

## Myocardial Infarction in Young Black African in Burkina Faso: Epidemiological and Therapeutic Aspects

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### Abstract

**Background:** The purpose of this study was to assess epidemiological, clinical, and follow up data in a series of 15 patients consecutively admitted for Myocardial Infarction. Patients were black African and less than 45 years old.

**Methods:** We conducted a retrospective study from January 1st 2010 to December 31st 2012 in the Yalgado Ouedraogo University Hospital in Burkina Faso. We assessed medical records of young patients less than 45 years of age who were consecutively admitted for Myocardial Infarction.

**Results:** A total of 15 young subjects were admitted for myocardial infarction during the study period. Sex ratio was 2.75 for males; mean age was  $35 \pm 8$  years with extremes of 21 and 45 years. Three main cardiovascular risk factors were noticed including hypertension (33.3%), diabetes and smoking (26.7%). Metabolic syndrome was found in three patients (20%). Revealing symptom of myocardial infarction was typical chest pain (80%) and ST + Acute Coronary Syndrome (ACS) diagnosed in all patients. 66.7% of patients were admitted more than 24 hours after the onset of their chest pain. EKG signs of necrosis were mostly found on anterior, septal, and lateral leads (26.7%). Doppler echocardiography found a systolic left ventricular dysfunction in 66.7% of cases. Thrombolysis was only used in 13.3% of patients. Complications were found in 86.7% of cases. Mortality rate was 20%.

**Conclusion:** Myocardial infarction in young black African is more and more common in current cardiology practice. It is therefore necessary to adopt a proactive attitude, mostly primary prevention, targeting young people less than 45 years old.

**Keywords:** Myocardial infarction; Young patients; Black Africa; Cardiovascular risk factors

### Introduction

According to World Health Organization (WHO) estimations, cardiovascular diseases are causing 17.3 million deaths including 7.3 million due to Coronary Heart Diseases (CHD) [1]. Myocardial Infarction (MI) and CHD are both expressions of coronary atherosclerosis [2]. Atherosclerosis has a silent disease course that could last several decades [3]. Clinical manifestations are more frequent with aging: 1 to 1.5% for patients under 50 and 5% for those over 70 years old [4].

However, observational data show a global tendency toward an increase in myocardial infarction cases in younger patients less than 65 years old [5]. This present study focused on myocardial infarction cases occurring in young patients with less than 45 years of age and assessed epidemiological, clinical, and follow up data for such patients.

### Methods

We conducted a retrospective descriptive study within the Cardiology department of Yalgado Ouedraogo University Hospital.

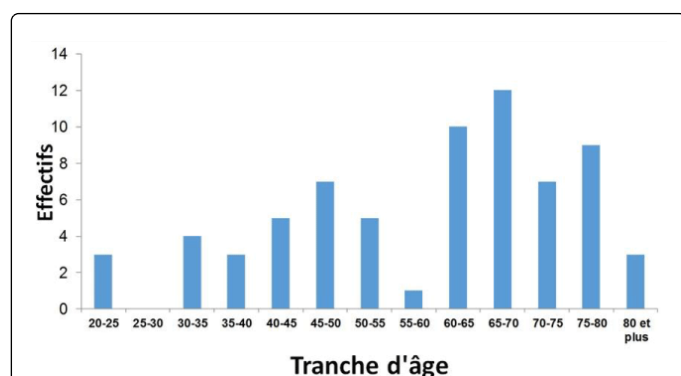
The study covered a three- year period from January 1st 2010 to December 31st 2012. We included all patients under 45 years of age who were admitted in the Cardiology department for Myocardial Infarction. All incomplete medical records were excluded from our study. We analysed patients' medical records and assessed epidemiological, clinical, and follow up data. We compared data from young patients to those from older patients ( $\geq 65$  Years old). Data collection forms were used and data were analysed through Epi Info 3.5.1 software. Proportions of qualitative variable were compared using a Chi square test or a Fischer exact test (for population size of less than 5). Statistical tests were significant if p value was less than  $<0.05$  ( $p < 0.05$ ).

