SVT	WT LOSS	1.80	N	8.35	I	0.02	D	THYROTOXICOSIS
78	19	F	D	12 MON	300	NIL	SVT	NIL	4.10	N	1.99	N	7.03	I	HYPO-SUB
79	21	F	D	15 MON	200	NIL	AF	NIL	2.89	N	1.32	N	1.22	N	NORMAL
80	18	F	I	18 MON	200	NIL	AF	NIL	1.94	N	1.99	N	1.39	N	NORMAL
81	18	F	D	12 MON	300	NIL	SVT	palpitation	8.32	I	6.90	I	0.01	D	THYROTOXICOSIS
82	18	F	D	15 MON	300	NIL	SVT	NIL	2.87	I	2.10	N	8.89	I	HYPO-SUB
83	20	F	I	15 MON	200	NIL	SVT	NIL	1.77	N	0.92	N	0.40	N	NORMAL
84	62	M	I	18 MON	200	DM,HT	DCMP	NIL	3.56	N	1.45	N	3.83	N	NORMAL
85	18	M	D	18 MON	300	NIL	SVT	NIL	1.70	N	9.30	I	0.02	D	HYPER
86	48	M	I	16 MON	200	HT	DCMP	NIL	3.12	N	1.34	N	1.45	N	NORMAL
87	57	M	I	6 MON	200	HT	VT	NIL	1.87	N	2.23	N	2.82	N	NORMAL

88	67	M	I	24 MON	200	HT	DCMP	NIL	3.84	N	2.10	N	1.74	N	NORMAL
89	32	M	D	18 MON	300	NIL	SVT	NIL	2.70	N	10.40	I	0.05	D	SUBCLINI THYROTOX
90	58	M	I	12 MON	200	DM,HT	VT	NIL	1.52	N	1.94	N	2.65	N	NORMAL
91	61	M	D	12 MON	200	DM,HT	VT	NIL	2.67	N	1.11	N	3.42	N	NORMAL
92	60	F	D	18 MON	300	NIL	DCMP	NIL	4.15	N	1.89	N	7.65	I	HYPO-SUB
93	25	F	I	18 MON	200	NIL	AF	NIL	1.93	N	0.84	N	0.74	N	NORMAL
94	66	F	I	18 MON	200	HT	VT	NIL	3.34	N	1.22	N	4.24	N	NORMAL
95	45	F	D	12 MON	300	DM	DCMP	NIL	3.80	N	9.43	I	0.07	D	SUBCLINI THYROTOX
96	60	F	I	24 MON	200	NIL	VT	NIL	1.63	N	1.21	N	0.89	N	NORMAL
97	38	F	D	24 MON	200	NIL	SVT	NIL	1.89	N	0.91	N	4.24	N	NORMAL
98	20	F	I	12 MON	200	NIL	AF	NIL	1.64	N	1.82	N	4.03	N	NORMAL
99	60	F	D	15 MON	300	DM,HT	AF	LETHARGY	0.98	D	0.00	D	21.36	I	HYPO-CLI
100	45	F	D	12 MON	200	DM	AF	NIL	2.50	N	1.80	N	3.90	N	NORMAL
101	35	F	D	18 MON	300	NIL	SVT	NIL	2.60	N	9.60	I	0.09	D	SUBCLINI THYROTOX
102	87	F	D	15 MON	200	DM	VT	NIL	3.17	N	1.34	N	1.65	N	NORMAL
103	63	F	I	15 MON	200	DM	DCMP	NIL	1.78	N	1.90	N	1.56	N	NORMAL
104	50	F	D	12 MON	200	HT	VT	NIL	3.34	N	0.97	N	3.24	N	NORMAL
105	53	F	D	12 MON	300	DM	AF	NIL	3.30	N	2.10	N	6.29	I	HYPO-SUB
106	50	F	I	14 MON	200	HT		NIL	2.09	N	1.02	N	3.89	N	NORMAL
107	50	M	I	12 MON	200	NIL	SVT	NIL	2.10	N	1.78	N	3.50	N	NORMAL
