Addis Ababa University

College of Health Science

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THE MAGNITUDE AND CAUSES OF OUT OF HOSPITAL SUDDEN DEATH IN AUTOPSY STUDIES, AMONG SELECTED GOVERNMENTAL HOSPITALS IN ADDIS ABABA, ETHIOPIA

BY

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Abbreviations

AAU: Addis Ababa University

BLS: Basic life support

CA: Cardiac arrest

CPR: Cardiopulmonary Resuscitation

FMoH: Federal Ministry of Health

LQTC: Long QT syndrome

OHCA: out of hospital cardiac arrest.

SCA: Sudden cause of cardiac arrest

SCD: Sudden cause of death

SD: Sudden Death

SQTS: Short QT syndrome

TASH: Tikur Anbessa Specialized Hospital

WHO: World Health Organization

Abstract

Background: Sudden death (SD) is one of the most important problems in medicine. More than 40% of patients die suddenly, mostly in an out-of-hospital setting. The precise prevalence of sudden cause of death (SD) in Ethiopia is poorly investigated, especially in young patients. This precludes evaluation of the Problem and determination of possible prophylactic solutions. **Objective;** The aim of this study was to evaluate the magnitude and Cause of out of hospitals sudden death in autopsy studies in selected governmental hospitals of Addis Ababa, Ethiopia from January 1, 2014 to October 31, 2017

Methods*:* Retrospective study was conducted from Registry book on the magnitude and Cause of sudden death in autopsy studies of selected governmental hospitals of Addis Ababa, Ethiopia from January 1, 2014 to October 31, 2017. Data was collected from police reports about circumstance of death and pathological features were analyzed by autopsy. Data was entered and analyzed using SPSS version 21 and P value<0.05 was considered to be statistically significant.

Result: During the Four year interval of this study, 746 patients underwent autopsy for sudden cause of death, 80.2% were males and 19.8% were females. The Mean age of the participants was 40 years. About 0.3% has risk factors. In 321 (43%), Sudden death was attributable to non-cardiac causes. 121 (16.2%) patients with uncertain pathology result and about 165 patient (22.1%) died due to disease unrelated to the heart (poisoning, intoxication and drowning). The rest of those who presented with sudden cause of death died due to cardiac causes, Cardiomyopathy 102(13.7%) and MI 36(4.8%). About 154(20.6%) and 218(29.2%) were student and employees in occupation respectively.

Conclusion: In this study SCDoccurred predominantly in men of relatively young age and was most frequently associated with Myocardial Infarction. Students and employees take almost half of the SCD. Improved preventive measures, health care access, and enhanced emergency management may reduce sudden cause of death from MI and other cardiac diseases in this Area.

Key word: Sudden cause of death, sudden cause of death, Autopsy.

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CHAPTER ONE: INTRODUCTION

1.1. Background

According to the legend, the Greek soldier Pheidippides suddenly died after having completed his run from Marathon to Athens in 490 B.C. to deliver the message of the victory over the Persians (1). During the last decades, several stories are told about famous athletes dying suddenly and unexpectedly during competitions. These have been reported as headlines in the newspapers. Most Non-violent, unexpected sudden deaths in the young population are from cardiac causes and their occurrence is unpredictable. (1)

1.2. Definition

Cardiac arrest is an emergency medical condition characterized by the cessation of cardiac mechanical activity with the absence of circulation leading to pulseless, loss of consciousness, and abnormal or absent breathing without immediate and decisive treatment, chances of survival are minimal (3-11,4,16).

There is a sudden risk of cardiac arrest due to disturbance of the electrical activity in the heart which can be caused by wide range of disease conditions. Some considerable sub set of patients with structurally normal heart can have risk of sudden cardiac arrest due to primarily arrythmogenic disorders like ARVC, long QT syndrome (LQTS), Brugada syndrome, and short QT syndrome (SQTS) (4,7-16). OHCA is defined as an OHCA in which the collapse was either seen or the sound of falling or the disappearance of breath sounds was heard by someone else. This person is supposed to call for help and then begin simple resuscitation maneuvers, the so-called bystander CPR. Bystander CPR or basic life support (BLS) is defined as simple respiratory and circulatory support (providing airway patency, ventilations and chest compressions). In this regard cardiovascular disease is the most common cause of sudden cardiac arrest in the developed world (5).