### Results

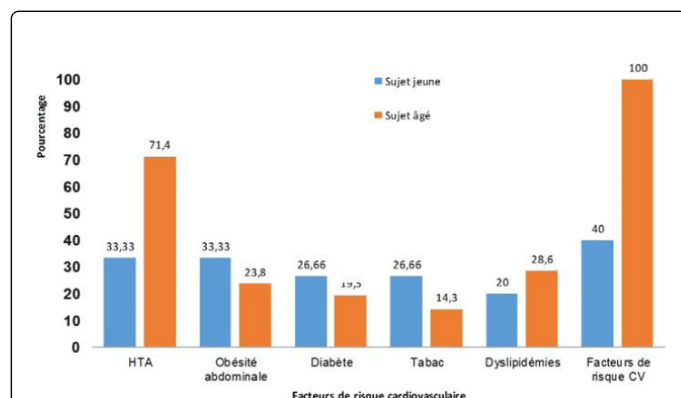
Sixty nine (69) patients were admitted for Acute Coronary Syndrome (ACS) during our study period, including fifteen (15) patients with less than 45 years of age accounting for an in-hospital incidence of 5 cases /year and a frequency of 21.7%. Thirty one patients were over 65 years old. In-hospital frequency for myocardial infarction was 44.9% among older patients. These fifteen patients were included in our series. Sex ratio was 2.75 with a total of 11 men and 4 women among young patients compared to a sex ratio of 4.16 with 25 men and 6 women among older patients. Mean age among young

patients was 35 years with extremes of 21 and 45 years. Patients' age distribution is represented in Figure 1. Main cardiovascular risk factors in our series included Hypertension (33%), Android Obesity (33%), Smoking (27%), Diabetes (27%), Dyslipidemia (20%), and family history of CHD in 7% of cases. Cardiovascular risk factors were similarly noticed among young and older patients except for hypertension which was significantly more prevalent in older patients (70.96% of cases,  $p=0.015$ ) and smoking which was more prevalent among young patients compared to patients above 45 years of age ( $p=0.4$ ). Hemoglobinopathy was found in three (3) patients (20%); two of them were homozygote SS and the third one heterozygote SC. One patient was tested HIV positive and another had essential thrombocytemia.

Cardiovascular risk factors were prevalent in 40% of young patient and 100% of older patients. The distribution of cardiovascular risk factor in our series is presented in Figure 2.



**Figure 1:** Distribution of staff according to age groups



**Figure 2:** Distribution of cardiovascular risk factors by age

Clinical, electrocardiographic and therapeutic features in our patient are described below:

- Typical chest pain in 80% of cases among young patients and in 66.7% among older patients.
- The time lag between onset of chest pain and admission in the cardiology department was more than 24 hours in 86% of patients ( $n=13$ ).
- CHD with ST + ACS was exclusively found in all patients included in our series ;

- Eight patients (53% of cases) had both necrotic Q wave associated with ST elevation on their admission EKG among young and older patients.
- The predominant EKG localization for infarction was extended anterior territory (septal, anterior, apical, and lateral) in four (4) cases (33.3%) and inferior territory in three (3) cases (20%). The same extended anterior territory was most commonly reported among older patients.
- Thrombolysis was only conducted in two patients (13.3% of cases).

Thirteen patients among the younger group (86.6% of cases) presented MI complications on admission. Those complications included left ventricular systolic dysfunction (66.6% of cases and 77% of complications) and thromboembolic events (40% of cases and 66% of complications). Eighty percent of patients under treatment had a favorable course of disease among young patients. Three cases of death were noticed accounting for a mortality rate of 20% in young patients compared to 52.4% in older patients.