108	50	F	I	15 MON	300	NIL	AF	NIL	1.42	N	1.79	N	15.75	I	HYPO-SUB
109	43	M	D	24 MON	200	DM	VT	NIL	3.28	N	0.99	N	3.00	N	NORMAL
110	45	F	I	12 MON	200	HT	AF	NIL	3.24	N	1.12	N	1.06	N	NORMAL
111	38	M	I	14 MON	200	NIL	VT	NIL	2.25	N	1.91	N	1.14	N	NORMAL
112	30	M	I	6 MON	200	NIL	SVT	NIL	3.66	N	1.11	N	1.50	N	NORMAL
113	28	M	D	12 MON	200	NIL	SVT	NIL	1.30	N	1.79	N	1.90	N	NORMAL
114	65	M	D	12 MON	200	DM	DCMP	NIL	2.48	N	1.87	N	4.56	N	NORMAL
115	72	M	D	14 MON	200	DM,HT	DCMP	NIL	3.92	N	1.55	N	2.94	N	NORMAL
116	28	M	D	12 MON	200	NIL	SVT	NIL	2.89	N	1.23	N	2.47	N	NORMAL
117	65	M	I	12 MON	200	DM	DCMP	NIL	1.67	N	1.86	N	2.30	N	NORMAL
118	72	M	I	14 MON	200	DM,HT	DCMP	NIL	1.69	N	1.89	N	3.40	N	NORMAL
119	45	M	I	10 MON	200	NIL	SVT	NIL	3.87	N	0.93	N	2.19	N	NORMAL
120	45	M	D	14 MON	200	NIL	AF	NIL	2.04	N	1.90	N	2.31	N	NORMAL
121	65	M	I	12 MON	200	DM	SVT	NIL	1.57	N	1.79	N	4.21	N	NORMAL
122	66	M	D	18 MON	200	DM,HT	DCMP	NIL	2.73	N	0.83	N	2.53	N	NORMAL
123	24	M	I	12 MON	200	NIL	SVT	NIL	3.08	N	1.11	N	1.16	N	NORMAL
124	28	M	D	12 MON	200	NIL	SVT	NIL	1.76	N	8.20	I	0.04	D	SUBCLINI THYROTOX
125	45	M	D	24 MON	200	NIL	AF	NIL	1.67	N	2.10	N	4.21	N	NORMAL
126	62	M	I	18 MON	200	HT	DCMP	NIL	2.24	N	1.99	N	3.83	N	NORMAL
127	18	M	I	18 MON	300	NIL	SVT	NIL	3.33	N	1.23	N	2.15	N	NORMAL
128	48	M	D	16 MON	300	NIL	SVT	DYSPNOEA	2.60	N	9.20	I	0.08	D	SUBCLINI THYROTOX
129	57	M	I	6 MON	200	DM	DCMP	NIL	1.67	N	1.11	N	2.82	N	NORMAL
130	67	M	I	24 MON	200	DM	SVT	NIL	3.85	N	2.01	N	1.74	N	NORMAL
131	32	M	I	18 MON	200	NIL	AF	NIL	1.56	N	2.10	N	3.86	N	NORMAL
132	58	M	I	12 MON	200	DM	SVT	NIL	1.98	N	1.23	N	2.65	N	NORMAL

133	61	M	D	12 MON	200	DM	DCMP	NIL	2.67	N	1.22	N	3.42	N	NORMAL
134	60	F	D	18 MON	300	DM	DCMP	NIL	3.90	N	5.30	I	0.20	D	SUBCLINI THYROTOX
135	25	F	I	18 MON	200	NIL	SVT	NIL	3.39	N	1.45	N	0.74	N	NORMAL
136	66	F	I	18 MON	200	DM	DCMP	NIL	3.12	N	0.89	N	3.24	N	NORMAL
137	45	F	D	12 MON	300	NIL	DCMP	NIL	1.83	N	1.05	N	0.74	N	NORMAL
138	60	F	I	24 MON	200	DM	DCMP	NIL	2.15	N	1.98	N	0.89	N	NORMAL
