

Study of Risk Factors for ST Segment Elevation Myocardial Infarction and its Correlation With Thyroid Functions Profile.

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ABSTRACT

Background: To assess the occurrence of risk factors in patients with STEMI with special reference to Thyroid functions and Thyroid profile (Hypothyroidism/ Hyperthyroidism). **Methods:** A total of 140 patients diagnosed with ST segment elevation myocardial infarction (STEMI) admitted to ICU/CCU of NIMS Medical College & Hospital over the period of 18 months (June 2016 - November 2017) will be included in the study and subsequently evaluated for presence of risk factors and thyroid dysfunction. Majority of subjects belonged to rural areas located near to the hospital of either sex above the age of 18 years. On the basis of history, clinical examination, inclusion and exclusion criteria of the study, subjects were selected. It is an observational cross-sectional study. Statistical analysis was done using Fisher test, student 't' test and Chi-Square test. 'p' value less than 0.05 is taken as significant. **Results:** Out of 140 patients with STEMI, 20 patients had thyroid dysfunction while 120 patients had euthyroid status. Subclinical hypothyroidism was reported in 12 (8.6%) patients while Hypothyroidism was noticed in 4 (2.9%) patients. Subclinical hyperthyroidism and Hyperthyroidism were observed in 3 (2.1%) and 1 (0.7%) patients, respectively. Out of 140 patients with STEMI, 2 patients with euthyroid status died while 8 patients with thyroid dysfunction died with $p=0.001$ which was statistically significant. **Conclusion:** Thyroid dysfunction significantly increases relative risk of mortality as compared to euthyroid function in patients with STEMI.

Keywords: STEMI- ST segment elevation myocardial infarction, MI- Myocardial Infarction, IHD- Ischemic Heart Disease, TSH- Thyroid Stimulating Hormone, BMI- Body Mass Index, CAD-Coronary Artery Disease.

INTRODUCTION

The term acute coronary syndrome is defined as any form of symptoms compatible with acute myocardial ischemia. Ischemic heart disease remains the leading cause of death in men and women worldwide and cardiovascular deaths exceed the number of deaths from all cancers combined.^[1] Incidence of myocardial infarction has shown an upward trend in Indians in the last decade.^[2] In India incidence of cardiovascular diseases was about 7% in 1970 and increased up to 32% in 2011 and is projected to be the highest in India by 2020.^[3] The INTERHEART and INTERSTROKE study found that more than 86% of cardiovascular disease was attributable to nine key risk factors (smoking, lipids, hypertension, diabetes, obesity, diet, physical inactivity, alcohol consumption and psychosocial factors).^[4,5]

The cardiovascular system is very sensitive to thyroid hormone, and a wide spectrum of cardiac changes has been recognized in overt thyroid dysfunction.^[6] Starting from the phase of embryological development, thyroid gland and the heart are related.^[7,8] Thyroid hormone exerts a major influence on the cardiovascular system by a number of direct and indirect mechanisms and, not surprisingly, cardiovascular effects are prominent in both hypo- and hyperthyroidism.^[9] In addition, thyroid hormone exerts direct inotropic, chronotropic, and dromotropic effects that are similar to those seen with adrenergic stimulation. A slightly change in thyroid status affects ventricular function, serum cholesterol levels, and heart rate and rhythm, and increases risk of IHD.^[10,11] In this study an attempt has been made to study the risk factors for IHD presenting with ST segment elevation myocardial infarction with special reference to thyroid functions and thyroid profile.

MATERIALS AND METHODS

The present observational cross-sectional study was done with 140 patients to assess the occurrence of risk factors in patients with STEMI in special

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reference to Thyroid functions profile. On the basis of history, clinical examination, inclusion and exclusion criteria of the study, subjects were selected. Clearance from scientific and ethical committee was taken before the study. Blood samples from all patients were collected in a standardized manner and were subjected for routine and special investigations including TSH, T3, T4. Association among the study groups is assessed with the help of Fisher test, student 't' test and Chi-Square test. 'p' value less than 0.05 is taken as significant.

RESULTS

Table 1: Distribution of patients according to BMI.

BMI (kg/m ²)	No.	%
<25	41	29.3%
25-30	75	53.6%
>30	24	17.1%
Total	140	100%
Mean±SD	27.1±3.49	

Table 2: Distribution of patients as per Associated Risk Factors.

Associated Risk Factors	No.	%
Smoking	110	78.6%
Hypertension	57	40.7%
Diabetes Mellitus	34	24.3%
Dyslipidemia	30	21.4%

Table 3: Distribution of patients as per Thyroid Hormone Abnormalities.

