

Evaluation of risk factors and in-hospital outcomes in patients with coronary artery disease in a tertiary care teaching hospital

Faizal P¹, Leelavathy D. Acharya^{1*}, Padmakumar R², Krathish Boppana³. Sureshwar Pandey¹

¹Department of Pharmacy Practice Manipal College of Pharmaceutical Sciences, Manipal-576 104.India.

²Department of Cardiology. Kasturba medical College, Manipal-576 104.India.

³Manipal Acu Nova Limited

*Email: leela.da@manipal.edu, leela_acharya@yahoo.co.in
Phone no- 0828- 2922403 (office)

Abstract: Cardiovascular disorders are estimated to be the leading cause of mortality world wide. Among them, acute coronary syndrome (ACS) has the highest incidence and extensive mortality. It has been long recognized that ACS risk factors increase the likelihood of disease. Clinical research studies have demonstrated that effective ACS risk factor reduction results in decreases in ACS morbidity and mortality. Present study is aiming at to assess various risk factors and in-hospital outcomes of patients with acute coronary syndrome. Study is carried out in the department of cardiology in Tertiary Health Care Hospital in South India. Prospective data were collected for one and half year by the investigator during regular ward rounds. Data collected were evaluated for the following parameters such as demography, risk factor and in-hospital outcome. A total of 253 patients were admitted for the management of ACS. The average age of study population was found to be 61.07±11.38 years. Occurrence of ACS was highest [154(60.87%)] in the range of 55-74 years. Majority of them were males [204(80.63%)] .

Among the risk factors of ACS, dyslipidaemia (79.28%) was most common, followed by hypertension (54. 92%), diabetes (43.51%) and smoking. out of 253 ACS patients 99(39.13%) patients had various in-hospital outcomes. The average length of hospital stay for ACS patients was found to be 6.4 ± 3.5 days. This study provides a valuable reference data on the risk factors and in-hospital outcomes of acute coronary syndrome. By taking care of risk factors, one can reduce the incidences of ACS.

Keywords: Acute coronary syndrome, risk factors, in-hospital outcomes

INTRODUCTION

"In earlier times, starvation consigned languishing bodies to death; now, prosperity plunges them into the grave"
—Lucretius

Coronary artery disease (CAD) has probably affected human beings throughout history, but it is only in the last century or so that it has emerged as a leading cause of death. In the early 20th century the medical profession gave widespread recognition to CAD as a major cause of death. In industrialized nations, these advances in public health coincided with lifestyle changes, such as adoption of a diet high in meat and other fatty foods, an increase in cigarette smoking, and a more sedentary life-style. It was at this time that the death rate from heart attacks began to soar.¹

The last century has seen a rapid increase in the global prevalence of CAD. An estimate from the Global Burden of Disease Study (GBDS) says that India faces the greatest burden due to CAD². Projection on mortality rates due to CAD in India clearly indicates nearly 100% increase in the rates from 1985 to 2015. While decline in CAD mortality has been demonstrated among some industrialized countries, the reverse trend appears to be seen in developing countries. This could be explained by the epidemiological transition occurring in these countries³. Indeed, the total number of CAD deaths from China and India equals that of the CAD deaths contributed by all developed countries put together. A marked ethnic diversity has been well documented in the prevalence of CAD with Indians having a higher prevalence of premature CAD⁴.

It has been long recognized that a group of conditions or CAD risk factors increase the likelihood of CAD. Furthermore, a number of risk factors are associated with CAD and may act as predisposing conditions. Many other putative risk factors have been identified; these remain the subject of clinical investigation and ongoing epidemiologic research. Importantly, clinical research studies have demonstrated that effective CAD risk factor reduction results in decreases in CAD morbidity and mortality⁵.

OBJECTIVE

To assess the risk factors and in-hospital outcomes of patients with acute coronary syndrome.

MATERIALS AND METHODS

Duration

This was an observational study done for the period of one and half year (Aug 2005 to Jan 2007), conducted in the cardiology unit of tertiary care teaching hospital in South India. Ethical clearance was obtained from the Institutional Ethics Committee.

Criteria for Enrollment

The study group consisted of all the patients admitted in the Cardiology unit with chief diagnosis of acute coronary syndrome.

