Descriptive Epidemiology of Cases of Acute Myocardial Infarction in Tobago

R Alfred[1], O Okeke[2], C Moronu[2], V Elliot[1], A Frankson[3], EN Barton[1]

ABSTRACT

Objectives: The goal of this study is to identify co-morbidities associated with acute myocardial infarction in Tobago.

Methods: This was a longitudinal retrospective study of myocardial infarction at the Tobago Regional Hospital in two selected periods: January 2007 to April 2007 and January 2008 to April 2008. Data were retrieved from the patients' medical records. These included co-morbid conditions eg hypertension, diabetes mellitus, dyslipidaemia, ESRD, whether history of smoking or cocaine use and if any prior care. In the former period, 11 cases were confirmed as having myocardial infarction and 27 cases in the latter period.

Results: In 2007 and 2008, all cases had dyslipidaemia (LDL > 100 mg/dL) and were hypertensive. There were 36.4% of cases in 2007 that had diabetes mellitus, compared to 33.3% cases in 2008 and 9.1% had chronic kidney disease in 2007, compared to 25.9% in 2008.

Conclusion: The most common co-morbidities associated with acute myocardial infarction in Tobago are dyslipidaemia, hypertension and diabetes mellitus, with ESRD, smoking and cocaine use less so. Many of these patients had never received prior care.

Epidemiología Descriptiva de Casos de Infarto Agudo del Miocardio en Tobago

R Alfred[1], O Okeke[2], C Moronu[2], V Elliot[1], A Frankson[3], EN Barton[1]

RESUMEN

Objetivos: El objeto de este estudio fue identificar las comorbilidades asociadas con el infarto agudo del miocardio en Tobago.

Metódos: Se realizó un estudio retrospectivo longitudinal del infarto del miocardio en el Hospital Regional de Tobago, en dos períodos: enero de 2007 a abril de 2007, y enero de 2008 a abril de 2008. Los datos fueron obtenidos a partir de las historias clínicas de los pacientes. Estos datos incluyeron condiciones co-mórbidas, por ejemplo, hipertensión, diabetes mellitus, dislipidemia, ERFT, historia de hábito de fumar o uso de cocaína, y cualquier atención previa del caso, si la hubiese. En el primero de estos períodos, se confirmó que 11 casos tenían infarto del miocardio, en tanto en el último caso se confirmaron 27 casos.

Resultados: En 2007 y 2008, todos los casos padecían de dislipidemia (LDL > 100 mg/dL) y eran hipertensos. El 36.4% de los casos en 2007 sufría de diabetes mellitus, en comparación con el 33.3% de los casos en 2008. El 9.1% tenía la enfermedad renal crónica en 2007, en comparación con el 25.9% en 2008.

Conclusión: Las comorbilidades más comunes asociadas con el infarto agudo del miocardio en Tobago son la dislipidemia, la hipertensión y la diabetes mellitus, y en menor grado la ERET, el hábito de fumar, y el consumo de cocaína. Muchos de estos pacientes no habían recibido nunca atención con anterioridad.

From: [1]Department of Medicine, The University of the West Indies, Kingston 7, Jamaica, West Indies, [2]Department of Internal Medicine, Tobago Regional Hospital, Tobago, West Indies, [3]Faculty of Medical Sciences, The University of the West Indies, Kingston 7, Jamaica.

Correspondence: Dr R Alfred, Department of Medicine, The University Hospital of the West Indies, Kingston 7, Jamaica. E-mail: rose24_tt@yahoo.com

INTRODUCTION

Tobago is 42 kilometres long and 10 kilometres wide. The population is 54 084, most of whom are of African descent. The Internal Medicine department of the Tobago Regional Hospital, the lone hospital, comprises two inpatient wards with a total of thirty beds. The 2007 Joint Task Force of the

European Society of Cardiology, the American College of Cardiology Foundation, the American Heart Association and the World Health Federation redefined acute myocardial infarction (MI) as a clinical consequence of ischaemia of cardiac myocytes. There are no published studies on acute myocardial infarction in Tobago. The Jamaican National Healthy Lifestyle Survey (2000) has identified obesity, hypertension, hyperlipidaemia, diabetes mellitus, and smoking as major problems in the region (1). Other risk factors include gender, age, cocaine abuse and end stage renal disease.

