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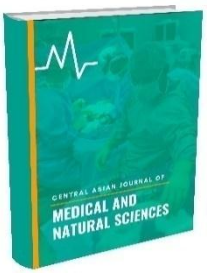

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Hypothyroidism in Association with Heart Diseases Among Patients Admitted to Cardiac Care Unit

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Abstract: Background: Heart disease is the prominent reason of death globally. Especially associated with modern risk factors such as diabetes, dyslipidemia and hypertension, which are grossly share to development of heart diseases. Thorough management of these risk factors is related with significant lowering of hazard of cardiovascular disease in general

Aim of study to assess the relationship between hypothyroidism and heart diseases and which types of heart disease more associated with hypothyroism.

Patients and methods: A cross sectional study was conducted at Diwanhyia teaching hospital in Al-Diwanhyia governorate, Iraq. The study was achieved through period from 1st of June 2022 to 1st February 2023. A sample of 80 patients with heart diseases were admitted to cardiac unite in hospital from both sex, above 18 years were included in the study.

Result : Eighty patients with mean age 57 years divided in 3 groups according to age. In our sample the heart failure patients were 42.5%, unstable angina were 26.3% and myocardial infarction were 31.2%. Prevalence of hypothyroidism among sample of patients with cardiac problems was 20% and 80% of patients have no such condition, as table 4. Moreover, hypothyroidism presented in patients with heart failure, angina and myocardial infarction was 32.3%, 9.5% and 12% respectively.

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Conclusion: Hypothyroidism is associated with increased risk of cardiac disease, hypothyroidism are more common in heart failure. Hypothyroidism has a wide spectrum of clinical exhibitions. Not only major variations, but also indirect changes in the circulating pool of thyroid hormone may cause or share to cardiovascular disorder risk.

Key words: Hypothyroidism, heart diseases

Introduction

Heart disease is the prominent reason of death globally. Especially associated with modern risk factors such as diabetes, dyslipidemia and hypertension, which are grossly share to development of heart diseases. Thorough management of these risk factors is related with significant lowering of hazard of cardiovascular disease in general[(1)]. Nevertheless, even after correction of this risk factor still numerous individual suffering from heart disease have residual risk and not completely disappear of illness, emphasizing the need to appreciative mechanism of cardiac disease developed[(2)].

However, thyroid diseases are a worldwide problem and related to increase heart diseases. Because of a wide spread of accessibility to thyroid dysfunction treatment thus there are increase importance in discovered the role of thyroid in cardiovascular disease[(3)].

Thyroid dysfunction consist of major two types hyperthyroidism due to increase secretion of thyroid hormones and hypothyroidism a state that characterized by reduce hormone production, there are a lot of conditions that lead to hypothyroid state, sometime directly associated in thyroid or in direct when disorder away from thyroid but affect the thyroid function by many factors such as immune disease[(4)]. Insufficiency of thyroid hormone has extensive concern on body, since the thyroid hormone has a wide action in growth, development and numerous cellular processes.

Direct action of thyroid hormone has been documented on heart work, blood vessel lipid metabolism[(5)].

In state of hypothyroidism the patients may be presented with reducing heart rate, blood vessel might be constricted and hypertension, in addition, edema due to increase of fluid retention and high cholesterol levels[(6)].

Intensive of heart disease increase with severity of condition thyroid dysfunction in severe deficiency of hormone can lead to heart failure and death[(7)].

Treatment of thyroid deficiency by hormonal replacement which is could be reverse of negative effect and disease process. Over treatment, by thyroid hormone might be reported high thyroid secretion and dysrhythmia[(8)].

Thyroid hormones (THs) play fundamental roles in cardiovascular homeostasis[(8)] . Given that cardiovascular diseases are among the most prevalent illnesses worldwide, causing substantial mortality, morbidity and hospitalization, an understanding of the role of THs in the cardiovascular system is imperative[(9)] .

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Many studies reveal thyroid function disorders are related with myocardial infarction, low cardiac output, heart rate irregularities, increased in systemic vascular resistance, endothelial disorder, cardiomyopathy and high heart failure and atherosclerosis prevalence[10,11].