## Discussion

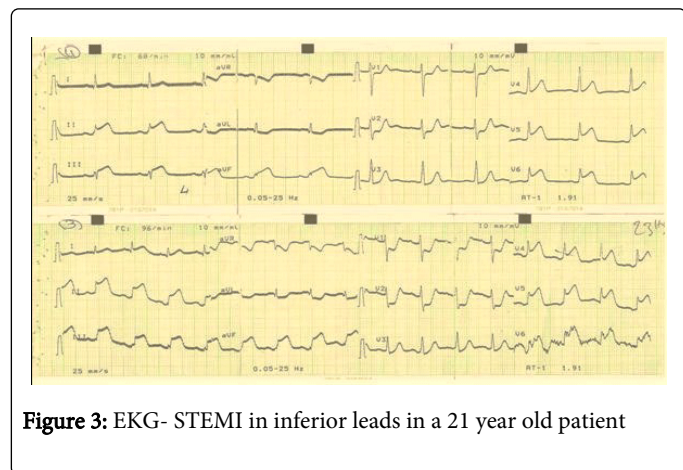
### Characteristics of the study population

Our study population was made of 15 patients including 4 women (27%) and 11 men (73%). Mean age of patients was  $35 \pm 8$  years. In Dakar, NV Yameogo et al. conducted a retrospective study on myocardial infarction in young adults from January 2003 to December 2008 and reported the following: 16.6% of all admissions for myocardial infarction had less than forty (40) years of age, with mean age of 34.5 years, similar to the findings in our present study [6]. Similarly, B.Hamadou and Coll reported a mean age of  $34.14 \text{ years} \pm 2.96$  and a sex ratio of 7.8 which are both comparable to the findings in our present study [7]. The similarities in the above findings strengthen the validity of observations made by both WHO [8] and France Institut de veille sanitaire which showed a general tendency of early onset age for cardiovascular diseases [5].

### Cardiovascular risk factors

The main cardiovascular risk factors in our series are Hypertension and android obesity, followed by smoking, diabetes and dyslipidemia. Diarra et al. conducted a study in the cardiology department of Point G University Hospital, Mali, and reported Hypertension (51.8%) and Smoking (50.6%) to be the predominant risk factors for Myocardial Infarction [9]. Joussein-Remacle et al. conducted a prospective study on cardiovascular risk factors in young patients diagnosed with myocardial infarction and reported a predominance of Smoking (92.6% of cases), lack of regular physical exercise (81.5%), dyslipidemia (66.7%), and family history of cardiovascular diseases (48.2%) ; Hypertension was only found in 37% of cases and Obesity in 18.5% of cases [10]. Yameogo et al. conducted a study in Dakar on 14 cases of myocardial infarction in young patients less than 40 years old, and reported several cardiovascular risk factors including 7 cases of dyslipidemia, 6 cases of smoking, and 3 cases of hypertension [6]. Hamadou et al. reported smoking as the main cardiovascular risk factor in their study; smoking was prevalent in 81% of these young patients. The results from these different studies show a similarity in many cardiovascular risk factors associated with myocardial infarction both in young and older patients although hypertension was significantly higher in patients over 45 years ( $p=0.015$ ) and smoking more prevalent in younger patients. However the cardiovascular risk

factors associated with myocardial infarction in young people are essentially modifiable ones. According to the WHO study on cardiovascular diseases, Hypertension, hyperglycemia, lipid profile abnormalities, heavy weight, and obesity occurred prematurely in young people due to unbalanced nutrition and lack of physical exercise [8]. These observations could explain the early onset of coronary heart diseases.



