Original Research Article

A study on clinical profile of acute coronary syndrome in type 2 diabetes mellitus patients with relevance to HbA1c

K. Babu Raj[1], G. Sivachandran[2*]

[1]Reader, [2]Final Year Post Graduate
Department of Medicine, Rajah Muthiah Medical College, Annamalai University, Chidambaram, Tamil Nadu, India
[*]Corresponding author email: **drgsivachandran@gmail.com**

International Archives of Integrated Medicine, Vol. 5, Issue 8, August, 2018.

Available online at http://iaimjournal.com/
ISSN: 2394-0026 (P) **ISSN: 2394-0034 (O)**
Received on: 11-07-2018 **Accepted on:** 16-07-2018
Source of support: Nil **Conflict of interest:** None declared.
How to cite this article: K. Babu Raj, G. Sivachandran. A study on clinical profile of acute coronary syndrome in type 2 diabetes mellitus patients with relevance to HbA1c. IAIM, 2018; 5(8): 1-8.

Abstract

Background: Cardiovascular disease (CVD) has emerged as the dominant chronic disease in many parts of the world. At the beginning of the twenty-first century, CVD accounts for nearly half of all deaths in the developed world and 25% in the developing world. Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia. Vascular diseases account for most morbidity and mortality in patients with DM.

Aim and objectives: To study the clinical profile of type 2 diabetic patients presenting with Acute Coronary Syndrome (ACS) with reference to HbAlc level.

Materials and methods: After selecting appropriate samples for the study based on the inclusion criteria, a detailed history was elicited and clinical examination was done as per the proforma. The necessary investigations were done as per the proforma. The clinical profile of these patients was then analyzed and correlated with reference to HbAlc level and statistical analysis performed using paired' test.

Results: The prevalence of microvascular diabetic complications was high with nephropathy amounting to 62% and retinopathy amounting to 58%. Neuropathy was not documented. About 32% of patients were free of microvascular complications. Other macrovascular diabetic complications were not documented. Among complications of ACS, 24% developed hypotension and no other complication was noted. Remaining 76% did not suffer any complications. No mortality was documented. Patients with systolic dysfunction constituted 82% and diastolic dysfunction 66%. The percentage of patients with HbA1c >7% constituted 62% which was very high and only 32% of patients had their HbA1c level in the control range.

Conclusion: A majority of diabetic patients developing acute coronary syndrome have poor glycaemic control as reflected by their HbAlc levels. The coronary event is likely to occur sooner after the detection of diabetes if good glycaemic control is not achieved. Exercise, in the form of regular day to day activities, does not achieve satisfactory glycaemic control and cannot prevent the development of adverse complications of diabetes.

Key words

Acute Coronary Syndrome, Type 2 Diabetic Patients, Vascular Complication, High glycaemic index, HbA1c.

Introduction

The term Acute Coronary Syndrome (ACS) represents a spectrum of ischemic myocardial events that share similar pathophysiology and includes Unstable Angina (UA), Non-ST Elevation Myocardial Infarction (NSTEMI) and ST- Elevation Myocardial infarction (STEMI). Cardiovascular disease (CVD) has emerged as the dominant chronic disease in many parts of the world [1]. At the beginning of the twenty-first century, CVD accounts for nearly half of all deaths in the developed world and 25% in the developing world [2]. This global rise in CVD is the result of a dramatic shift in the health status of individuals around the world and an unprecedented transformation in the dominant disease profile or the distribution of diseases responsible for the majority of cases of death and debility [3]. As this trend spreads to and continues in the developing countries, CVD will dominate as the major cause of death by the year 2020, accounting for at least one in every three deaths. India is one of the developing economies in the world and one-sixth of the world's population lives in India. CVD accounts for 24% of total deaths. Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia. Vascular diseases account for most morbidity and mortality in patients with DM [4]. Diabetes causes microvascular diseases such as nephropathy, neuropathy and retinopathy, and macrovascular disease, that is, atherosclerosis, mainly of coronary, cerebral and peripheral arteries. Patients with diabetes have twofold to fourfold increase in the risk of Coronary Artery Disease (CAD). For every age stratum, ethnic background and risk factor level, men with diabetes had an absolute risk of CAD death more than three times higher than that in the non-diabetic cohort, even after adjustment for established risk factors [5]. At present, the glycated hemoglobin fraction A1c (HbA1c) is the best surrogate marker available for assessing blood sugar control and for setting goals of treatment. This study, keeping in mind the above-said factors, focuses on highlighting the clinical profile of ACS patients with type 2 diabetes mellitus based on the glycated hemoglobin fraction A1c [6].