Even subclinical hypothyroidism is related with left ventricular dysfunction in both systolic and diastolic pattern. The mechanism of increase heart size due to variation in level of thyroid hormone grossly affects the hemodynamic load of the heart[12,13].

Aim of study to assess the relationship between hypothyroidism and heart diseases and which types of heart disease more associated with hypothyroism.

Patients and methods

A cross sectional study was conducted at Diwanhyia teaching hospital in Al-Diwanhyia governorate, Iraq. The study was achieved through period from 1st of June 2022 to 1st February 2023. A sample of 80 patients with heart diseases were admitted to cardiac unite in hospital from both sex, above 18 years were included in the study.

Patients with history of use medication that alter thyroid function such as amiodarone and antithyroid drugs were excluded from study,

We collect the data from direct interview with patients and from patients file then data filled in well-structured questionnaire contain many parts for sociodemography characters such as ID number, age, sex, residence, occupation, educational level, history of chronic disease and medications. Also include Anthropometrics measurement like weight, height and BMI. There is part specific for results of laboratory investigations thyroid function test (TSH,T4,T3) lipid profile (HDL-C, LDL-C, TG, and TC). Types of heart disease in last part include myocardial infarction, unstable angina pectoris and heart failure.

Heart diseases were written according to diagnosis of patient's physician in medical file.

Laboratory Tests

Venous blood samples were obtained at the time of study entry, processed, and stored at −80°C until the time of assay. Chemiluminescent immunoassays for TSH, T4, T3.

The reference ranges for TSH, T4, and T3 were 0.45 to 4.5 mIU/L, 0.7 to 1.7 ng/dL, and 80.0 to 159.0 ng/dL, respectively.

Thyroid function tests were used to define standard categories of thyroid function as follows.

	TSH	T4	T3
Hyperthyroidism	< 0.45 mIU/L	Elevated	elevated
Hypothyroidism	TSH≥20.00 mIU/L or TSH>4.50 mIU/	Normal or below reference range	Normal or below reference range
Eu thyroid	0.45–4.50 mIU/L	Normal	Normal

Overt and subclinical hypothyroidism consider as one diagnosis.

Ethical approval

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Approval for study was obtained from our hospital and health directorate. Furthermore a written consent and taken from participants before study enrollments.

Investigator was clearly explain the purpose and process of study.

Statistical analysis

Work analyzed by uses of statistical packages of social sciences (SPSS,) version 24. Data of patients collected in excel sheet for data bases system.

Continuous variables data were stated as mean ± standard deviation (SD). While categories data stated as number and percentages. P-value less than 0.05 considered significant.

Result

Our study comprised 80 patients with mean age 57 years divided in 3 groups according to age first group less than 40 years, second group from 40 -69 years and 70 years and more. Fifty three patients were female and 27 were male. About 33.8% of sample was overweight and 23.7% was obese, in addition there were 61.3% of patients lived in urban area as in table 1. In table 2, shows present of chronic diseases for patients admitted in cardiac care unite, prevalence of hypertension was 28.7%, diabetes was 17.5% and dyslipidemia was 38.7%.

In our sample the heart failure patients were 42.5%, unstable angina were 26.3% and myocardial infarction were 31.2%, as in table 3.

Table 1: demographic characters of sample.

Variables		**Number**	**Percent**
Age group	**< 40 years**	**13**	**16.3%**
	40-69 years	**46**	**57.5%**
	≥70 years	**21**	**26.2%**
Gender	**Male**	**27**	**33.7%**
	Female	**53**	**66.3%**
BMI	**Under weight**	**11**	**13.8%**
	Normal	**23**	**28.7%**
	Over weight	**27**	**33.8%**
	Obese	**19**	**23.7%**
Residence	**Urban**	**49**	**61.3%**
	Rural	**31**	**38.7%**

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Table 2: prevalence of chronic diseases among sample.