**Figure 3:** EKG-STEMI in inferior leads in a 21 year old patient

### Clinical and topographic characteristics

Clinically, chest pain was typical in 80% of patients in our series; time lag between onset of pain and admission into the cardiology department was more than 24 hours in 86.6% of cases (n=13). The delay in specialized patient care forbids the use of thrombolytic which represent the first line treatment for health facilities that do not have a coronarography unit. All patients in our series (both young and old patients) presented with ST + acute coronary syndrome; 53.3% of patients had necrotic Q waves associated with ST elevation on admission. Myocardial infarction was anterior in 33.3% of cases, and inferior in 20% of cases. Infarction in extended anterior territory was the most frequent with 33.3% of cases, followed by inferior territory in 20% of cases. In Dakar, Seck et al. reported angina type pain in 87% of their patients; a 29 hours 28 min time lag with extremes of 6 hours (19%) and more than 24 hours (57%) was observed between the onset of symptoms and admission to cardiac intensive care unit. Most myocardial infarctions were localized anteriorly (58%) and inferiorly (37%) on EKG [11]. In the same locality of Dakar, Yameogo et al. reported an admission delay of  $15 \pm 4$  hours. In that study, more than half of cases (n=12) presented with anterior EKG abnormalities [6]. Jacquemin et al. reported a predominance of anterior lesions on EKG (32.3%) [12]. In Mali, Beye et al. reported typical angina-type chest pain in 75% of cases; EKG abnormalities were in extended anterior territory in 75% of cases and inferior in 12.5% of cases. This study also reported a time lag of more than 24 hours between the onset of chest pain and the first EKG tracing in 87.5% of patients [13].

Similar to studies conducted by Seck et al. Jacquemin et al. and Beye et al., our present study reported typical chest pain as a main revealing symptom of myocardial infarction. These results corroborate with literature data which present chest pain as the main revealing symptom of myocardial infarction [14]. The delay in EKG tracing which causes late diagnosis and late specialized care was found in all of our sub-Saharan African studies. These findings could be explained by lack of EKG machines in emergency department admission wards

and/or insufficient qualified personnel with the ability to recognize EKG signs of myocardial infarction in this part of Africa.

While we may explain delays in diagnosis, we do not have sufficient literature data to explain the anterior and inferior EKG localization of myocardial infarction which was predominant both in our study and in all other studies that we referred to Figure 3.

### Therapeutic and evaluative aspects

Only 13.3% of patients underwent thrombolysis, the solely available reperfusion procedure in our setting. Thrombolysis was conducted based on admission delay, extent of EKG lesions, available medical technical resources, patients' financial capabilities, as well as indications and counter-indications of such procedure. Patients who did not receive thrombolytic (86.6% of cases) presented complications on admission or during their inpatient stay. Complications such as Left ventricular dysfunction occurred in 66.6% of case and represented 77% of complications. Thromboembolic complications occurred in 40% of cases and represented 66% of complications. Mortality rate was 20%. Yameogo et al. in Dakar reported three cases of thrombolysis. In their study, they reported major complications such as heart failure in 4 cases, AV blocks in two cases, and one death. Beye et al. reported hemodynamic disorders like low systolic blood pressure (less than 90 mmHg) as major complications of myocardial infarction in intensive care patients. Major events occurred during follow up period including 3 cases of left heart failure, and 2 deaths due to cardiogenic shock. Hamadou et al. reported that angioplasty was successfully performed in all patients (100%), with minor iatrogenic complications in 13% of cases and residual angina in 34% of cases. They also reported a successful medical treatment in 93% of patients, with residual angina in 7% of cases. They did not report any case of death nor other complications besides residual angina.

Thrombolysis is the only available revascularization procedure in the many African studies that we reviewed, yet underused in many series. This low usage rate could be explained on one hand by late diagnosis which causes the delayed specialized care observed in the majority of our series and on another hand by reduced access to thrombolytic drugs in sub-Saharan African countries. Sub-Saharan African studies reported high rate of complication and heavy mortality, as a consequence of inappropriate patient care. However, Hamadou et al. reported less complications and low mortality rate in their series in which diagnostic and care strategies were made according to recommendations; they had shorter delays in both diagnosis and care [2].

### Conclusion

Risk factors for acute coronary syndrome in young patients are essentially modifiable ones. Lack of EKG machines and qualified personnel is detrimental for proper diagnosis of ACS in emergency health facilities. These shortcomings in personnel and material equipment favor late diagnosis and delayed specialized care causing higher rates of morbidity and mortality. Therefore, it is urgent to set up a quick diagnostic strategy and properly equip health facilities with effective diagnostic and therapeutic tools in order to reduce morbidity and mortality due to acute coronary syndrome in sub-Saharan Africa.

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