Materials and methods

The study sample included 50 patients with diagnosed type 2 diabetes mellitus findings of both sexes and who belonged to the age group of 50 to 80 years from RMMCH. A detailed clinical history was taken for these patients who were included in this study. After selecting appropriate samples for the study based on the inclusion criteria, a detailed history was elicited and clinical examination was done as per the proforma The necessary investigations were done as per the proforma. The clinical profile of these patients was then analyzed and correlated with reference to HbAlc level and statistical analysis performed using paired 't' test.

Inclusion criteria

- Patients presented to RMMCH with the anginal type of chest pain and ECG changes pertinent to the acute coronary syndrome.
- Above mentioned patients who also had Type- 2 Diabetes Mellitus.

Exclusion criteria

- Patients with Type -1 Diabetes Mellitus.
- Patients with anemia (Hb <9 g/dl) including hemolytic anemia.
- Patients with chronic kidney disease (stage 3 and above).
- Patients with liver failure.5.Patients with hemoglobinopathy.
- Patients with recent blood loss and blood donation.

Results

The age wise distribution revealed that 18% of the patients were below 50 years of age, 48% between 51-60 years, 22% between 61-70 years and 12% above 70 years of age (**Graph – 1**).

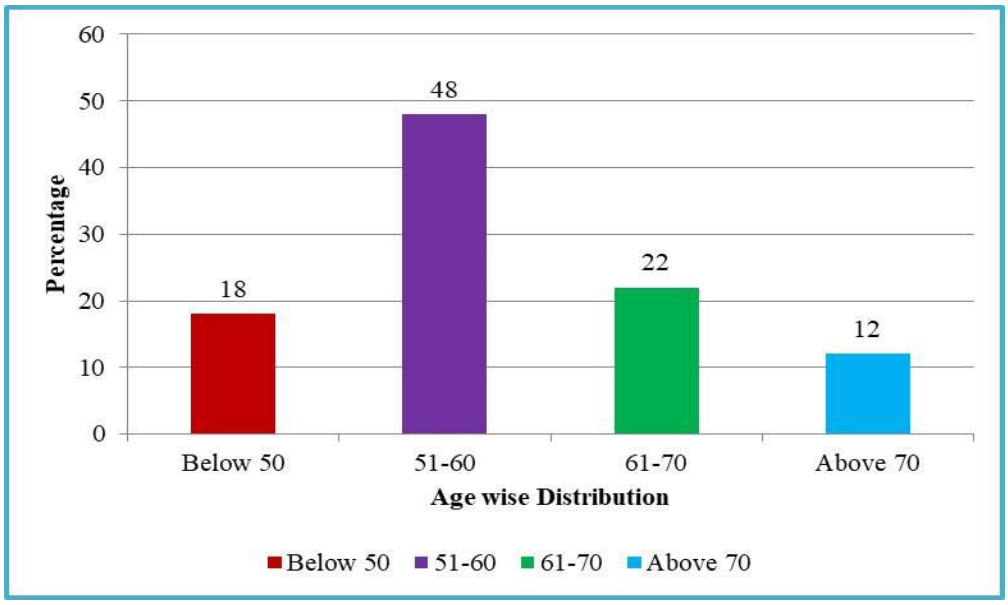
Males were predominant, with a figure of 60% and females constituted 40%.

Patients, whose detected duration of diabetes was less than 5 years constituted 60%, 6-10 years 28%, 11-15 years 10% and more than 15 years 2% (**Graph – 2**).

The percentage of patients who were on OHA alone was 44%, insulin alone was 3%, both were 1%. Remaining 2% of patients were not on any drug. Compliant patients constituted 77.08% and the remaining 22.99% were not compliant with treatment (**Graph – 3**).

Systemic hypertension was present in 20% of the patients, dyslipidemia in 22% and both in 42% (**Graph – 4**).

Graph – 1: Age wise distribution among patients.