Dyslipidaemia, hypertension and diabetes mellitus are well recognized risk factors of acute myocardial infarction in international trials. The Anglo-Scandinavian Cardiac Outcomes Trial-Lipid Lowering Arm (ASCOT-LLA) concluded that there was a 35% relative risk reduction in combined fatal and non-fatal myocardial infarction ($p = 0.0005$) in patients on atorvastatin (2). The Caribbean Cardiac Society has advocated a target LDL < 75 mg/dL in high risk individuals (3). The Caribbean population is plagued with hypertension and diabetes mellitus. Hypertension (HTN) has been identified as a major risk factor in persons with acute myocardial infarction in the Framingham Heart Study (4). Many of these patients go on to develop the sequelae of end stage renal disease before cardiovascular complications become noticed. The National Cholesterol Education Programme Report from the United States of America (USA) and European guidelines on cardiovascular disease prevention consider Type 2 diabetes mellitus (DM) to be a coronary heart disease (CHD) equivalent. Practice guidelines from the National Kidney Foundation and the American College of Cardiology/American Heart Association task force have recommended that chronic kidney disease (CKD) be considered a coronary heart disease risk equivalent (5). Age and gender may also contribute. For more serious manifestations of coronary disease, such as MI, women lag behind men in incidence by 20 years, but the sex ratio for incidence narrows progressively with advancing age (6). A recent study has shown no significant gender difference as age increased (7).

Cocaine use in Trinidad and Tobago is a cause of pressing and social healthcare concerns (8). In the worldwide INTERHEART study, smoking accounted for 36% of the population attributable risk of a first MI (9). The mortality benefit of smoking cessation was assessed in a meta-analysis of 20 prospective cohort studies and results showed a 36% reduction in crude relative risk (RR) of mortality for patients with CHD who quit smoking (10). One survey of 10 085 adults between the ages of 18 and 45 years, found that 25% of non-fatal MI cases were attributable to frequent cocaine use (11).

This study will support policy development and emphasize the need for persons trained in primary and secondary prevention of CHD, as well as for cardiology services in Tobago.

SUBJECTS AND METHODS
This was a longitudinal retrospective study of cases of myocardial infarction conducted at the Tobago Regional Hospital. Two random periods, January 2007 to April 2007 and January 2008 to April 2008, were selected and compared. Data were collected from case notes kept in the medical records department. Forty-five files were obtained and thirty-eight cases were selected, based on the inclusion criteria. Eleven cases were confirmed as acute myocardial infarction for the period January 2007 to April 2007. Twenty-seven cases were confirmed for the period January 2008 to April 2008.

Patients had to be admitted to the Tobago Regional Hospital. Confirmation of acute myocardial infarction was based on fulfilling two out of the three following criteria:

1. Classical ischaemic like chest pain or associated atypical symptoms.
2. Acute electrocardiogram changes, of ST segment elevation myocardial infarction (STEMI) or non-ST segment elevation myocardial infarction (NSTEMI).
3. Increased specific cardiac enzyme markers. The use of troponin I or troponin T for MI diagnosis was recommended by the 2007 Joint ESC/ACCF/AHA/WHF Task Force for the definition of myocardial infarction (12, 13). Cocaine use was confirmed by urine testing. All patients had positive troponin values.

Persons who did not meet two out of three criteria were excluded from the study. Patients excluded were those who had old LBBB, not fulfilling Sgarbossa's criteria, or no acute changes with no symptoms or cardiac markers. Permission to conduct the study was granted by the Hospital Medical Directorate.

RESULTS
The most common co-morbidities associated with acute myocardial infarction in Tobago are dyslipidaemia, hypertension and diabetes mellitus with ESRD, history of smoking and cocaine use also noted. Many of these patients had never received prior care for their co-morbidities. Data were analysed using SPSS version 11.0 (Table).

There were fewer cases of acute myocardial infarction in January 2007 and February 2007 compared to March 2007 and April 2007. There were more cases of acute myocardial infarction in March 2008 than in April 2008 (Fig. 1). Pearson's chi-square tests showed that patterns on incidence of acute MI differed significantly between each group.