1.3. Causes

The most common causes of sudden cardiac deaths are, valvular and congenital heart diseases and other cardiac diseases like cardiomyopathy ,primary electrophysiological disorders, genetic ion-channel abnormalities preceded by Coronary artery disease (6). Majority of patients experience warning sign before the arrest typically Angina pectoris and shortness of breath.

About 25 percent of people do not have any symptoms which makes cardiac arrest very difficult to predict before it happens (7). Even though, Other typical non cardiac diseases and conditions that can lead to cardiac arrest include: lung diseases, electrolyte imbalance, hypervolemia, trauma (accidents, violent attack, and suicide), drug overdose, suffocation, hypothermia, drowning, and electrocution (8,11). Due to the variety of causes, cardiac arrest considered to be a condition—not a disease by itself—and the common saying, "cardiac arrest is the leading cause of death" should be avoided, since cardiac arrest is an obvious consequence and inevitable part of all deaths, irrespective of the cause (9).

The prevention of SCD is challenging, previous studies on symptoms and risk factors have most often analyzed the general population (all ages) where up to 80 % of the individuals (10), who suffer SCD have coronary heart disease (14). Systematic investigations in the younger age group are difficult to perform because of low patient numbers, and the main focus has been on athletic activity as a presumed risk factor for SCD (3, 20). Several recent studies point to the increasing frequency of coronary atherosclerosis in Ethiopia and other African countries as well (8).

2. Statement of the problem

The very frustrating and shocking experience for medical community and to the families left behind is SD in young person. Half of sudden cardiac death in young and considered to be in good health individuals occurs suddenly (11, 16).

Usually sudden cause of death (SCD) occurs at any time and at any place. A special sub group is Out of Hospital Sudden Cardiac death (OHCA). Such patients have additional challenges due to their physical location which brings a delay or absence of recognition and treatment. ( )

Patient's chance of survival, OHCA is not only a concern for health care professionals, but also a concern for the general public, who have the opportunity to act when witnessing a cardiac arrest.{2-4,15,17}

The global average incidence was 55 adult OHCAs of presented cardiac cause per 100,000 person year of all OHCAs 27% had VF as the initial rhythm. The incidence of OHCA among adults in different states of the United States and Canadian sites ranges from 76 to 159 per 100,000 persons, compared with an incidence of 60 per 100,000 persons in the Netherlands.(34)

The incidence of SCD in Ethiopia is not currently known in detail, and there are only few, probably one data available on this matter. **Schneider et.al** More than 40% of these patients die suddenly, mostly in an out-of-hospital setting demonstrates that ischemic heart disease is the leading Couse of death

The current challenge in our country Ethiopia is life style modification with especially with the dietary habit change and not getting early treatment of the risk factors such as Diabetes. Besides changes in life style, the occurrence of SCD from coronary artery disease isincreasing. Hence the magnitude of this problem is not known in Ethiopia.

This thesis is focused identifying the cause of SCD in Ethiopia because it is not well known and there is only one old study which concluded that the commonest cause being Myocardial infarction. Therefore this thesis is focused on magnitude and Couse of out of hospital sudden death in autopsy studies of public hospitals in Addis Ababa Ethiopia.

3. Significance of the Study

This study provides an update information regarding SCD in Ethiopia, that can Help policy makers and different stake holders as a second information for improvement in activities and intervention strategies.

It can also use for researchers as a source of information for further investigation and to design prevention strategies for Cardiac causes, MI and Cardiomyopathy, and other none cardiac cause of SCD.

CHAPTER TWO:Literature Review

The exact incidence of sudden death in young individuals remains unclear. The incidence of sudden death for individuals under 40 years of age is between 0.7 and 6.2/100′000 person-years (22, 23-24)

According to the World Health Organization (WHO), cardiovascular diseases are the leading cause of Mortality in the world, accounting for 30% of deaths in 2008 [6]. The Swiss Federal

Statistical Office (FSO) report also supports this and 33.8% of the 62′091 deaths registered in 2012 were of cardiovascular origin [7].