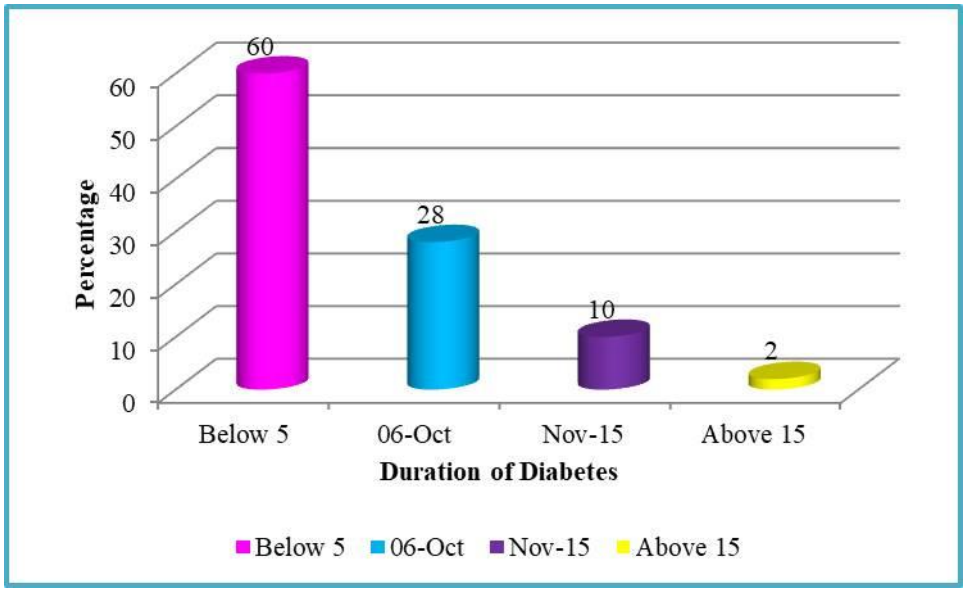
The prevalence of microvascular diabetic complications was high with nephropathy amounting to 62% and retinopathy amounting to 58%. Neuropathy was not documented. About 32% of patients were free of microvascular complications. Other macrovascular diabetic complications were not documented (**Graph – 5**).

Among ACS, STEMI constituted 80%, NSTEMI 10% and UA another 10% (**Graph – 6**).

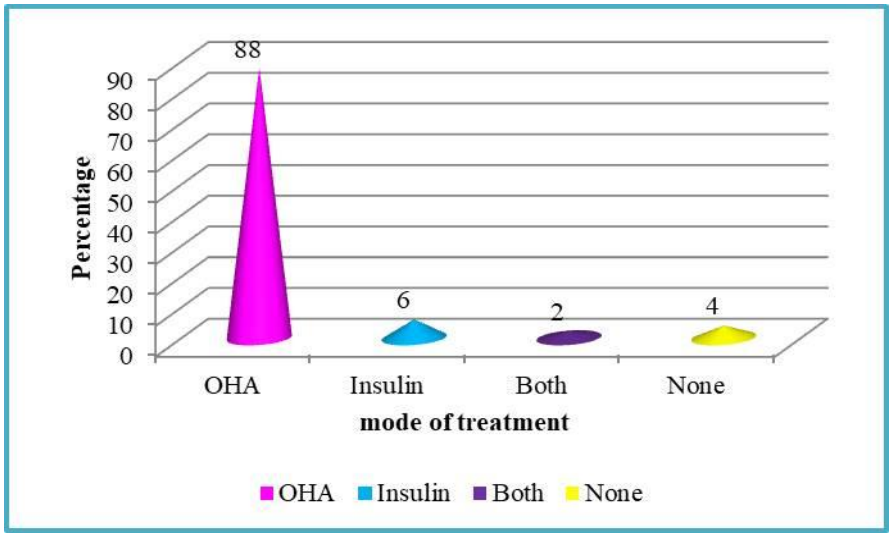
Patients with systolic dysfunction constituted 82% and diastolic dysfunction 66% (**Graph – 7A and 7B**).

Ejection fraction was as per **Graph – 8**. The percentage of patients with HbA1c >7% constituted 62% which was very high and only 32% of patients had their HbA1c level in the control range (**Graph – 9**).