Generally, more males were diagnosed with acute myocardial infarction over both time periods: (63.6% in 2007 and 51.9% in 2008). Gender analysis was done by cross-tabulation and the difference between males and females was not significant with respect to occurrence of an acute MI. Independent samples *t*-test revealed significant difference in

Table: Results comparing descriptive epidemiology of myocardial infarction in Tobago for the two groups studied.

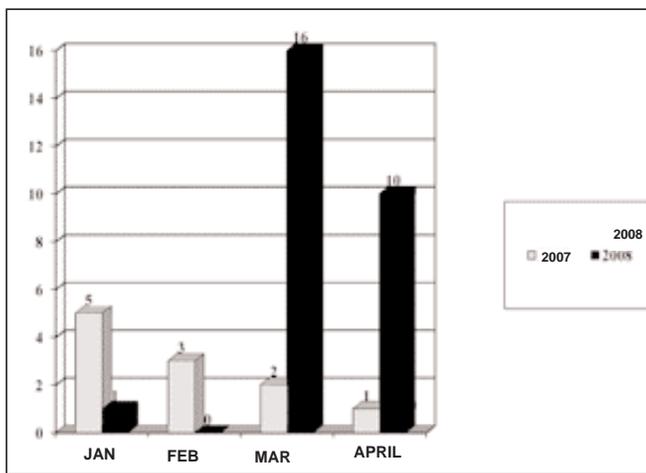| Variable	January 2007 to April 2007	January 2008 to April 2008	Overall result
Mean ages	58.5 years	7 1.0 years	67.4 years
% Male	63.6	51.9	55.3
% Diabetes mellitus	36.4	33.3	34.2
% Hypertensive	100	100	100
% Chronic kidney disease	9.1	25.9	21.1
% Cigarette smokers	9.1	3.7	5.3
% Dyslipidaemia	100	100	100
% Cocaine use	0	3.7	2.6
% Medical outpatient clinic	9.1	18.5	15.8
% Local health centre	9.1	18.5	15.8
% Renal outpatient clinic	0	18.5	13.2
% No prior care	81.8	40.7	52.6
% Private physician	0	3.7	2.6

Fig. 1:   Actual numbers of cases from January 2007 to April 2007, compared to cases from January 2008 to April 2008.
Legend – year 2007 – January to April and 2008 – January to April
Y axis = year, X axis = actual number of cases, Abbreviation: Jan = January, Feb = February, Mar = March, Apr = April.

age between the two groups ($p < 0.005$). Also, females studied were noticed to be older than the males.

The most common age range was > 65 years for both periods studied. The mean age between the two groups studied was 67.37 ± 2.19 years. Sample distribution was normal. For 2007, the mean was 58.47 ± 12.66 and for 2008, the mean age was 71.00 ± 12.25.

In 2007, 81.8% of the cases received no prior care for their co-morbidities; 9.1% were being followed in the general medicine outpatient clinic at Tobago Regional Hospital and equally at the local health centres. In 2008, 40.7% received no prior care, followed by 18.5% attending the Renal outpatient clinic at the Tobago Regional Hospital, and 18.5%

attending the general medicine outpatient clinic, 18.5% from the local health centres, with 3.7% being followed by private general practitioners.

In 2007 and 2008, all cases had dyslipidaemia (LDL > 100 mg/dL) and hypertension. In 2007, 36.4% of cases had diabetes mellitus, compared to 33.3% of cases in 2008. In 2007, 9.1% had chronic kidney disease, compared to 25.9% in 2008. The presence of diabetes mellitus in a patient with chronic kidney disease increased his/ her risk of sustaining an acute MI, as was revealed by Fischer test analysis. Other studied co-morbidities included end stage renal disease and cigarette smoking, as well as inhalational cocaine abuse, which were more significant in 2008.

DISCUSSION

This study indicates that inpatients with acute myocardial infarction had the "conventional" (14) risk factors. These were most commonly dyslipidaemia, hypertension and diabetes mellitus. End-stage renal disease and substance abuse were also contributory. Thus, intense focus on these variables is needed. This study attempts to identify persons at high risk of developing acute myocardial infarction, by looking at co-morbidities and those patients who need to be targeted for optimized control of their status. Hopefully, community health staff will be sensitized to the fact that there are still persons who do not seek healthcare and as such, a more rigorous outreach programme and a capturing approach should be employed. More persons should be trained in the primary and secondary prevention of cardiovascular events.