Materials

Case record form (CRF) - Contents of CRF include hospital number, demography of patient, date of admission, date of discharge, complaint on admission, risk factor, medical and medication history, diagnosis, investigations and procedures, physical findings, and in-hospital outcome. **(Appendix-A).**

APPENDIX-A

CASE RECORD FORM DEPT.OF PHARMACY PRACTICE,MCOPS,MANIPAL						
Patient name:		Age:		Sex: M/F		Hosp no:
IP no:		DOA:		DOD:		LOHS:
Complaints on admission:						
Medical history:				Previous treatment:		
Final diagnosis:						
In-hospital outcome:						
RISK FACTORS FOR ACS						
Dyslipidaemia	TC>200	LDL>100	TG>150	HDL<40	Smoking	
Hypertension					Sedentary life style	
Diabetes mellitus					High fat consumption	
Obesity					Vegetarianism	
Hyperhomocysteinemia					Family history	
Lipoprotein A					Stress	
Investigations:		Physical Findings:			ECG:	
TC:	FBS:	BP: (mm Hg)			PR: (/min)	RR: (/min)
TG:	RBS:					
HDL:	PPBS:	Height: (m)			Weight: (Kg)	BMI: (Kg/m ²)
LDL:	GlyHb:					
TC/Hc:	WBC:	Waist: (cm)			Hip: (cm)	Waist/Hip:
CK:	CKMB:					
TROP:	Hb:	Others:				
K ⁺ :						

Data Collection

Data's were collected from the sources of data maintained in the study site such as patient case records and daily admission list maintained by medical records department (MRD).

Modality of operation and Data analysis

Patients were included as per study criteria during study period. Case records of each patient were reviewed and relevant data were collected in CRF. Data collected were evaluated for the following parameters such as risk factors and in-hospital outcome.

Demographic data considered were age, gender and diagnosis. In age, the patients were classified in to six groups as ≤ 34 , 35-44, 45-54, 55-64, 65-74, ≥ 75 years. Diagnosis based on ECG, which include the different type of ACS such as UA, NSTEMI and STEMI.

As it was observational study risk factors which were mentioned in the patient's case record only considered. The risk factors followed were age, gender, dyslipidaemia, hypertension, diabetes mellitus, obesity, hyperhomocystinemia, lipoprotein A, smoking, sedentary life style, high fat consumption, vegetarianism, family history, and stress. Patients with dyslipidaemia were identified after reviewing laboratory reports for their lipid profiles. A criterion to define the dyslipidaemia was any of the following: total cholesterol ($>200\text{mg/dl}$), LDL cholesterol ($>100\text{mg/dl}$), triglycerides ($>150\text{mg/dl}$) and HDL cholesterol ($<40\text{mg/dl}$). Random blood sugar (RBS) on admission and glycosylated hemoglobin were used to understand the diabetes or glucose in tolerance. Random blood sugar level was classified in to three category, such as low ($<133\text{mg/dl}$), medium ($133\text{-}182\text{mg/dl}$) and high ($>182\text{ mg/dl}$). According to hospital standard glycosylated hemoglobin was categorized in to normal ($4.5\text{-}6.5\%$) and high ($>6.5\%$). Description about obesity was available in some patient case record, other wise calculated from the available weight and height details. As per the body mass index, patients were classified in to normal ($18.5\text{-}24.9\text{ kg/m}^2$), over weight ($25\text{-}29.9\text{ kg/m}^2$) and obese ($>30\text{ kg/m}^2$). Abdominal obesity was represented as waist circumference and waist/hip ratio. The waist circumference less than 102cm in male and less than 88cm in female were considered as normal. Similarly waist/hip ratio less than 0.95 in male and 0.85 in females where considered normal. To measure sedentary life, information available in the patient case record was insufficient. Occupations were considered here to analyze sedentary life style since sedentary life was mainly depends on the occupation of patient.

In-hospital outcome measured were the patient conditions during the hospital stay. In-hospital outcome also includes interventional procedure such as percutaneous transluminal coronary angioplasty (PTCA), PTCA with stent and coronary artery bypass graft (CABG), and adverse drug reaction to the cardiac medication such as bleeding, thrombocytopenia etc. Average length of

hospital stay was also used as in-hospital outcome. Length of hospital stay was calculated by using the time and date of admission and discharge. In case if discharge time is not available 12.00 noon was considered as discharge time. Descriptive statistics were performed for baseline characteristics, risk factors and in-hospital outcomes. Data were presented as percentages for categorical variables with group comparisons made using chi-square tests. The variables considered were, age group and gender.

