

Cardiovascular Diseases in Mena Hospital during Hajj (1429H) at Makkah, Saudi Arabia

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Abstract: Background: The numbers of Hajj pilgrims are increasing yearly. During Hajj period of 1428H (2007G), cardiac problems have been reported as one of the commonest causes of admissions in hospitals. However, the data regarding the commonest presentations and types of cardiac diseases were not reported in the literature. **Objectives:** To identify the cardiovascular diseases in Hajj pilgrims for the year 1429H (2008G) In Mena Hospitals. To determine the proportion of heart diseases most common among the pilgrims, with a focus on patients with heart failure (HF) and ischemic heart disease (IHD). It is known that patients who suffer from HF have elevated some of cardiac enzymes, that originated the idea of this research is trying to reach an early signs in patients with HF and try to diagnose their condition and refer them to a cardiologist early to treat and prevent complications of the disease. **Methods:** Analysis of the data was carried out for all patients, who were admitted at Mena Emergency Hospital over a period of 15 days in Hajj season 1429H (2008G). A questionnaire has been filled out and blood samples were taken from all patients admitted to Coronary care unit (CCU) and cardiology wards in the hospital. **Results:** A total number of 507 patients were admitted to the hospital including 120 patients with heart diseases, 85 of them were admitted in CCU and 35 in cardiology ward. The patients suffering from various cardiac diseases were in the following order: heart failure cases 70%; ischemic heart disease 20%; and valvular heart disease 10%. Brain Natriuretic Peptide (BNP) was significantly increased in all patients with heart failure. By analyzing the questionnaire in patients who have HF with high BNP we found that 80% of them admitted to the hospital after they perform physical effort and more than 50% of them had started the symptoms they have after they throwing pebbles. **Conclusions:** Most common cardiac diseases were found in hospitalized patients for Hajj 1429H, belonging to different countries over the globe. Circulating levels of the BNP can help in the diagnosis of cardiovascular disease and provide prognostic information not only in patients with HF but also the general population and other patient groups. The BNP test is used as an aid in the diagnosis and assessment of severity of heart failure (HF). BNP testing on clinical outcomes of patients presenting to the emergency department with acute dyspnea could be helpful and may lead to a decrease in admission rates and decrease in mean length of stay. The BNP test is also useful for the risk stratification of patients with acute coronary syndrome.

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1. Introduction

Once in a lifetime every Muslim is expected to undergo a holy pilgrimage, known as Hajj, which takes place in the 12th month of the Islamic lunar calendar. The Kingdom of Saudi Arabia has been privileged to host the event of Hajj being one of the five pillars of Islam. It brings millions of pilgrims of several Nationalities from different countries of the world every year. Although, this important pilgrimage need mental, physical and financial fitness, for its performance, which is ignored, especially for the physical abilities, by the visiting Hajji themselves and health authorities of their home countries. Therefore, yet a lot of pilgrims come to Makkah with major cardiovascular diseases. In addition, overcrowding and the hot climate subject the pilgrims further towards environmental and health hazards. The rituals performed during hajj include a walk around Kaaba, a cube-shaped building in

Makkah considered the most sacred site in Islam, followed by the Sa'i consisting of walking between two hills (Safa and Marwa) seven times, each with a distance of about 450 m to a total of 3.15 km. Other rites include a 14.5 km journey to the desert Arafat, a night spent at Muzdalifah where pebbles to be thrown the following day at Mena (about 5 km from Makkah).

In a previous study, heart diseases (Serafi, 2008), whether exacerbations of pre-existing disease or the occurrence of new ones have been reported to account for (20%) of all diseases seen during the 2-week periods of the Hajj. A person could be ill at any time in his life and to seek medical aid, he might be admitted to a hospital for as long as needed. But during the Hajj days, too many Hajj pilgrims get medical problems ranging from minor flu to major illnesses and some may need surgical intervention. It is worth to mention that excellent medical services

are provided in every hospital of Makkah, Muzdalifa, Arafat and Mena (**Gazzaz et al., 2004**). It results in only 2 to 3% casualties among huge admissions in various hospitals. Yousef and colleagues (**Yousaf et al., 1995**) have recorded the health problems of pilgrims seen as outpatients. Of these, the commonest diseases were pneumonia, diabetes and ischemic heart disease. This resulted in a high admission rate to the medical departments, as in our current study.

The pattern of surgical problems alone was studied by Elhassan & Hameed (**1990**) and Al-Harthi & Al-Harbi (**2001**). The commonest problems listed were blunt abdominal trauma due to traffic accidents, obstructed inguinal hernia, and intestinal obstruction. In recent years, there has been a change in the pattern of diseases among pilgrims (from cholera and meningitis, to diabetes and ischemic heart disease), perhaps due to improved health education and hygiene (**Ahmed, 2002**) as highlighted in Hajj studies for specific diseases (**Ataur-Rahim, 1986; Yousaf, 2000; Ahmed, 2002**).