The rate of cardiovascular mortality increases with age, but cardiac deaths can also concern younger populations [8]. Sumeet S. Chugh et al also showed, however the gender-related trends appear to have shifted, with an increase in the proportion of females who suffer sudden cardiac death. Earlier studies had reported 25:75 ratios of females to males. The Origin experience shows that females, on a yearly basis, consistently make up approximately 40% of all sudden cardiac death cases {12}. While the reasons for this changing trend merit further evaluation, one possibility is that this mirrors the altered gender distribution in prevalence of and mortality from, coronary artery disease {13}

Up to 53% of the sudden deaths in children, teenagers and young adults remain unexplained, despite performing a complete autopsy; these deaths are often considered to be arrhythmic in nature, resulting from inherited channelopathies [17, 19].

In Europe, cardiovascular diseases (CVD) account for around 40% of all deaths under the age of 75 years. SCA is responsible for more than 60% of adult deaths from ischemic heart disease (IHD).{2} Conversely, in young populations under 40 years, inherited ‘arrhythmogenic’ cardiac disorders are the main cause.{8} The initial recorded rhythm in patients presenting with a sudden cardiovascular collapse is ventricular fibrillation (VF) in 75 to 80%, whereas Brady arrhythmias and a systole are thought to contribute to a minority of SCDs.{4,22}

The Council of Europe recommends that the cause of death be established if at all possible and strongly encourages the use of autopsy.

An autopsy plays an essential role in determining the cause of death and allows for its verification in an objective way. It also enables the documentation of precise demographic statistical data.

The risk factors affecting survivals from cardiac arrest are several. The most important factors are short time interval in the treatment of cardiac arrest. Bystander CPR has beneficial effect on surviving from OHCA. **Van Hoeyweghen et al**. 1993. And the unfavorable effect of delay in initiation of resuscitation is well documented. The chance of survival decreases with each passing minutes without CPR, Defibrillation or ALS. In cardiac arrest patient with witnessed VF, survival decreased by 3 percent with each minutes until CPR was done and 4 percent with defibrillation delay. **Weaver et al.** 1986.

The incidence of SCD in Ethiopia is not currently known in detail, and there are only few, probably one data available on this matter. **Schneider et.al** More than 40% of these patients die suddenly, mostly in an out-of-hospital setting demonstrates that ischemic heart disease is the leading Couse of death.

According to various estimates, SCD occurs in 0.36–1.28 cases in every 100,000 subjects. Often, sudden death is the first manifestation of heart disease. The precise prevalence of SCD in Ethiopia is poorly investigated, especially in young patients. This precludes evaluation of the Problem and determination of possible prophylactic solutions.

CHAPTER THREE: OBJECTIVES

3.1. General Objective

To evaluate the magnitude and couses of out of hospitals sudden death in autopsy studies in selected governmental hospitals of Addis Ababa, Ethiopia from January 1, 2017 October 31, 2017

3.2. Specific Objectives

- To determine the socio-demographic characteristics of the autopsies in the study period
- To identify the pattern of sudden cause of death in Addis Ababa, Ethiopia.
- To assess the specific causes of sudden death.

CHAPTER FOUR: Methods

4.1. Study design

Retrospective, cross sectional study was conducted from cardiac arrest registry in Minilik II and St. PAUL Hospital, Department of Forensic medicine, was analyzed from January 1, 2014 October 31, 2017. This registry includes consecutive adult patients who experienced non-traumatic out-of-hospital sudden cause of death in Addis Ababa Ethiopia. The registry was originally developed to estimate the incidence and cause of sudden death in those selected governmental Hospitals of Addis Ababa, Ethiopia.

4.2. Study setting

This research was done on the Magnitude and cause of out of hospital sudden death in Addis Ababa, In Minilik II and St Paul hospital Millennium medical college in Forensic medicine department and post mortem examination unit. All pathology records were included in this study.