RESULT

During the study period, a total of 253 patients were admitted for the management of acute coronary syndrome. Majority of patients with ACS were male [204 (80.63%)]. The average age of the study population was found to be 61.07 ± 11.38 years. Occurrence of ACS was highest [154(60.87%)] in the age range of 55-74 years. Graphical representation is given in **figure 1**.

Risk factor

Among study population evaluated for the presence of risk factors, dyslipidaemia (79.28%) was found to be most prominent, followed by hypertension (54.92%), diabetes (43.51%) and smoking (43.48%). Details are shown in **table 1**.

a) Hypertension and diabetes were more prevalent risk factors observed in female (65.76% and 51.00%) compared to male (52.55% and 41.54%) respectively. There was a higher prevalence of smoking as risk factor in male (51.46%). Graphical representation is given in the **figure 2**.

b) Dyslipidaemia

Among 253 patients, lipid profile data was available for 222 patients. Majority of the patient had high LDL cholesterol (48.20%) and low HDL (41.44%). Details are shown in **table 2**.

c) Diabetes

Among 253 patients, random blood sugar (RBS) and glycosylated hemoglobin details were available for 224 and 74 patients respectively. RBS of 93(41.52%) patients out of 224 patients and glycosylated hemoglobin of 46 (62.16%) patients out of 74 patients were high. Details are mentioned in **table 3**.

d) Obesity

Out of 253 patients BMI data was available only for 35 patients, out of this 12(34.29%) patients were over weight and 4(11.43%) patients were obese. Details are given in **table 4**. Data of waist circumference and waist/hip ratio were available only for 14 patients. Among 14 patients waist circumference and waist/hip ratio were above the limit for 5 (35.71%) and 11 (78.57%) patients respectively. Details are mentioned in **table 5**.

e) Sedentary life style

Among 253 patients admitted with ACS, 57 (22.53%) patients were house wife followed by agriculturist [36 (14.23%)] and retired government employees [27 (10.67%)]. 30 (11.86%) were unemployed. Details are mentioned in **table 6**

In-hospital outcome of ACS

Out of 253 ACS patients 99 (39.13%) patients had various in-hospital outcomes. Among 99 patients 41 patients were died with mortality rate of 16.21% and 54 (21.34%) patients underwent interventional procedure. Other major in-hospital outcomes are left ventricular failure [33 (13.04%) patients] and cardiogenic shock [31 (12.25%) patients]. Details are mentioned in **table 7**.

Among 99 patients who had in-hospital outcomes, 46 (40.68%) patient had only one outcome whereas others shown more than one in-hospital outcome. Details are shown in **table 8**.

A total of 41 patients died among 253 patients admitted with ACS. Maximum patients died between 4 and 12 hours after hospital admission [8 (19.51%) patients]. Around 70% patients died with in two days. Details are shown in **table 9**

The average length of hospital stay for ACS patients was found to be 6.4 ± 3.5 days. Details are given in **table 10**.

Among 137 patients who underwent coronary angiography (CAG) 54, 37 and 38 patients had single, double and triple vessel disease respectively. Major coronary vessel affected was LAD, followed by RCA vessel. Details are shown in **table 11**.