139	38	F	D	24 MON	200	NIL	SVT	NIL	2.74	N	0.88	N	4.24	N	NORMAL
140	20	F	I	12 MON	200	NIL	SVT	NIL	4.24	N	0.91	N	4.35	N	NORMAL
141	60	F	D	15 MON	300	DM	DCMP	DYSPNOEA	6.20	N	14.11	I	0.02	D	THYROTOXICOSIS
142	32	F	D	12 MON	200	NIL	AF	NIL	2.80	N	1.77	N	1.91	N	NORMAL
143	39	F	D	15 MON	200	NIL	DCMP	NIL	3.73	N	0.88	N	1.21	N	NORMAL
144	40	F	D	12 MON	200	HT	DCMP	NIL	3.99	N	0.91	N	2.18	N	NORMAL
145	35	F	D	15 MON	300	NIL	SVT	NIL	2.70	N	7.60	I	0.07	D	SUBCLINI THYROTOX
146	55	F	D	15 MON	200	HT	DCMP	NIL	1.67	N	1.13	N	4.10	N	NORMAL
147	22	F	D	24 MON	200	NIL	SVT	NIL	3.22	N	1.12	N	3.03	N	NORMAL
148	19	F	I	15 MON	200	NIL	SVT	NIL	1.98	N	1.14	N	2.07	N	NORMAL
149	23	F	D	15 MON	200	NIL	AF	NIL	1.61	N	0.81	N	3.87	N	NORMAL
150	34	F	I	12 MON	200	NIL	AF	NIL	3.30	N	1.67	N	2.53	N	NORMAL
151	27	F	I	24 MON	200	NIL	AF	NIL	2.71	N	0.99	N	3.10	N	NORMAL
152	22	F	D	12 MON	400	NIL	SVT	NIL	1.50	N	7.30	I	0.01	D	THYROTOXICOSIS
153	30	F	D	18 MON	200	NIL	AF	NIL	2.04	N	1.99	N	1.42	N	NORMAL
154	19	F	D	12 MON	200	NIL	AF	NIL	2.12	N	1.14	N	0.90	N	NORMAL
155	19	F	I	18 MON	400	NIL	SVT	NIL	1.90	N	2.00	N	5.20	I	HYPO-SUB
156	21	F	I	12 MON	200	NIL	SVT	NIL	3.47	N	1.03	N	0.91	N	NORMAL
157	29	F	I	18 MON	200	NIL	SVT	NIL	1.90	N	1.87	N	2.40	N	NORMAL
158	60	M	I	12 MON	300	NIL	AF	NIL	3.98	N	2.10	N	11.35	I	HYPO-SUB
159	85	M	I	12 MON	200	DM,HT	DCMP	NIL	2.21	N	1.99	N	3.95	N	NORMAL
160	49	M	D	8 MON	200	DM	AF	NIL	3.60	N	1.09	N	1.49	N	NORMAL
161	30	M	I	15 MON	200	NIL	AF	NIL	3.84	N	0.87	N	0.55	N	NORMAL
162	78	M	I	24 MON	400	DM	DCMP	DYSPNOEA	20.43	I	2.30	I	0.01	D	THYROTOXICOSIS
163	18	M	D	18 MON	200	NIL	SVT	NIL	1.89	N	2.01	N	1.59	N	NORMAL
164	46	M	D	18 MON	200	DM	DCMP	NIL	3.98	N	1.99	N	4.31	I	NORMAL
165	88	M	D	18 MON	400	DM,HT	SVT	NIL	3.71	N	0.85	N	4.14	N	NORMAL
166	40	M	I	12 MON	200	DM	SVT	NIL	2.06	N	0.94	N	1.01	N	NORMAL
167	49	M	D	24 MON	400	NIL	SVT	WT LOSS	12.97	I	1.90	N	0.02	D	THYROTOXICOSIS
168	48	M	I	12 MON	200	DM	SVT	NIL	3.20	N	0.93	N	0.48	N	NORMAL
169	80	M	D	12 MON	200	HT	DCMP	NIL	2.32	N	1.99	N	1.87	N	NORMAL
