
Prevalence, Presenting Complaints, Risk Factors and Comorbidity of Acute Coronary Syndrome at Orotta National Referral Hospital Intensive Care Unit Eritrea: Retrospective Study

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Abstract: Coronary Heart Disease (CHD) being one of the major manifestations of atherosclerotic cardiovascular disease, it ranks a third for all deaths above the age of 35 in developed countries. It is the principal cause of mortality globally for greater than 4.5 million people in the developing world with a relative lack of preventive measures implemented. Eighty percent of deaths due to Cardiovascular Diseases (CVD) occur in developing countries. CHD rates are expected to increase in developing countries mainly South East Asia, Sub-Saharan Africa, Latin America, and the Middle East; from 9 million in 1990 to 19 million by 2020. This Retrospective study was carried out to assess the Prevalence, Presenting Complaints, Risk factors and Comorbidity of Acute Coronary Syndrome (ACS) at Orotta National Referral Hospital Intensive Care Unit, Asmara, Eritrea. Hospital based Retrospective record review study of ten years was done on clinical cards of patients. The study results revealed an overall prevalence of 8.5 percent. ACS was observed to increase with an increasing age, being higher in 164 patients (55%) who are in the age group greater than sixty. Majority (86.6%) of admissions were reported as from zoba Maekel. It was observed to increase in males than females with 3.66 to 1 ratio of male to female. Chest pain was documented as a chief complaint (85.23%). The average length of hospital stay until discharged or death was found to be 11 days. Comorbidity between Hypertension, Diabetes and ACS was documented as 55.4 percent showing a significant association (P Value= 0.001). The study results also revealed a significant association between sex and, NSTEMI and STEMI at a P- value = 0.003, but no any association was found among NSTEMI and STEMI, and age, smoking, cholesterol level, Diabetes and Hypertension. In conclusion, this study revealed that ACS is increasing in Eritrea as any other developed and developing countries. The association between sex and, NSTEMI and STEMI which may be attributed to modifiable behavioral risk factors that are gender related. Therefore, the study recommends to Clinicians to ask and record, family history of premature CHD death, duration of Diabetes, Hypertension and other chronic cardio-pulmonary diseases, all diagnostic investigations and specific medications that are used for the management of the disease and good outcome.

Keywords: Coronary Heart Disease, Acute Coronary Syndrome, Intensive Care Unit, Presenting Complaints, Risk Factors, Comorbidity

1. Introduction

Coronary Heart Disease (CHD) being one of the major manifestations of atherosclerotic cardiovascular disease, it ranks a third for all deaths above the age of 35 in developed countries [1]. Eighty percent of deaths due to Cardiovascular Diseases (CVD) occur in developing countries and CHD is the principal cause of mortality globally for greater than 4.5 million people in the developing world with a relative lack of preventive measures implemented [2, 3]. CHD rates are expected to increase in developing countries (South East Asia, sub-Saharan Africa, Latin America, and the Middle East) from 9 million in 1990 to 19 million by 2020 due to aging, nutritional change, physical inactivity, tobacco and alcohol use [2, 3]. It was projected to reduce by 24 -50 percent in mortality since 1975, but still it is the leading cause of death in affluent countries [4]. A study that was done before twenty years indicated that the prevalence of CHD in Africa as rare because of low socioeconomic status [5]. Age-standardized mortality rates due to CHD was predicted to rise by 27 percent and 25 percent in men and women in 2015 and it was projected also to rise by 70 and 74 percent by 2030 in African men and women, respectively. This is probably due to surge of the risk factors such as hypertension, diabetes mellitus, obesity, physical inactivity, increased tobacco smoking and dyslipidaemia. The nutritional, demographic and epidemiologic transitions are causing an increase in the epidemics of noncommunicable disease [6].