Fig. 1. Age wise distribution of occurrence of ACS

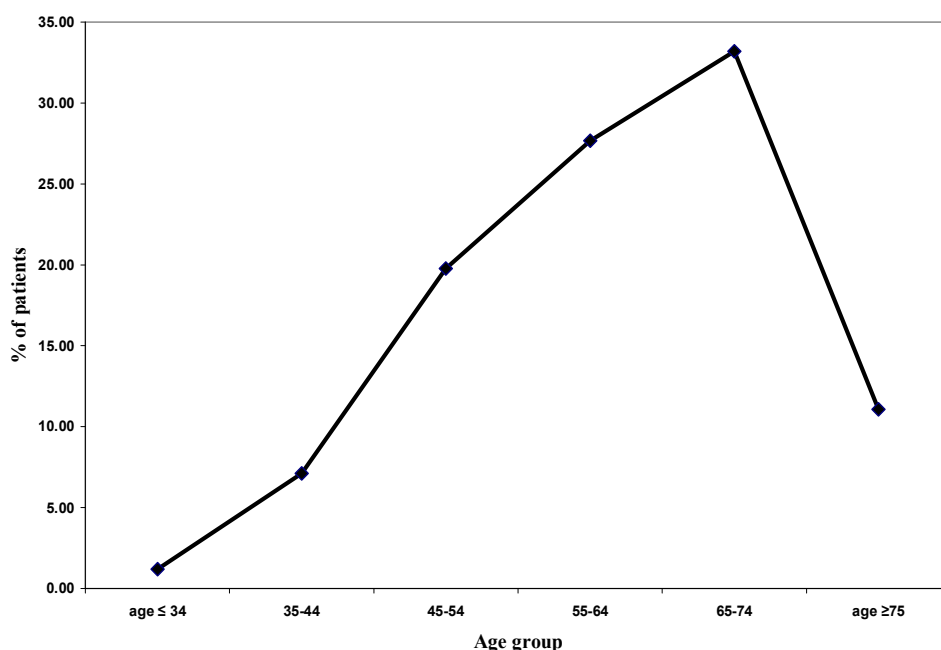
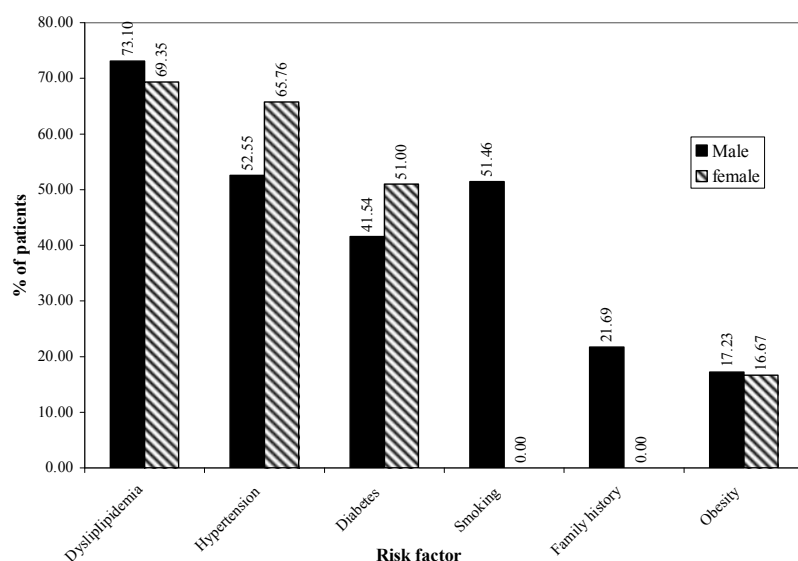


Table 1. Risk factors for ACS

S.No	Risk factor	Total No. of patients among them related risk factors data were available	No. of patients had risk factor (%)
1	Dyslipidaemia	222	176 (79.28)
2	Hypertension	244	134 (54.92)
3	Diabetes	239	104 (43.51)
4	Smoking	230	100 (43.48)
5	Family history	61	8 (13.11)
6	Obesity	35	4 (11.42)

Fig.2 Gender wise comparison of risk factors for ACS**Table 2. Dyslipidaemia**

S.No	Dyslipidaemia	No. of patients (n =222) (%)
1	Total cholesterol(TC) >200 mg/dl	57 (25.68)
2	LDL cholesterol >100 mg/dl	107 (48.20)
3	Triglycerides >150 mg/dl	66 (29.73)
4	HDL cholesterol <40 mg/dl	92 (41.44)
5	TC/HDL >5	57 (25.68)

Table 3. Blood glucose parameters

S.No	Blood sugar parameters		No. of patients (%)
1	Random blood sugar (mg/dl) (n=224)	Low (<133 mg/dl)	81 (36.16)
		Medium (133-182 mg/dl)	50 (22.32)
		High (>182 mg/dl)	93 (41.52)
2	Glycosylated hemoglobin (n=74)	Normal (4.5-6.5%)	28 (37.84)
		High (>6.5%)	46 (62.16)

Table 4. Obesity

S.No	Body mass index (Kg/m ²)	No. of patients (n =35) (%)
1	Normal (18.5-24.9)	19 (54.29%)
2	Over weight (25-29.9)	12 (34.29%)
3	Obesity (≥30)	4 (11.43%)

Table 5. Abdominal obesity

S.No	Abdominal obesity parameters	No. of patients (n=14) (%)	
		With in limit	Above than limit
1	Waist circumference	9 (64.29)	5 (35.71)
2	Waist/Hip ratio	3 (21.43)	11 (78.57)