In Ehtiopia, there are only three centers that are currently providing forensic medicine service. From these centers, Minilik II hospital and St. Paul Millennium medical college are included in this study

Minilik II Hospital:Emperor Minilik II was fascinated by modernity, and like Emperor Tewodros II before him had a keen ambition to introduce Western technological and administrative advances into Ethiopia. The Russian support for Ethiopia led to the advent of a Russian Red Cross mission. The Russian mission was a military mission conceived as medical support for the Ethiopian troops. It arrived in Addis Ababa some three months after the historic Minilik's Adwa victory 1st of March 1896 (26) and then the first hospital, (Minilik II) was created in Ethiopia. Minilik II Hospital is first hospital where forensic pathology service is provided in Ethiopia, this being the reason for the large amount of deaths received in the center in a period of 3-4 years. There are two Legal Medicine specialists working in the department on a full time basis. Minilik Hospital is located in gulelie sub city Addis Ababa, Ethiopia which has 600 beds.

St Paul hospital, St Paul's Millennium Medical College, as it is known today, was established through a decree of the Council of Ministers in 2010, although the medical school opened in 2007 and the hospital was established in 1968 by the late Emperor Haile Selassie. The inpatient

capacity is more than 700 beds sees an annual average of 300,000. It has a catchment population of more than 5 million. The College sees an average of 1200 emergency and outpatient clients daily. It is the second hospital in Ethiopia who started forensic medicine for post mortem examination which is located in Gulelie sub city, Addis Ababa, Ethiopia. . It is also among the first hospitals to start a post graduate training on Forensic medicine in Ethiopia

4.3. Source population

All patients who were reported by police as a case of sudden death from January1, 2014-October 31, 2017

4.4. Study population

All confirmed sudden deaths from January 1, 2014 - October 31, 2017.

4.5. Sample size and sampling technique

Convenient sampling technique was applied on all out of hospital suddenly died patients for whom pathological report were done from January 1, 2014- October 31, 2017 who fulfill inclusion criteria were included in the study. A total of 746 patients were recruited in the study.

4.6. Inclusion criteria:

All cases of sudden death reported by police and Autopsies done.

4.7. Exclusion criteria

- Those who died from accident and other trauma.
- Insufficient data e.g incomplete, no autopsy done,

4.8. Variables

4.8.1. Independent variables

- Age and sex of patients, Marital status, Occupation .

4.8.2. Dependent variables

- Causes of sudden cardiac death.

4.10. Data collection and entry

Data was collected using a structured survey from registry review. Pretest was done in 100 cases and the data collection sheet was modified according to the need. Training on how to collect the data was given to two health officers working at Minilik and St.paul Hospital for two days by the principal investigator.

The general information regarding the autopsies performed was contacted with the pathologist communicated for detailed information personally and by its phone number. It was entered in to Statistical Package for Social Sciences (SPSS) Version 21 for analysis. Descriptive statistics was displayed using frequencies and proportions. $P<0.05$ were considered statistically significant.

4.11. Data quality management

The Data collection was done by two health officers and Supervision and quality control was done by principal investigator, continious assessment were done by supervisors.

4.12. Data analysis

Data analysis was done using SPSS version 21. Patient Demographics (age and gender), was analyzed using analyses of variance procedure of SPSS Version 21. The Nominal single most relevant Cause of death was analyzed using Pearson's chi-square test. $P<0.05$ were considered to be statistically significant and results were explained in Table, Graph and linear regration was done to measure the strength of association of the variables.

4.13. Ethical considerations

Ethical clearance was obtained from Addis Ababa University College of health science Department of Emergency Medicine ethical review committee, written approval was optained from Minilik II, TASH, St.Paul hospitals.

4.14. Dissemination of results

The result of the study will be submitted to the School of Medicine Emergency department, Addis Ababa University. Moreover, publication of the findings to African Federation journal of Emergency medicine will be considered and Data will be published in scientific journals and also it will be disseminated to each Hospital.

CHAPTER FIVE: RESULTS

A total of 1500 data were collected from the registry book, among this only 746 fulfilled the inclusion criteria and got recruited in to the study and data were collected from, Jan 1, 2014-Octo 31,2017. The rest 754 cases were excluded because of insufficient data, lack of Autopsy result and lack of demographic data.

From the total of 746 patients 598(80.2%) were male and 148 (19.8%) were females. The mean age of the study participants was 40 years. Employed and Students were commonly affected accounting for 29.2 and 20.6% respectively. About 0.3 percent had identified risk factors such as Hypertension, Diabetes and Smoking (Table1).