A systematic review that was done by Hertze et al. (2014), on seven observational studies that included 92,378 participants from 5 countries (South Africa, Sudan, Nigeria, Senegal, and Kenya); indicated that the prevalence of acute myocardial infarction was ranging from 0.1 to 10.4 percent [7]. A study by Yusuf et al. (2004), that included 28 000 subjects from 52 countries revealed 90 percent of the attributable risk factors for acute myocardial infarction were hypertension, diabetes, central obesity, dyslipidaemia, physical inactivity, psychological stress, tobacco use, inadequate intake of fruits and vegetables and alcohol intake [8]. Similar study by Steyn et al. (2005), also documented similar attributable risk factors such as dyslipidaemia, abdominal obesity and tobacco use with higher risk in comparison to hypertension and diabetes [9]. A study that was done at Teaching Hospital in Nigeria, by Joseph, for a ten year analysis of cases, documented the most common presenting symptoms of acute coronary syndrome as extreme weakness, sweating, and left ventricular failure and sever

chest pain; in addition the study also revealed the prevalence of transmural infarct (Q wave infarct) as 38.5 percent [10]. A five years retrospective study on Myocardial Infarction (MI) by Seyoum & Leake (2002), from 1997 to 2001, at Halibet National Referral Hospital, Asmara, Eritrea documented the incidence of acute Myocardial Infarction as 4.35 per 1000 admissions. The study results indicated also the average age of patients as 60 years with 5 to 1, male to female ratio. The study documented the major modifiable and non-modifiable risk factors such as smoking, uncontrolled hypertension, diabetes mellitus. Mortality rate was reported to be 35.8 percent which is concordant with studies that were done in the United States, mainland Europe [11]. According to WHO (2011), in Eritrea the prevalence of cigarette smoking was 6 percent (13% for men and less than 1% for women); and in 2010 the prevalence of total alcohol per capital consumption, raised blood pressure and obesity were reported to be 1.1 percent, 23.2 percent and 1.5 percent, respectively [12]. There are studies that reported the prevalence of MI which is close prevalence of Coronary Artery Disease (CAD), including ST elevation MI and non ST elevation MI [13].

2. Materials and Methods

A ten year hospital based retrospective record review study was done on patients who were admitted to Orotta National Referral Hospital Intensive Care Unit (ONRH-ICU), from 2005 to 2015 for assessing the Prevalence, Presenting Complaints, Risk factors and Comorbidity of Acute Coronary Syndrome (ACS). The patients were selected based on World Health Organization (WHO) criteria, International Classification of Diseases (ICD) -10 Code: I 23 [14]. Data was collected from the In-Patient Medical Department (IPMD) log book using a structured questionnaire. After data collection the data was entered in to excel sheet, cleaned and then exported to SPSS version 20 for analysis

3. Results

3.1. Prevalence of ACS from 2005 to 2015

In the 10 years period from 2005 to 2015, a total of 3503 patients were admitted to Orotta National Referral Hospital Intensive Care Unit (ONRH-ICU). Out of these 298 patients were admitted with the diagnosis of ACS. The admission rates of ACS cases in ONRH- ICU had showed a gradual increase in the last 10 years, from 2005 (6%) to 2015 (10.5%) with an average increase of 8.5 percent (Table 1).

Table 1. Total admission and prevalence of ACS.

Year of Admission	Patients admitted to ONRH-ICU (N)	Patients admitted to ONRH-ICU (N)	Patients with ACS (%)
2005	265	16	6.0
2006	354	22	6.2
2007	253	20	7.9
2008	353	16	4.5
2009	283	19	6.7
2010	326	31	9.5
2011	299	24	8.0

Year of Admission	Patients admitted to ONRH-ICU (N)	Patients admitted to ONRH-ICU (N)	Patients with ACS (%)
2012	306	37	12.1
2013	339	35	10.3
2014	323	36	11.1
2015	402	42	10.4
Total	3503	298	8.5

3.2. Background Information

Majority (92%) of the patients with ACS were married. The admission flow was higher (86.6%) from Zoba Maekel. Majority (81.54) of the patients were Christian by religion.

There was no single admission from Debubawi Keih-Bahri Zone but the results showed 1.68 percent (n=5) of foreigners and from diaspora, of which 1.01 percent (n=3) were Indians (Table 2).

Table 2. Background information of Patients with ACS.

Variable	Frequency (n)	Percent (%)
Age		
20-29	6	2.02
30-39	29	9.76
40-49	42	14.14
50-59	56	18.86
60-69	74	24.92
70+	90	30.30
Missed	1	0.34
Total	298	100
Sex		
Female	64	21.48
Male	234	78.52
Total	298	100
Zone		
Maekel	258	86.58
Debub	15	5.03
Gash Barka	7	2.35
Anseba	6	2.01
Semenawi Keih-Bahri	7	2.35
Foreigners/Diaspora	5	1.68
Total	298	100
Religion		
Christian	243	81.54
Moslem	50	16.78
Hindu	3	1.01
Missed	2	0.67
Total	298	100
Marital status		
Married	275	92.28
Single	23	7.72
Total	298	100

The ten year results showed an increase trend of ACS with increasing age being higher in 164 patients (55%) who are in in the age group greater than sixty. ACS was observed to increases in males than females with the increase of patients age (Table 3). The male (n=234) to female (n=64) ratio was 3.66 to 1.