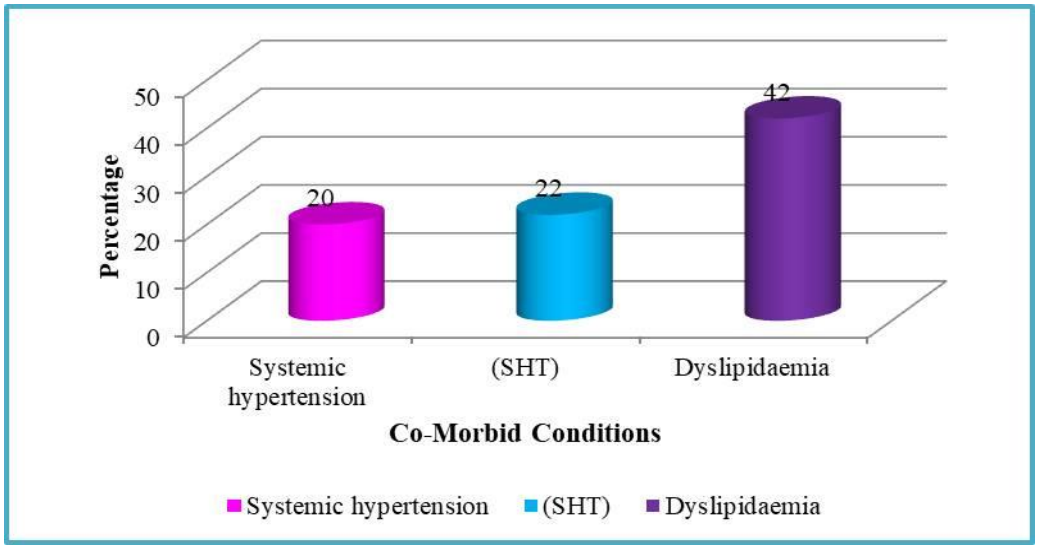
Graph – 2: The duration of diabetes.



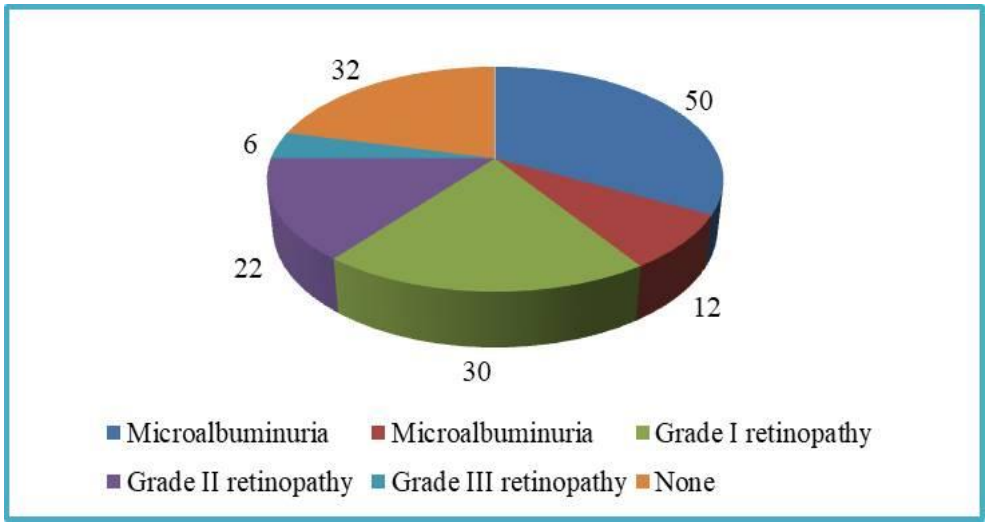
Graph – 3: Mode of treatment.