Table 6. Occupation of study population

S.No	Occupation	No. of patients (n=253) (%)
1	Agriculture	36 (14.23)
2	Accountant	2 (0.79)
3	Business	21 (8.30)
4	Bank employee	4 (1.58)
5	Carpenter	2 (0.79)
6	Conductor	1 (0.40)
7	Contractor	2 (0.79)
8	Cook	1 (0.76)
9	Coolie	3 (2.29)
10	Driver	8 (3.16)
11	Doctor	2 (0.76)
12	Engineer	1(0.40)
13	Fishing	4 (1.58)
14	Gold smith	1 (0.40)
15	House wife	57 (22.53)
16	Industrialist	2 (0.79)
17	Labor	6(2.37)
18	Merchant	1 (0.40)
19	Police	3 (1.19)
20	Retired	27 (10.67)
21	Religious work	2 (0.76)
22	Service	22 (8.70)
23	Tailure	1 (0.40)
24	Teacher	3 (1.19)
25	Technician	1 (0.40)
26	Unemployed	30 (11.86)
27	Unknown	1 (0.76)

Table 7. In-hospital outcomes of ACS patients

S.No	In-hospital outcome	No. of patients (n=253) (%)
1	Death	41 (16.21)
2	Cardiogenic shock	31 (12.25)
3	Cardiac arrest	10 (3.95)
4	Complete heart block	22 (8.70)
5	Renal failure	26 (10.28)
6	Rhabdomyolysis	2 (0.79)
7	Ventricular tachycardia	6 (2.37)
8	Left ventricular failure	33 (13.04)
9	Pulmonary edema	13 (5.14)
10	Post infraction angina	3 (1.19)
11	Pericarditis	3(1.19)
12	Atrial fibrillation	2 (0.79)
13	Respiratory failure	12 (4.74)
14	Thrombocytopenia	1 (0.40)
15	Septicemia	2 (0.79)
16	Bleeding	2 (0.79)
17	AV block	1 (0.40)
18	Ventricular septal relapse	1 (0.40)

Table 8. Number of in-hospital outcomes

S.No	No. of In-hospital outcome	No. of patients (n=99) (%)
1	One	46 (46.46)
2	Two	19 (19.19)
3	Three	20 (20.20)
4	Four	6 (6.06)
5	Five	7 (7.07)
6	Six	0 (0.00)
7	Seven	1 (1.01)

Table 9. Time of death after hospital admission

S.No	Time of death	No. of patients (n=41) (%)
1	<1hr	1 (2.44)
2	1-2hr	5 (12.20)
3	2-4hr	4 (9.76)
4	4-12 hr	8 (19.51)
5	12-24hr	5 (12.20)
6	1-2days	7 (17.07)
7	2-4days	4 (9.76)
8	4-8 days	6 (14.63)
9	8-12 days	0 (0.00)
10	>12days	1 (2.44)

Table 10. Length of hospital stay

S.No	Diagnosis	Length of hospital stay (days)
1	UA/NSTEMI	6.1 ± 3.2
2	STEMI	7.3 ± 2.6
3	ACS	6.4 ± 3.0

Table 11. Major coronary vessels affected

S.No	Major coronary vessels affected	Vessels affected		
		Single	Double	Triple
1	LAD	38	35	38
2	RCA	16	31	38
3	LCx	0	8	38
4	LDA + RCA	-	29	-
5	LAD + LCx	-	6	-
6	RCA + LCx	-	2	-
7	LAD + RCA + LCx	-	35	38

DISCUSSION

The present study was conducted in the Cardiology unit of a tertiary care teaching hospital of south India for the duration of one and half year. Risk factors and in-hospital outcomes were studied.

The demographic data shows that the patient population in this study is similar to other high-risk coronary heart disease populations shown in other studies.⁶⁻¹² Mean age of study population was 61.07±11.38 years, which is comparable to studies by OASIS registry⁸, Jose et al⁶ and Lundberg V et al¹³. In comparison to our study the average age in other studies such as BLITZ⁷ (67.0±12.5),

ENACT¹⁰ (64.5), PRAIS-UK¹¹ (66±12) and Euro heart survey (EHS)¹⁴ (64.6±12.5) were higher. Present study showed predominance of male (80%) with early onset of ACS as compared to females, which shows the similarity with Jose et al⁶ study. Women appear to be less susceptible to CHD than men although they seem to lose this protection after the menopause, presumably because of hormonal changes.

Dyslipidaemia was the most prevalent risk factor for ACS, [79.28%], which is high when compared to other studies such as EHS¹⁴ and Kramer JM et al¹² study.