Table 1.

Socio-demographic characteristic of cases who died suddenly during the years from 2014 up to 2017 and had Postmortem examination in the Medical department of Minilik and St. Paul Hospitals. Addis Ababa, Ethiopia.

Variables		Num.746	PERCENT
Age	18-28	202	27.1%
	29-39	210	28.2%
	40-50	134	18.0%
	51-61	65	8.7%
	62-72	54	7.2%
	>73	37	5.0%
	Unknown	44	5.9%
	Total	746	100.0%
Gender	Male	598	80.2%
	Female	148	19.8%
	Total	746	100.0%
Marital status	Single	201	26.9%
	Married	264	35.4%
	Separated	0	0.0%
	Widowed	1	.1%
	Unknown	280	37.5%
	Total	746	100.0%
Occupational status	Student	154	20.6%
	Employed	218	29.2%

	Nonemployed	15	2.0%
	not specified	359	48.1%
	Total	746	100.0%
Residency	Addis Ababa	532	71.3%
	out of Addis Ababa	213	28.6%
	3.00	1	.1%
	Total	746	100.0%

In addition, significantly higher proportion SCD was observed in patients recruited from Addis Ababa (71.3%) compared to patients recruited from Out of Addis Ababa (28.6%).

Autopsy findings;

In three hundred twenty one patients (43%), SD was attributable to non-cardiac causes such as infection, cerebrovascular accident and pulmonary embolism. Hundred twenty one patients (16.2%) had uncertain pathology result and about 165 patient (22.1%) died due to disease unrelated to the heart (poisoning, intoxication and drowning). (Figure 2) The remainder of those who presented with SD was considered to have died of cardiac causes. From cardiac causes Cardiomyopathy 102(13.7%) and myocardial infarction 36(4.8%) were identified in a large majority (Table2). From 138 patients with sudden cardiac death SCD 102(13.7%) had structural changes to explain the cause of death. About 154(20.6%) and 218(29.2%) are student and employees in occupation.

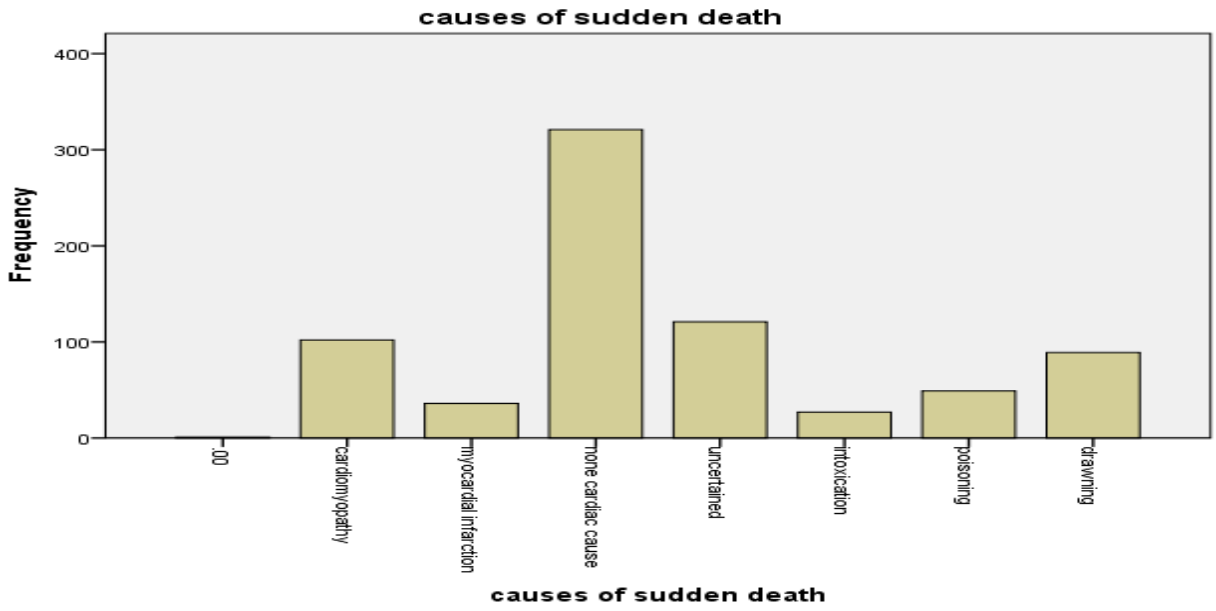
Estimated incidence of SCD

The population of Addis Ababa, the capital city of Ethiopia, is 3,384,520 according to the census report with yearly growth rate of 2.85%. About 29.58% of the population has age ranging from 25-54years. Majority of the patient in this study falls in this age group.