Thyroid Status	No.	%
Subclinical hypothyroidism	12	8.6%
Hypothyroidism	4	2.9%
Subclinical hyperthyroidism	3	2.1%
Hyperthyroidism	1	0.7%
Normal	120	85.7%
Total	140	100%

Table 4: Relative risk of thyroid disorders on mortality in patients with STEMI.

Mortality	Euthyroid (n=120)		Thyroid (n=20)		Chi-Square	p Value
	No.	%	No.	%		
Survived	118	98.3%	12	60%	37.979	0.001
Deceased	2	1.7%	8	40%		

Table 5: Multivariate Analysis of Risk Factors of STEMI with Different Levels of Thyroid

Parameters	Subclinical hypothyroidism			Hypothyroidism			Subclinical hyperthyroidism			Hyperthyroidism			Normal		
	OR	95% CI	p Value	OR	95% CI	p Value	OR	95% CI	p Value	OR	95% CI	p Value	OR	95% CI	p Value
BMI	1.57	0.87-3.13	0.082	2.87	2.16-3.82	0.063	1.37	1.16-1.23	0.085	0.61	0.34-1.38	0.271	2.67	0.51-4.39	0.251
Smoking	0.81	0.26-2.75	0.208	1.27	0.96-1.53	0.102	0.75	0.68-1.32	0.227	0.81	0.26-2.74	0.208	0.99	0.42-2.30	0.161
Hypertension	1.42	0.54-4.61	0.077	0.87	0.07-2.77	0.192	1.23	1.28-2.68	0.109	0.93	0.34-2.89	0.176	1.05	0.92-1.48	0.146
Diabetes	3.88	2.25-4.53	0.002	2.33	1.46-3.73	0.009	3.20	2.10-4.87	0.018	2.21	1.02-1.71	0.001	1.03	0.85-1.65	0.015
Dyslipidemia	1.09	1.43-3.89	0.138	0.60	0.28-1.27	0.274	0.93	0.30-2.89	0.176	1.42	0.54-4.61	0.078	1.41	1.12-1.76	0.079

DISCUSSION

Acute coronary syndrome (ACS) is one of the leading causes of morbidity and mortality worldwide. Ischemic heart disease is the number one cause of death in adults from both developing and developed countries.^[12] The high burden of CAD in the Indian subcontinent is the consequence of large population and high prevalence of CAD risk factors like smoking, tobacco abuse, lack of physical activity, obesity, high blood pressure, abnormal lipids and diabetes mellitus. The thyroid hormone changes could result in the functional derangement of cellular metabolism affecting all the organs including heart.

In present study, 70.7% had elevated BMI which was in accordance with the study conducted by Sreevidya KR et al.^[13] In present study, smoking accounted for 78.6% of the study population which

was higher than the results of the study conducted by Helmy MM et al and Saleh AU et al.^[14,15] Incidence of hypertension in the present study was 40.7% patients which was in accordance with the study conducted by Saleh AU et al and Okuyan E et al.^[15,16] The incidence of diabetes in our study was 24.3% which was in line with study conducted by Okuyan E et al.¹⁶ Diabetes Mellitus was statistically significant risk factor (p value <0.05) in patients with STEMI with different levels of thyroid. In present study 21.4% patients were dyslipidemic which were in line with the study done by Saleh AU et al.^[15]

Incidence of thyroid dysfunction in patients with STEMI was 14.3% in present study which was comparable to study conducted by Helmy MM et al,^[14] Khalil OA et al,^[17] Qari FA,^[18] Sreevidya KR et al and Sengottaiyan ST et al.^[13,19] Incidence of thyroid dysfunction in present study stated that

subclinical hypothyroidism was present in 8.6%, overt hypothyroidism was present in 2.9%, subclinical hyperthyroidism and overt hyperthyroidism were present in 2.1% and 0.7% respectively. Our results were in concordance with the study done by Qari FA,^[18] Helmy MM et al,^[14] Khalil OA et al,^[17] Sreevidya KR et al and Okuyan E et al.^[13,16] It was observed in the present study that 7.1% patients died due to thyroid dysfunction which was in line with the study conducted by Khalil OA et al.^[17]

CONCLUSION

The present study is a hospital based study predominantly in the rural population of Rajasthan. We conclude that thyroid dysfunction is present in 14.3% of our patients who presented with STEMI. Thyroid dysfunction resulted in increased cardiovascular mortality and morbidity especially in the presence of other risk factors. The need of the hour would be to increase the awareness of risk factors for MI among general public. Patients with coronary artery disease especially in the presence of other risk factors should be screened for thyroid dysfunction. We recommend tests for thyroid disorders in acute coronary syndrome can give predictor for risk of morbidity and mortality in those subjects.

Limitations

The sample size of the present study was very small. The study was time bound. Relatively small percentage of patients with thyroid function test abnormalities among ICCU patients.

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