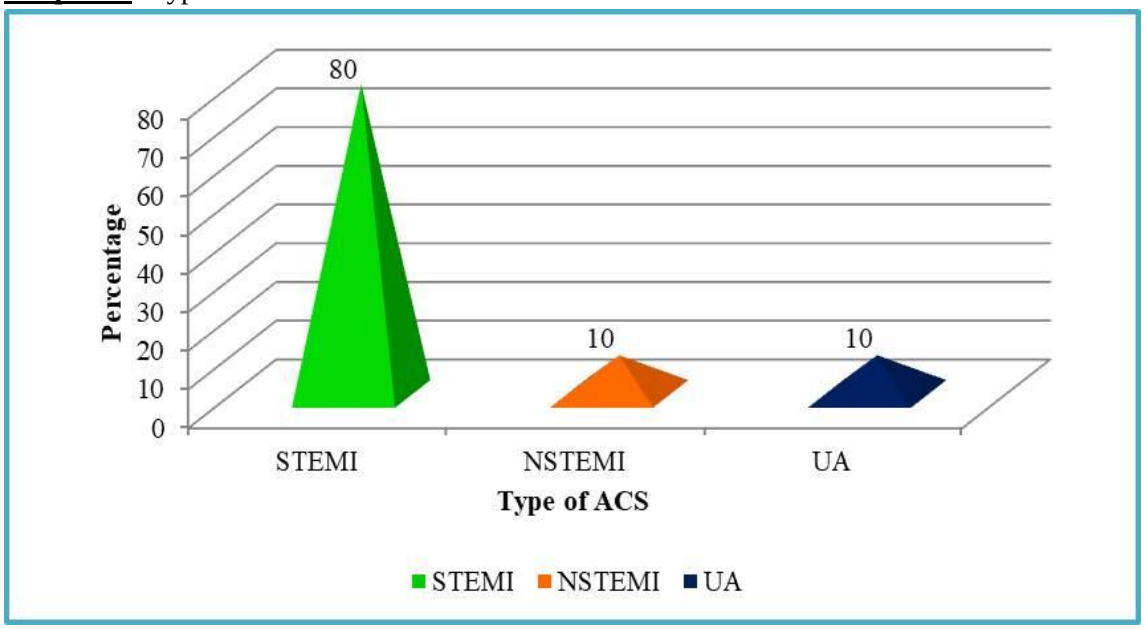
Graph – 4: Comorbid symptoms.



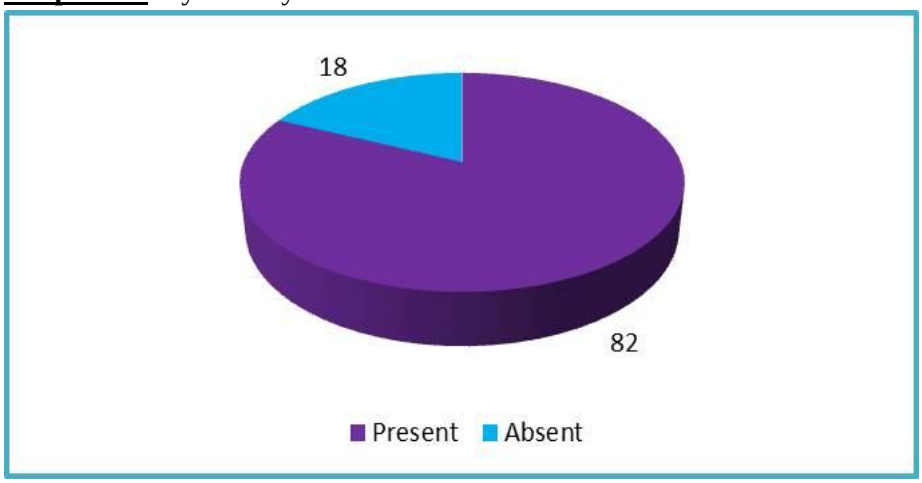
Graph – 5: Microvascular complications of diabetes.



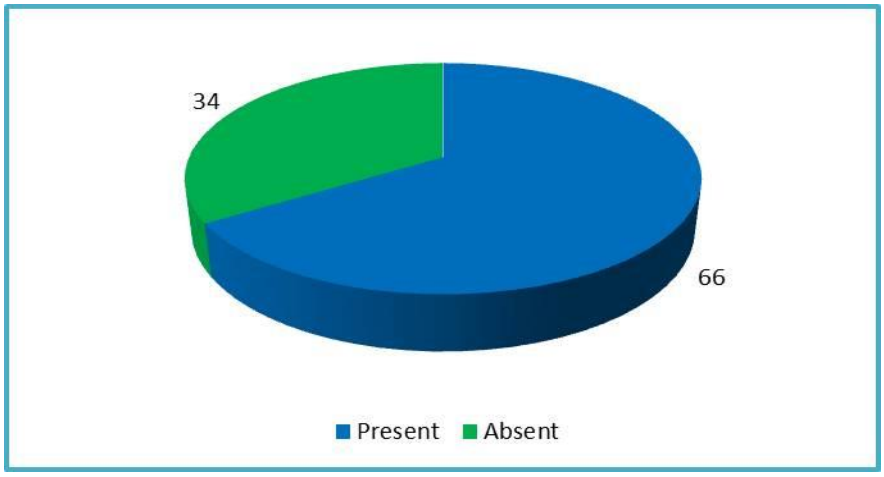
Graph – 6: Type of ACS.