Variables		Number	Percent
Hypertension	**Yes**	**23**	**28.7%**
	No	**57**	**71.3%**
Diabetes mellitus	**Yes**	**14**	**17.5%**
	No	**66**	**82.5%**
Smoking history	**Smoker**	**11**	**13.7%**
	Non smoking	**69**	**86.3%**
Family history of hypothyroidism	**Positive**	**10**	**12.5%**
	Negative	**70**	**87.5%**
Dyslipidemia	**Yes**	**31**	**38.7%**
	No	**49**	**61.3%**

Table 3: types of cardiac problem among sample

Types of heart diseases	Number	Percent
Heart failure	**34**	**42.5%**
Un stable Angina pectoris	**21**	**26.3%**
Myocardial infarction	**25**	**31.2%**
Total	**80**	

Prevalence of hypothyroidism among sample of patients with cardiac problems was 20% and 80% of patients have no such condition, as table 4. Moreover, hypothyroidism presented in patients with heart failure, angina and myocardial infarction was 32.3%, 9.5% and 12% respectively, as in shown in table 5.

Table 4: shows prevalence of hypothyroidism

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Variables		Number	Percent
Hypothyroidism	Yes	16	20%
	No	64	80%

Table 5: shows association of types heart disease with hypothyroidism

	Hypothyroidism			
Types of heart diseases	Yes	No	Total	p-value
Heart failure	11(32.3%)	23(67.7%)	34	0.001
Un stable Angina pectoris	2(9.5%)	19(90.5%)	21	
Myocardial infarction	3(12%)	22(88%)	25	
Total	16	64	80	

Discussion

In our study show prevalence of hypothyroidism among sample of patients with cardiac problems were 20% and 80% of patients having no such condition, about 68.7% of hypothyroid patients had heart failure these finding consistent with other studies[14]. {20, 14} Triggiani et al. reported hypothyroidism was found in 17% in pateints with congestive heart failure[15] . {19} whereas Sato et al. reveals only 12% of sample consist from 1200 patients with cardiac conditions[16] [15].

Hayashi et al. reveal hypothyroid were present in 21% of acute heart failure patients and also he reported the hypothyroidism was associated significant reduction in survival rate and two fold increase risk of cardiovascular disorder happened in compare to sample of normal thyroid function[17]. [21].17

Moreover in other meta-analyses study was found the public subjects with hypothyroid function with elevated TSH show more incidences of cardiovascular events and mortality and heart failure[18]. [22].4{8}

A study conducted in Italy by Biondi et al suggested patient suffering from hypothyroidism with elevated TSH > 10mU/L are of increase risk of heart failure significantly in older patients[19] [23]. In addition, a meta-analyses of 6 prospective studies including more than two thousand patients suffering from hypothyroid function goes with similar results [20].

A work by Erkan et al. , were detected in group of patients with hypothyroidism the wall thickness of posterior ventricles and left atrium diameter was higher than general range [21].

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Lakshmi Kannan study reported individuals with self reported heart failure with hypothyroidism had elevated risk of mortality than normal thyroid function participants [22].

Another study reported cardiac problems patients with subclinical hypothyroidism show poor outcomes [23]. More over patients admitted to cardiac care with acute event with hypothyroid function are related with three fold increase in risk of mortality. Consequently, the subclinical hypothyroidism happened after myocardial infarction is greatest marker of worse ending, these are benefit from intervention if proven efficacy because it remain unidentified whether the association between hypothyroidism and poor prognosis in heart disease patients about causal relationships [24].

In Saudi Arabia, the researcher reported coronary artery diseases higher prevalence among patients with hypothyroidism than general population [25].

There are many mechanism stated in variables studies about effect of hypothyroid function on heart diseases, firstly increase left ventricular end diastolic dysfunction was reported by researchers [26]. Secondly, there is a link between pulmonary hypertension and thyroid dysfunction as show by different studies, these effect lead to increase pulmonary artery pressure and pulmonary vascular resistance which are worse the outcome in heart failure patients [27]. Lastly by using the magnetic resonance specific for heart there are reduction in cardiac preload and elevated in after load, subsequently lead to reduce stroke volume and cardiac output in hypothyroid patients [28].

Conclusion

Hypothyroidism is associated with increased risk of cardiac disease, hypothyroidism are more common in heart failure. Hypothyroidism has a wide spectrum of clinical exhibitions. Not only major variations, but also indirect changes in the circulating pool of thyroid hormone may cause or share to cardiovascular disorder risk.

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