170	37	M	I	15 MON	200	HT	SVT	NIL	2.63	N	1.04	N	3.07	N	NORMAL
171	41	M	I	24 MON	400	NIL	SVT	DYSPNOEA	13.97	I	2.00	N	0.01	D	THYROTOXICOSIS
172	46	M	I	12 MON	200	DM	AF	NIL	3.88	N	0.86	N	1.31	N	NORMAL
173	70	M	D	24 MON	400	DM,HT	DCMP	NIL	4.25	N	1.25	N	6.14	I	HYPO-SUB
174	19	F	I	6 MON	200	NIL	SVT	NIL	2.10	N	1.89	N	1.98	N	NORMAL
175	56	M	D	12 MON	200	HT	DCMP	NIL	3.66	N	1.98	N	1.79	N	NORMAL
176	34	M	D	12 MON	200	NIL	AF	NIL	3.96	N	1.21	N	1.44	N	NORMAL
177	46	F	D	24 MON	300	NIL	AF	NIL	4.20	N	0.92	N	1.64	N	NORMAL

178	19	F	D	12 MON	300	NIL	SVT	NIL	3.99	N	1.90	N	7.03	I	HYPO-SUB
179	21	F	D	15 MON	200	NIL	SVT	NIL	2.73	N	1.09	N	1.22	N	NORMAL
180	18	F	I	18 MON	200	NIL	SVT	NIL	1.92	N	0.87	N	1.39	N	NORMAL
181	23	F	D	12 MON	300	NIL	SVT	NIL	3.32	N	1.01	N	1.68	N	NORMAL
182	25	F	D	15 MON	200	NIL	SVT	NIL	4.05	N	1.80	N	3.50	N	NORMAL
183	50	M	I	12 MON	300	NIL	DCMP	NIL	3.40	N	1.84	N	3.90	N	NORMAL
184	50	F	I	15 MON	200	DM	AF	NIL	1.42	N	1.70	N	4.30	N	NORMAL
185	43	M	D	24 MON	400	DM	DCMP	DYSPNOEA	13.28	I	2.20	I	0.01	D	THYROTOXICOSIS
186	45	F	I	12 MON	200	HT	DCMP	NIL	3.14	N	1.12	N	1.06	N	NORMAL
187	38	M	I	14 MON	300	NIL	AF	NIL	4.25	N	1.91	N	1.14	N	NORMAL
188	30	M	I	6 MON	200	NIL	SVT	NIL	3.66	N	0.91	N	1.50	N	NORMAL
189	28	M	D	12 MON	200	NIL	SVT	NIL	4.00	N	2.00	N	3.89	N	NORMAL
190	65	M	D	12 MON	200	NIL	DCMP	NIL	3.48	N	1.98	N	3.46	N	NORMAL
191	72	M	D	14 MON	200	HT	DCMP	NIL	2.99	N	1.07	N	2.94	N	NORMAL
192	45	M	I	10 MON	300	HT	SVT	NIL	2.04	N	0.83	N	2.19	N	NORMAL
193	45	M	D	14 MON	300	NIL	DCMP	palpitation	12.04	I	2.90	I	0.02	D	THYROTOXICOSIS
194	65	M	I	12 MON	200	NIL	AF	NIL	2.10	N	1.98	N	3.30	N	NORMAL
195	66	M	D	18 MON	200	DM	DCMP	NIL	2.71	N	1.81	N	2.53	N	NORMAL
196	24	M	I	12 MON	200	NIL	AF	NIL	3.08	N	1.19	N	1.16	N	NORMAL
197	28	M	D	12 MON	200	NIL	AF	NIL	1.76	N	1.99	N	3.24	N	NORMAL
198	45	M	D	24 MON	200	DM	DCMP	NIL	3.79	N	1.24	N	4.21	N	NORMAL
199	62	M	I	18 MON	200	DM	DCMP	NIL	2.24	N	1.11	N	3.83	N	NORMAL
200	19	F	D	12 MON	300	NIL	SVT	WT LOSS	8.70	I	1.80	N	0.02	D	THYROTOXICOSIS