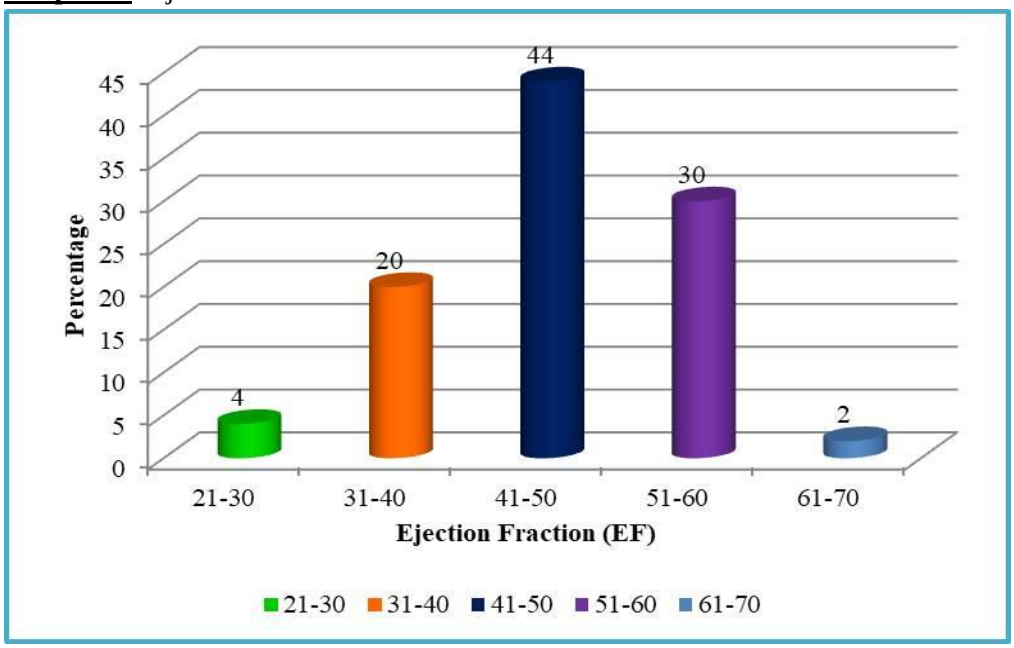
Graph - 7A: Systolic dysfunction.



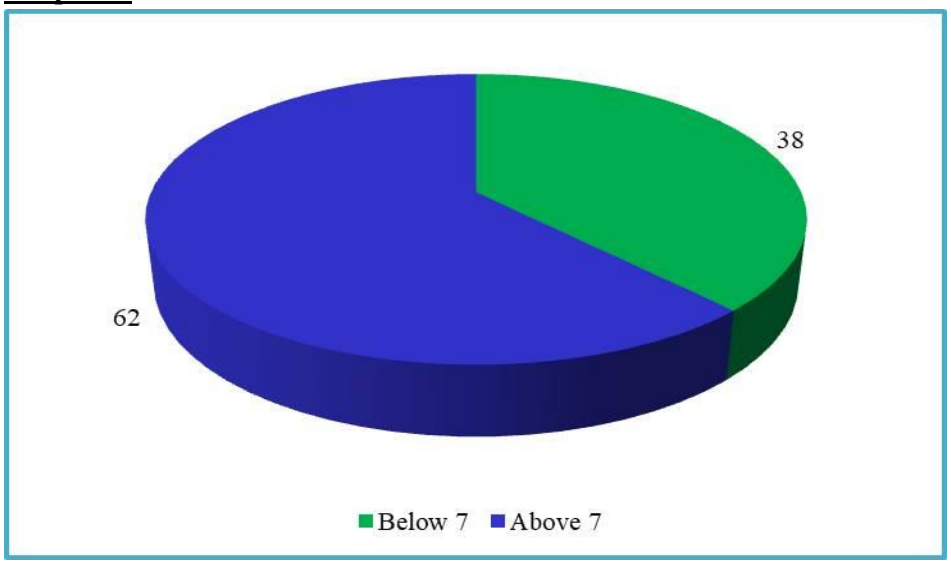
Graph - 7B: Diastolic dysfunction.



Graph – 8: Ejection fraction.



Graph – 9: HbA1c levels.