Table 3. Age, Sex and Distribution of Patients with ACS.

Age	Female	Male	Total Number of patients with ACS
20 – 29	0	6 (100%)	6
30 – 39	6 (20.69%)	23 (79.31%)	29
40 – 49	11(26.19%)	31(73.81%)	42
50 – 59	9 (16.07%)	47 (83.93%)	56
60 – 69	16 (21.62%)	58 (78.38%)	74
70+	22 (24.44%)	68 (75.56%)	90
Missed	0	1(100%)	1
Total	64 (21.48%)	234 (78.52%)	298

3.3. Presenting Complaints, Length of Hospital Stay and Referral

Majority (85.23%) of patients presented chest pain as a chief complaint whereas shortness of breath, epigastric pain, palpitation and others were found to be 6 percent, 4 percent 1.3 percent and 3.4 percent, respectively (Table 4).

Table 4. Presenting complaints in patients with ACS.

Variable	Frequency (n)	Percent (%)
Chest Pain	254	85.23
Shortness of Breath (SOB)	18	6.04
Epigastric Pain	12	4.03
Others	10	3.36
Palpitation	4	1.34

Others* include= Generalized body weakness, fall down, loss of consciousness and seizure

The average length of hospital stay until discharged or death was 11 days. Majority (71.5%) of patients were self-referrals whereas 28.52 were referred from health facilities (Table 5).

Table 5. Hospital stay and Referral.

Variables	Frequency (n)	Percent (%)
Average Length of Stay in Days		
<5	50	16.78
5-9	99	33.22
10-14	74	24.83
15 and above	75	25.17
Total	298	100
Referral		
Facility Referral	85	28.52
Self-Referral	213	71.48
Total	298	100

3.4. Prevalence of Risk Factors and Co-Morbidity

Table 6. Risk factors in patients with ACS.

Variable	Frequency (n)	Percent (%)
Smoking		
No	110	36.9
Yes	54	18.1
Missed	134	44.97
Total	298	100
Hypertension		
No	189	63.42
Yes	109	36.58
Total	298	100
Diabetes		
No	206	69.13
Yes	92	30.87
Total	298	100

The prevalence of smoking in patients with Acute Coronary Syndrome (ACS) who were admitted to Orotta National Referral Hospital Intensive Care Unit (ONRH-ICU) from 2005 to 2015 was recorded for 164 out of 298 patients with ACS having 33 percent (n=54) as smokers and 67 percent (n= 112) as nonsmokers. In one third of patients with ACS hypertension and diabetes were observed to be as risk

factors with a prevalence of 37 and 31 percent (Table 6).

Comorbidity between Hypertension and Diabetes in ACS patients was documented in 55.4 percent (n=51) of the patients which was found to have significant association (P Value= 0.001) (Table 7).

Table 7. Comorbidity between Hypertension and Diabetes in patients with ACS.

Variable	Diabetic	Non Diabetic	Total	P value
Hypertensive	51	58	109	<0.001
Non Hypertensive	41	148	189	

The study results showed a significant association between sex and, NSTEMI and STEMI at a P- value = 0.003, whereas there was no any association among NSTEMI and STEMI, and age, smoking, cholesterol level, diabetes and hypertension (Table 8).

Table 8. Risk factors and type of MI.

Variable	NSTEMI		STEMI		Total		P value
	(n)	(%)	(n)	(%)	(n)	(%)	
Sex							
Female	22	34.92	42	17.87	64	21.48	0.003
Male	41	65.08	193	82.13	234	78.52	
Total	63	100	235	100	298	100	
Age							
20-29	2	33.33	4	66.67	6	100	0.863
30-39	8	27.59	21	72.41	29	100	
40-49	10	23.81	32	76.19	42	100	
50-59	10	17.86	46	82.14	56	100	
60-69	15	20.27	59	79.73	74	100	
70+	18	20	72	80	90	100	
Missed	-	-	-	-	1	0.33	
Total	63	100	234	100	297	99.7	
Smoking							
No	29	72.5	81	65.32	110	67.07	0.401
Yes	11	27.5	43	34.68	54	32.93	
Total	40	100	124	100	164	100	
Cholesterol							
Borderline high	6	22.2	21	77.8	27	100	0.969
Desirable	30	23.8	96	76.2	126	100	
High	3	21.4	11	78.6	14	100	
Total	39	-	128	-	167	-	
Diabetes							
No	46	22.3	160	77.7	206	100	0.45
Yes	17	18.5	75	81.5	92	100	
Total	63	21.1	235	78.9	298	100	
Hypertension							
No	39	20.6	150	79.4	189	100	0.779
Yes	24	22	85	78	109	100	
Total	63	21.1	235	78.9	298	100	