Recently In a 2012 review article (**Al Shimemeri, 2012**) examining the pattern of cardiovascular disease in Hajj Pilgrims found that over the past few years cardiovascular diseases have emerged as an important cause both of intensive care unit (ICU) admission and of mortality during Hajj. For instance, in a study analyzing Hajj hospital admissions in 2004 as a function of pilgrims' geographical origin, myocardial infarction was identified as the major cause of admission into the intensive care units (ICU) of seven hospitals (four in Mena, three in Arafat), ahead of pneumonia, asthma, chronic obstructive pulmonary disorder (COPD) and pulmonary edema (**Madani et al., 2004**). More than 60% of the ICU admissions came from cardiovascular causes of which myocardial infarction and left ventricular failure occurred with the highest frequencies.

In 2005 the Ministry of Health of the Kingdom of Saudi Arabia identified deaths resulting from cardiovascular diseases as the highest recorded during Hajj (**Health Statistics: Saudi Ministry of Health, 2005**).

Serafi (**2010**) studied the commonest cardiac diseases at AL Noor specialist Hospital for Hajj 1429 and he concluded that hospitalized patients in Al-Noor Hospital for Hajj 1429H, were already suffering from most common cardiac diseases before coming for Hajj, and belongs to different countries over the globe. It clearly indicates loop holes in the health services of their home countries that did not verify the physical fitness of their pilgrims and allowed them to proceed for Hajj. This study will also serve as a helping tool for the Ministry of Hajj in Saudi Arabia to take appropriate measures for

demanding strictness for the physical fitness of Hajj pilgrims and anticipated health services for them.

It is recommended that Health authorities of other countries should undertake counseling & medical testing of all persons planning for Hajj beforehand (at least six months earlier to the start of their journey for Hajj) and arrange an awareness program to advise and educate Hajj pilgrims regarding health care. And do not allow cardiac risk patients to proceed for Hajj unless they obtain acceptable vital values with medicine and care. Such patients should also possess a medical card with them; stating brief history regarding their main cardiac problem and medicines (generic/ chemical names) prescribed to them. This will reduce hospitalization rate and the burden on health services in Makkah and Medina during Hajj season (**Serafi, 2010**).

Cardiovascular disease (CVD) remains the leading cause of death in both men and women in the United States, and CHF remains the most common cause of hospitalization in patients older than 65. Recent statistics from the American Heart Association (AHA) indicate that CHF-related mortality rose 35% from 1992 to 2002. The high disease prevalence and high mortality associated with CHF mandate aggressive diagnostic and management strategies. The revised American College of Cardiology/AHA heart failure guidelines incorporate a new classification system to more readily identify high-risk patients and to direct primary and secondary prevention efforts (**Dickstein et al., 2008**).

Approximately 5 million adults have congestive heart failure (CHF) in the USA, and approximately 550,000 new cases of heart failure are diagnosed in USA every year. The incidence of CHF increases dramatically in the elderly population: Approximately 10% of men and women older than 75 years have the disease (**Redfield et al., 2002**).

Circulating levels of the BNP system can help in the diagnosis of cardiovascular disease and provide prognostic information not only in patients with HF but also the general population and other patient groups. Changes over time also carry prognostic information and studies are assessing BNP-guided treatment strategies. New insights regarding the biology of the BNP system are emerging with identification of circulating molecular forms of BNP, which may improve the diagnostic and prognostic value of BNP (**Costello-Boerrigter et al., 2006**).

The BNP test is used as an aid in the diagnosis and assessment of severity of congestive heart failure (also referred to as heart failure). A recent meta-analysis concerning effects of BNP testing on clinical outcomes of patients presenting to the emergency department with acute dyspnea revealed that BNP

testing led to a decrease in admission rates and decrease in mean length of stay (Redfield *et al.*, 2006). The BNP test is also used for the risk stratification of patients with acute coronary syndromes (Dickstein *et al.*, 2008; Maisel *et al.*, 2008).

The above mentioned background shows a clear urgency for carrying out a study on patients with heart disease of pilgrims in Makkah and the holy sites. This study aimed to determine the proportion of heart disease most common among the pilgrims, with a focus on patients with heart failure (HF) and Ischemic heart disease (IHD). Since the mortality rate has risen significantly as a result of heart disease, especially in patients with coronary artery disease and heart failure we must search for ways and means to diagnose the disease early to try to control it and treat its complications.

It is known that patients who suffer from heart failure have higher levels of some cardiac enzymes that originated the idea of this research. This emphasize to observe the early signs in patients with heart failure (HF) and to try to diagnose their condition and refer them to the cardiologist early for treatment and to avoid, God willing, the incidence of complications as a result of heart diseases. The importance of the present research is for an attempt to find out the initial indicators early and try to treat and avoid them if possible. It is well known and is common to treat any disease or its complications, the results are far better off when detected early to try to control the patient.

Prevention is better than cure is the saying completely honest and this research may help patients with heart predicting the consequences that may affect them and try to prevent them, including through the organization of early treatment and referring to cardiac clinics.