Discussion

This study was conducted in RMMCH from the period of February 2016 till July 2017, spanning 6 months. The total number of people included was fifty (n=50). The following observations had been made. The maximum number of patients in our study belonged to the age group of 51-60 years (48%; n=24) (P = 0.002). The percentage of males affected by acute coronary syndrome in our study was more (60%, n=30) (P = 0.157). The number of patients who were unemployed in our study was found to be 44% (n=22) (P=0.000), indicating the fact that no physical activity predisposes more number of diabetics to acute coronary syndromes. However, 28% (n44) of patients who were farmers with heavy physical activity also developed ACS which could be explained by their habits of smoking and alcohol consumption [7]. A study by Gu K, Cowie CC, et al. revealed that subjects in the light-grade activity group had higher odds of CAD (OR 2.42, 95% confidence interval 1.40, 4.24, P = 0.011), compared with the heavy-grade activity group [8]. Majority of patients in our study (60%, n30) (P = 0.000) developed ACS within five years of diagnosis of diabetes which confirms the fact that diabetes accelerates coronary atherosclerosis and predisposes patients to ACS [9]. The percentage of patients who were on treatment with oral hypoglycemic agents (OHA) was 88% (n=44), insulin 6% (n3), both OHA and insulin 4% (n=2) (P = 0.000). One patient was not on any mode of treatment. The co-morbid conditions were also studied which revealed that 20% (n=10) of our patients also had systemic hypertension, 22% (n=11) had abnormal lipid levels and 42% (n=21) had both hypertension and lipid abnormalities (P = 0.000). Howard BV, et a1 in their study found out that around 37% of diabetic patients with ACS had systemic hypertension and 17.9% of patients had hypertension and dyslipidemia [10]. Hu FB, et al. found that 39.5% of their patients were smokers and 14.4% consumed alcohol. The percentage of patients who were obese in our study was 6% (n=3) and 22% (n=11) were overweight (P=0.000). There was no documentation of morbid obesity in our study. The most common microvascular complication of diabetes found in our patients was microalbuminuria (50%, n=25) followed by grade I diabetic retinopathy in 30% (n=15) (P=0000). The commonest type of ACS encountered in our study was STEMI (80%, n=40). NSTEMI and Unstable Angina (UA) accounted for 10% each (P=0.000) [11]. Knowler WC, et al. reported that out of 135 patients studied, STEMI was found in 71.1% (n=96), NSTEMI in 8.9% (n12) and unstable angina in 20% (n=27). The commonest complication of ACS encountered in our study was hypotension, which was found in 24% (n=12) of patients (P = 0.000). The Echocardiographic parameters were analyzed which showed that 82% (n=41) (P=0.000) of our patients had systolic dysfunction and 66% (n=33) (P=0.000) had diastolic dysfunction (63% of these patients also had hypertension). The ejection fraction in 44% (n=22) of our patients were in the range of 41-50% and in 4% (n=2) of patients EF was <30% (P=0.001).The HbAlc values of our patients were in the range of 5.7 - 10.1. About 62% (n=31) of patients had Aic value >7% and 18% (n=9) had Aic > 9% (P = 0.005) [12]. Kolodgie FD, et al. in their study found that 63% of diabetic patients with ACS had HbAlc > 7.5% [13].

Conclusion

A majority of diabetic patients developing acute coronary syndrome have poor glycaemic control as reflected by their HbAlc levels. The coronary event is likely to occur sooner after the detection of diabetes if good glycaemic control is not achieved. A majority of patients suffering from STEMI with a mean EF of 43%. Patients with microalbuminuria are more prone to develop ACS. Exercise, in the form of regular day to day activities, does not achieve satisfactory glycaemic control and cannot prevent the development of adverse complications of diabetes. The results showed that diabetics, whose A1c level >7% had a higher incidence of ACS especially STEMI, with resultant systolic

dysfunction. The presence of co-morbidities and substance abuse contributed significantly to the development of ACS. A fair percentage of patients also suffered from microvascular diabetic complications. Thus, poor glycemic control (A1c >7%) in diabetics, is a definite pre-disposing factor in the development of ACS with attendant complications.

Acknowledgments

The author would like to thank the Professors, Post Graduates, Hospital staffs of Medicine Department and ICUs of Raja Muthiah Medical College, Annamalai University, Chidambaram, Tamil Nadu, India for being a full support to complete the research work successfully.

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