4. Discussion

Acute Coronary Syndrome (ACS) is increasing in Eritrea as many other developed and low -income developing countries mainly that include the Sub-Saharan African (SSA) countries. A gradual increase in the prevalence of Acute Coronary Syndrome was observed in the years from 2005 to 2015. The prevalence was observed to increase 6 percent

10.5 percent with an average increase of 8.5 percent. A four year retrospective study on clinical records of ICU patients that was done in 2002 at Halibet Regional Referral Hospital Intensive Care Unit (HRRH-ICU), Asmara, Eritrea recorded an admission rate of 4.7 percent of the total admission to the respective ICU [11]. This increase is resulted due to an epidemiological shift from communicable to non-communicable diseases which is mainly related to life style and nutritional change in the developed and developing countries. A prospective study that was conducted in Kenya, in the year 2008 – 2010 documented a prevalence of 5 percent [15]. Another systematic review study on acute myocardial infarction in five Sub-Saharan African (SSA) countries (2014), also noted a range of 0.1 to 10.4 percent which is similar with the above mentioned results [7].

A review conducted by Okrainec, Banerjee & Eisenberg (2004), concerning Coronary Artery Disease (CAD) for the years 1990 to 2002 in developing countries had showed an increase in prevalence being in the top of causes of death that could give a projection for doubling from 1990 to 2020 with an estimated increase of 82 percent in the developing countries which is attributed to rapid socioeconomic growth that leads to aggregated exposure to the risk factors, that include mainly diabetes, hypertension, and smoking [2]. In Eritrea as other developing countries the prevalence of Diabetes increased from (2.3%) in 2004 to (4.7%) 2010 [16, 17]. So this has congruence with the above studies that have been indicated in relation to the risk factors. As it is indicated in the study results as age was increasing an increase of ACS was observed to increase, this relational can be argued that in this era as a result of demographic change aging is a risk factor for many non-communicable diseases including ACS. This can be explained by the fact that atherosclerosis advances as the age of a person increases [18]. The disease was more prevalent in males (78.5%) than females (21.5%) with a ratio of 3.7 to 1, as well as 55 percent in the older age group greater than 60 years old. A review study that was done for SSA documented also a higher ratio of male predominating results ranging between 1.3 – 6 for males and 1 for female [6, 11]. This result can be argued that males experience more to the modifiable behavioral risk factors such as smoking, alcohol use and others which lead mainly to non-communicable diseases. Eritrea as developing country urbanization is increasing; the highly urbanized area is zoba Maekel which is proximal to the ONRH-ICU, the only ICU highly equipped in terms of material and human resource. Eritrea is a country with two religions Christianity and Muslim and almost about 55 percent of the populations are Christian. Alcohol consumptions in the Christian community is very common mainly connected to ceremonials as traditional drink (Suwa, Meiss etc...). As it is indicated in a National Survey that was conducted in 2004 and 2010 alcohol consumption increased from 28.3 to 38.2 percent, showing a positive association with the increased in prevalence of DM from 2.3 to 4.7 percent that may lead also to ASC as a risk factor [16, 17]. Even though no record was found alcohol consumption either directly or indirectly as a

risk factor it can supplement to the high prevalence of ACS.

The commonest complaint was chest pain (85%). As it is reported by most patients a similar result was documented in previous studies in showing that as the most common presenting complaint in 93.1 percent of patients with ACS [19]. The average stay in the ICU until discharged or death was 11 days which is higher than a study in Switzerland that recorder an average stay of 9.5 days is increased [20]. This increased admission days is justified by less equipped and trained personnel's in the low income countries health care facility setting. This was proved by a study that was done by Keller *et al.* (2012), a decrease of days of admission from 8 days to 6 days in NSTEMI patients and from 8 to 7 days in STEMI patients [21]. Majority of the patients were self-referrals because people are becoming aware with their disease and know that there is a need of sophisticated equipment and highly trained personnel for the management of any cardiovascular disease. This hospital is also equipped with spirometers, Electro Cardio- graph (ECG), perfusers, others materials and trained medical staff that are required for the management of acute emergency diseases that include cardio-pulmonary diseases.