Based on these data, by mathematical calculation, (Population census numbers divided by gender and age group adapted from the Central Statistics Office of Ethiopia national population census 2006) it is estimated that SD occurred in 0.023% of the population 25 years of age during the study interval.

Figure 2

Causes of sudden, cardiac death, deaths Out of all reported from autopsy registry reports collected of Minilik and St. Paul Hospitals from 2014 up to 2017, **A**ddis Ababa, Ethiopia.



As Table 2 showed that the frequency of SCD showed that non-cardiac cause of sudden death and Uncertain causes were high in frequency 321(43%) and 121(16.2%) respectively, however intoxication and MI shows low frequency 27(3.6%) and 36(4.8%) respectively. Cardiomyopathy shows only 13.7%.

Table 2
The frequency distribution of pathological reports of cases that died suddenly from cardiac related diseases from 2014 up to 2017 in Minilik and St. Paul Hospitals, Addis Ababa, Ethiopia

		Frequency	Percent
Valid	myocardial infarction	83	11.1
	cardiomyopathy	25	3.4
	Others	638	85.5
	Total	746	100.0

Factors associated with sudden death

In linear logistic regression models, Employees were identified to have statistically significant association with sudden cause of death with a P value of <0.05. There was no statistically significant association between age, gender and place of residence of the participants with sudden death (P> 0.05) (Table 4).

Table 3.Shows the association between age, gender, occupation and residency with sudden cause of death.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	4.258	.337		12.644	.000	3.597	4.919
	age of patients	-.049	.037	-.049	-1.330	.184	-.120	.023
	gender of the patients	.018	.161	.004	.109	.913	-.299	.335
	occupational status of the patient	-.205	.052	-.146	-3.949	.000	-.307	-.103
	residency of the patient	.007	.141	.002	.049	.961	-.270	.284

In the multivariable logistic regression models, younger age groups and Students were identified to havestatistically significant association with sudden cause of death with a P value of <0.05.

Table 4

The pathological reports of cases that died suddenly during the years from 2014 up to 2017 and had Postmortem examination in the Medical department of Minilik and St. Paul Hospitals

		Frequency	Percent
Valid	myocardial infarction	83	11.1
	cardiomyopathy	25	3.4
	Others	638	85.5
	Total	746	100.0

Out of the total 746 patients with specific cause of sudden death Myocardial ischemia accounts for the majority which is 11.1% followed by Cardiomyopathy takes 3.4%.

CHAPTER-SIX:- DISCUSSION

The very frustrating and shocking experience for medical community and to the families left behind is SD in young person. Half of sudden death in young is considered to occur on individuals who appeared to be healthy (3).

The striking fact of this study is that the younger age groups are more involved. A bout 27.1 % (201) patients died with the age of 18-27 (21.7 %) years and majority of them were Male(80.2 %). By contrast in the US, the median age of SD is 69 years and about two-thirds were male in the SD report of Chugh et al. in Oregon, USA. Based on data from the Framingham study, men were at 3.8 times the risk of SCD compared to females. In our study, male predominance is likely related to both a higher cardiac risk profile in men and possible low autopsy rates in the female population. The difference between the results of this study compared with the results from high income countries might be due to proper follow up and identification of risk factors early on.

Another important finding of this study is the higher percentage of patients dying due to coronary artery disease. Among 746 autopsy result about 11.1 % (83) of them were from MI and 3.4 % (25) from Cardiomyopathy. A similar study performed in Tanzania (Dare-salaam) based mainly on medico legal subjects, confirmed that there was not a single case of coronary death among Africans while coronary artery disease was common in India (29). From 1981 up to 1986 only 17 Ethiopian were treated for myocardial infarction in Tikuranbesa hospital in Addis Ababa, Ethiopia (30). In this study, the prevalence of coronary disease increased from other studies done in different countries. This might be due to the progressively changing life style of the population modification and increased prevalence of risk factors like Diabeters, Hypertension and smoking.