Bias can result from the fact that only surviving patients were admitted. The weakness of this study lies in the small number of cases studied and the inadequate time period used to observe the evolution of cases. Variations seen may be due to chance. Most patients were over 50 years, and were African Caribbean in origin. Also, there was no control group without acute myocardial infarction for comparison. It is gratifying that an attempt was made at documenting possible risks for patients, as opposed to self-report, despite limited resources. Low levels of high density lipoprotein cholesterol, a potent risk factor that is typically considered dyslipidaemia was taken into consideration and not just hyperlipidaemia, as some studies have used. It would have been helpful if all patients treated had follow-up imaging in the form of an angiogram. Although only one tertiary institution exists in Tobago, the data presented may not be representative of all the cases of acute myocardial infarction in Tobago. We acknowledge that the mere presence of a risk factor does not guarantee a casual relationship. Finally, genetic and environmental risk factors were not represented. There were more cases of acute myocardial infarction in March 2008 than in April 2008 (Fig. 1). In this time period, quantified troponin T was more readily available. Troponin I and troponin T are known to have equal sensitivities early, but troponin I is more specific. The laboratory assays at the Tobago Regional Hospital were not studied, but these cut-off

values were based on a non-Caribbean population. Also with such small numbers, many of the monthly differences could be due to chance, so it would be wise to continue data collection over a longer time period.

A new trend was also seen in 2008, where patients from the renal outpatient clinic were presenting with acute myocardial infarction, despite the fact that there were no significant differences in care administered. Renal failure itself is a risk factor for cardiovascular disease. The National Kidney Foundation Task Force on Cardiovascular disease (CVD) concluded that the incidence of atherosclerotic CVD is higher in patients with Chronic Kidney Disease compared to the general population (15). The appropriate use of these enzymes in patients with renal insufficiency is less clear, since elevations in serum troponin are commonly observed in patients with renal insufficiency who do not have clinical evidence of myocardial damage (15).

Gender differences in the reviewed literature were not reflected in this study, although the time period was limited. One cannot definitely conclude that Tobagonian men are necessarily at a higher risk for acute myocardial infarction. Inhaled cocaine presented as a new feature in the 2008 period. There are currently no studies on the prevalence of cocaine use in Tobago.

The Tobagonian population mirrors the trends in co-morbidities seen elsewhere in terms of the significant associations of acute myocardial infarct with dyslipidaemia, hypertension and Type 2 diabetes mellitus (Fig. 2). Various

longitudinal studies can be propagated from this. Data collection must continue in order to determine the incidence and prevalence of acute myocardial infarction. Basal metabolic intake and ethnicity can be studied. It will also be interesting to study why persons delay in obtaining prior medical care for their co-morbidities and to take a closer look at primary care being delivered in the small population of Tobago. The island may benefit from a Cardiology service. Formal protocols should be created at the Tobago Regional Hospital for staff to use as guidelines for high risk patients, with regards to follow up, and also for the management of myocardial infarct cases. This is also a stimulus for further studies in the region.
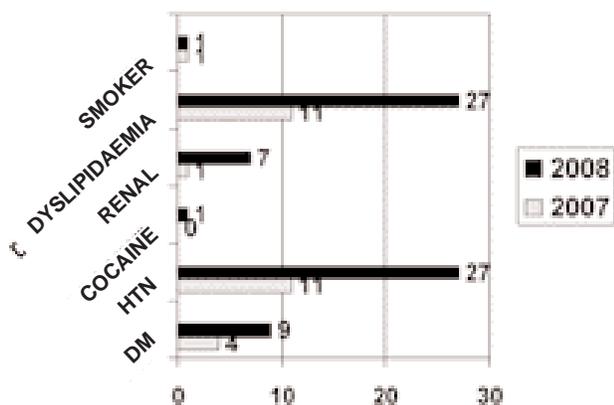

Fig. 2:   Actual numbers of acute MI cases per co-morbidity studied for January 2007 to April 2007 and January 2008 to April 2008. Legend – year 2007, Year 2008, Y axis – co-morbidity, X – axis-actual number of cases.

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