The presence or absence of smoking habit was found to be recorded only for 164 patient clinical cards and it was missed for 134. Despite the missed once it was as prevalent as 32.9 percent but overall prevalence for the whole study population was found to be 18.1 percent which is higher than that of the total population smoking habit in 2004 (8.7%) and 2010 (2.2%) [16, 17]. Smoking is one of the main risk factors for ACS with attributable risk together with dyslipidemia of 2 out of 3 Globally [8]. Hypertension and diabetes were found to be almost equally prevalent as risk factors represented as 36.7 and 30.9 percent. This study results have similarity with a study that was conducted in Africa that showed 42.3 and 23.6 percent for hypertension and diabetes in patients with ACS; which is lower than that of European that documented hypertension and diabetes to be prevalent as 56 and 21 percent [9, 22]. Even though there are risk factors that should be studied in these patients but the data recordings were found to be weak in evaluating history of alcohol use, physical activity, nutritional habit, comorbidity with other infectious and non-infectious diseases and risk factors. A study that was conducted in 2004 and 2010 in Eritrea indicated that the prevalence of Alcohol consumption, Fruit and Vegetables consumption < 5 servings / day and Physical inactivity (< 600 MET minutes/ week) as; 28.3, 97.6 and 42.1 in 2004, and 38.2, 97.5 and 19.7 percent in 2010 [16, 17]. The study results indicated a prevalence of 30.87 and 36.58 percent for Diabetes and Hypertension. Comorbidity among these three diseases was observed with significant association. A cross sectional study that was done in 2000, in Saudi Arabia documented a comorbidity of Diabetes and Hypertension with a prevalence of 44.9 and 27.6 percent in patients with ACS which is higher for diabetes and lower for hypertension than this study [23]. Out of the 298 patients with ACS 51 (17.1%) were found to have both Diabetes and Hypertension, the study results indicated that a significant

association between diabetes and hypertension at a P value < 0.001. Therefore, from the above studies we can argue that comorbidity of hypertension, diabetes and ACS is evident. And clinicians should be aware of these diseases. The study results also revealed a significant association between sex and, NSTEMI and STEMI at a P-value = 0.003, but no any association was found among NSTEMI and STEMI, and age, smoking, cholesterol level, diabetes and hypertension

The study has limitations because it didn't include some modifiable risk factors such as Body Mass Index (BMI) and waist circumference which would have put light on the burden of obesity as a risk factor and other types of diagnostic and treatment modalities. But as the study is based on retrospective review of clinical cards it gives information as a base line study.

In conclusion, this study revealed that ACS is increasing in Eritrea as any other developed and developing countries is experiencing. ACS is fatal and its short-term outcome includes MI which is an immediate killer. Eritrea is facing this problem as a result of some modifiable behavioral risk factors such as; alcohol consumption and sedentary lifestyles of which are the great risk factors in developing CAD. The study also indicated that the association between sex and ACS which may be attributed to modifiable behavioral risk factors that are gender related. Therefore, the study recommends to Clinicians to pay attention for the management of patients with ACS through detailed questioning and record review, asking family history of premature CHD death, existence and duration of Diabetes and Hypertension by doing all diagnostic investigations and the use of specific and proper medication for getting a good outcome.

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Conflict of Interest Statement

All the authors do not have any possible conflicts of interest.

Nomenclature

ACS	Acute Coronary Syndrome
BMI	Body Mass Index
CAD	Coronary Artery Disease
CHD	Coronary Heart Disease
CVD	Cardiovascular Disease
ECG	Electro Cardio- graph
HRRH-	Halibet Regional Referral Hospital Intensive
ICU	Care Unit
ICD	International Classification of Diseases
ICU	Intensive Care Unit

IPMD	In-Patient Medical Department
MI	Myocardial Infarction
ONRH-	Orotta National Referral Hospital Intensive
ICU	Care Unit
SSA	Sub-Saharan African
WHO	World Health Organization

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