However there are recent studies showing an increase incidence of death from coronary atherosclerosis in Ethiopia and other African countries as well (31)

Another striking finding fact of this study is the higher percentages of patients being students and employee in occupation.

Professor KebedeOli and Porteus showed that in Addis Ababa 0.64% of 9388 school children with the age of 14+1.3 years manifested clinical evidence of rheumatic valvular disease (32) which they concluded that Ethiopia has one of the highest rates of rheumatic heart disease worldwide (32). This could be the major risk factor for sudden cause of death in young Male in this study and some of this patients died by Cardiomyopathy specifically Hypertrophic cardiomyopathy.

Information about the risk factors of sudden death is lacking. Muna who drew attention to the increasing frequency of hypertension in 10% of rural and 12% of urban areas are common in Africa and complications such as stroke, heart failure and renal failure are leading causes of morbidity and mortality (33,34). Generally low prevalence of coronary atherosclerosis backs the suggestion that, hypertension by itself is not an important predisposing factor for coronary artery disease, except in presence of other risk factors.

Other risk factors like smoking diabetes mellitus and high blood lipids were unknown in most of the cases. Only two of them had hypertension and Diabetes Mellitus.

7. Strength and limitation of the study

7.1. Study strength

- Is the first to be conducted after 20 years in Ethiopia
- Large sample size.

7.2. Study limitation

- This is a retrospective analysis that entails the limitations inherent in the research method.
- The autopsy data do not include the number of diseased coronary arteries, but detailed segmental coronary and myocardial pathology were important elements of our analysis.
- Lack of proper documentation on the registry book.
- Lack of description of the structure of the heart and specific lesion
- Lack of mentioning the circumstance of death.

8. Conclusions

In this study SD occurred predominantly in men of relatively young age and was most frequently associated with Myocardial Infarction. Students and employees take almost half of the SCD. Improved preventive measures, health care access, and enhanced emergency management may reduce sudden cause of death from MI and other cardiac diseases in this Area

9. Recommendation

This kind of study should be done in regular basis

Data management and pathology facilities should be established.

Health education to the general population

To develop a habit of regular checkup at least every 6 month.

To have first aid kits and trained persons to provide care for individual who sustained SCD e.g CPR

To have multiple hospitals having forensic medicine department

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11. Annexes

Annex I. Data Collection sheet

Addis Ababa University, College of Health Science

Department of emergency medicine

This questionnaire is very important to develop magnitude and Couse of sudden death in autopsy studies of public hospitals in Addis Ababa, Ethiopia. All questions are to be filled from already recorded patients data found on logbook, name of patient is not needed.

A structured questioner designed to assess to develop the magnitude and cause of sudden death in autopsy studies of public hospitals in Addis Ababa, Ethiopia.

1. Socio demographic characteristics

Age……..

Sex……

Marital status……..

☐Single ☐married ☐separated ☐ widow

Occupation…….

☐ Student ☐ employed ☐ non employed

Residence……

☐Addis Ababa region ☐out of Addis Ababa

2. Diagnosis (including underlying chronic illness)……

3. Pathology result……..

4. Risk factors……

☐yes ☐no

5. Autopsy result…….

6. Cause of death…….

☐ Myocardial infarction

□ Cardiomyopathy

□ Poisoning

□ Drowning

□ Others

7. Duration of illness

- Less than one day
- Two days to weeks
- More than a week
- No recent illness
- none

8 presentation of patient to hospital

- dead body arrival
- death at home
- death referd
- unknown

9. other cause of death

- infection
- PTE
- Acute hemorrhagic pancratitis
- Unspecified liver disease.

Annex II. Declaration

I ZelalemGetahun, MD, the principal investigator of this study do there by declare that this thesis is original work and that it has not been submitted partially or in full by any other person for an aware of a degree in any other institution.

Principal Investigator_____sign_____date_____

Advisorname_____sign_____date_____