Among dyslipidaemia patients most of them had high LDL cholesterol and low HDL cholesterol. Although South Asians have been known to have comparable total cholesterol and LDL cholesterol level compared to Afro Caribbeans and Whites, but they do have lower HDL cholesterol and high triglyceride level.¹⁵

Second prevalent risk factor observed was hypertension (54.92%), which is comparable to other studies such as BLITZ⁷, EHS¹⁴, ENACT¹⁰ and Kramer et al¹². Whereas in Jose et al⁶ study and CREATE¹⁶ registry showed less prevalence of hypertension. Diabetes as a risk factor in present study is 43.51%, which is comparable to Jose et al⁶ and CREATE¹⁶ registry. The prevalence of diabetes in present study is double when compared to BLITZ⁷, EHS¹⁴, ENACT¹⁰, PRAIS-UK¹¹ and Kramer JM et al¹² study. Laboratory data on random blood sugar and glycosylated hemoglobin shows the major number of uncontrolled diabetes population in present study. Present study shows that the females have high prevalence of diabetes and hypertension than males which is comparable to Jose et al⁶ and MONICA project¹³.

Family history as a risk factor for ACS was 13.11% in the retrospective study, which is comparable to Jose et al⁶ study. Abdominal obesity reported in the study was in 11 (78.57%) patients out of 14 patients. We could not reach any conclusion about abdominal obesity as risk factor for ACS since the patient population is less, whereas Guha S et al⁹ study support the abdominal obesity as a risk factor for Indian population.

Smoking prevalence reported in the study was 43.48% which is comparable to Jose et al⁶, ENACT¹⁰ and Kramer et al¹² study. Occupation of the patient was used as a parameter to understand the sedentary life style. Housewife and agriculturist occupy around 22% and 14% respectively in present study, but in general as we know that they are not sedentary, their predominance might be due to increased proportions of them in the total population of this area. Among study population 12% were unemployed and 10% were retired from government service in both retrospective and prospective part of the study.

Maximum patients among those who had in-hospital outcomes were having only one in-hospital outcome, followed by two and three in-hospital outcomes. Cardiogenic shock and cardiac arrest were high when compared to other studies such as EHS¹⁴ and GRACE¹⁷ study. Pulmonary edema reported in present study is

comparable with EHS¹⁴ and GRACE¹⁷. Reinfarction reported in our study is comparable with EHS¹⁴ and GRACE¹⁷, whereas it is contrary to Jose et al⁶, PRAIS-UK¹¹ and DESCARTES¹⁸ study. Renal failure reported in present study is higher than reported in other studies such as EHS¹⁴ and GRACE¹⁷. Bleeding reported in present study was comparable to EHS¹⁴, PRAIS-UK¹¹ and Jose et al⁶ study. Length of hospital stay (LoHS) reported in present study is comparable to other studies such as GRACE¹⁷, Jose et al⁶ and Saleh SS et al¹⁹. LoHS in the present study is less than reported by other studies such as BLITZ⁷ and ENACT¹⁰. Maximum death happened within two days of admission; this may be due to attrition of the sickest, who get referred to this tertiary center.

Mortality rate in the present study is 16.21%, which was comparable to Western and Asian study wherein mortality of 15%²⁰ and 16.90%⁶ respectively were documented. As per cardiologist which is the reflection of referral patterns, whereby most ACS, especially UA are treated by local physician and only high risk cases like anterior wall MI are referred to tertiary care institution. The mortality rate was more in females compared to males.

LIMITATION

The results of this survey should not be generalized to all medical centers within this region since the study was conducted at only one center. As it was an observational study risk factors documented in the patients case records could only be followed. Since maximum patients were bed ridden on admission we could not measure weight, height and abdominal obesity, which tends to change in due course of hospital stay.

CONCLUSION

An observational study from Aug 2005 to Jan 2007 was conducted in the Cardiology unit of a South Indian tertiary care teaching hospital. Distribution of acute coronary syndrome was highest in age range of 55-74 years. Study showed male predominance over female. Mortality rate in present study was comparable with Western and Asian studies. Dyslipidaemia and hypertension were the commonest risk factors in present study. Death, cardiogenic shock, complete heart block, renal failure, left ventricular failure and pulmonary edema were the major in-hospital outcomes. This study provides a valuable reference data on the and in-hospital outcomes of acute coronary syndrome. It also indicates the need for additional regional databases to broaden our understanding on risk factor and in-hospital outcome.

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