There are great economic importance as well as early diagnosis may reduce the complications of heart attack, which will help States, individuals and health care institutions and organizations of the health insurance for early diagnosis and treatments, and to prevent complications of heart disease, such as treatments of cases of heart failure and coronary artery disease and other heart diseases. This reduces the cost as a result of early diagnosis of this deadly disease.

2. Methods:

The study was performed in Mena emergency hospital in Mena, Makkah, Kingdom of Saudi Arabia. The researchers were divided into two groups the first group was at the emergency department (ER), and the second group in coronary care unit (CCU). All

researchers had to complete a questionnaire and to take blood samples from all patients attending the two departments in the hospital. The blood samples were saved and then transferred for future analysis and all results were saved in an Excel sheet for future statistical analysis.

This study was conducted for 507 (297 males, 196 females and 14 children) pilgrims of Hajj, admitted in the Mena emergency hospital, 120 cardiac patients of them were admitted in Coronary care unit (CCU) (85) and cardiology wards (35), Makkah, Saudi Arabia. It was done from the first 15 days of Hajj season (Month Zul-Hajjah) of the Islamic year 1429H, corresponding to 29th November to 13th December 2008G. The patient's data collection includes, statistic of all patients admitted to the hospital, questionnaire and blood samples for patients with suspected heart disease and those with shortness of breath. Brain Natriuretic Peptide (BNP) was estimated for all patients with heart diseases and those with shortness of breath.

3. Results:

Table 1 shows that total numbers of admission were 507 patients, 82% of them were discharged, only 17% of patients were still in hospital and 1% of patients were dead at the end of Hajj season. Majority of admitted patients were non-Saudi 76% with 78% of them were discharged and 20% inpatients with 2% mortality, while the admitted Saudi patients were 24% with 92% of them discharged and 7.5% patients stayed in hospitals with only 1 patient died less than 0.5%.

Patients with heart diseases were 120 patients, 100 of them were Non-Saudi patients, and 20 Saudi patients. They presented with different types of heart diseases. Table 2 showed that majority of non-Saudi patients 37 (37%) presented with heart failure while the majority of Saudi patients 8 (40%) were post coronary arteries bypass graft surgery (CABG).

As shown in table 3 that the number of male patients admitted with heart diseases were more than female patients. Patients with heart failure (40%) were the commonest presentations for both genders.

Table 4 shows that the number of males admitted to CCU were 68 (80%) and female patients were (20%) with majority of them with heart failure for both genders.

BNP were measured from Blood samples of all patients admitted to CCU and who are admitted to hospital suffering from shortness of breath or suspicion of HF with a total number of 150 patients. BNP ranged from 759 to 13740 pg/ml with the highest levels in female patients with congestive heart failure.

Table 1. Anthropometric characteristics of all Saudi and Non-Saudi admitted patients.

	Saudi				Non Saudi				Total
	Male	Female	Children	Total	Male	Female	Children	Total	
Admission	71	48	1	120	226	148	13	387	507
Discharged	65	44	1	110	168	123	13	304	414
Inpatients	5	4	0	9	51	23	0	74	83
Dead	1	0	0	1	8	1	0	9	10

Table 2. Anthropometric characteristics of the Saudi (n=20) and Non-Saudi patients (n=100) with heart diseases.

	Rheumatic Heart Disease	Post CABG	Congestive Heart Failure (CHF)	Hypertension	Heart Arrhythmias	Heart Failure (HF)
Saudi	1	8	3	3	3	2
Non-Saudi	6	15	17	17	8	37
Total	7	23	20	20	11	39

Table 3. Anthropometric characteristics of Male (n=98) and Female (n=22) patients with heart diseases.

	Rheumatic Heart Disease	Post CABG	Congestive Heart Failure (CHF)	Hypertension	Heart Arrhythmias	Heart Failure (HF)
Male	5	20	17	17	9	30
Female	2	3	3	3	2	9
Total	7	23	20	20	11	39

Table 4. Anthropometric characteristics of Male and Female patients admitted to CCU.

	Heart Failure (HF)	Congestive Heart Failure (CHF)	Heart Diseases	Total
Male	30	17	21	68
Female	9	3	5	17
Total	39	20	26	85

Table 5. BNP Values in Male and Female patients with heart diseases, data (means±standard deviations).

	Heart Failure (HF)	Congestive Heart Failure (CHF)	Heart Diseases
Male	358 ± 1370	1310 ± 12490	67 ± 759
Female	512 ± 2421	1718 ± 13740	87 ± 870

4. Discussion:

This study was done in continuation of previous studies (Serafi, 2008; 2010) to further evaluate the Hajj Pilgrims admitted in hospital with respect to their classification as cardiac patients. It may be tempting to ask the question: should the Saudi Arabian authorities institute an age based exclusion criterion for granting admittance onto the pilgrimage? Perhaps, it would be of greater help; however, to have the different national and regional authorities work together with the Saudi Arabian authorities in ensuring intended pilgrims are adequately screened for likely risk factors such as cardiovascular diseases with a special attention to how well such chronic diseases have been managed by the individual.

Expectedly, this will parametrically consider age as a risk factor; however, such screening should primarily focus on disease risk factors. This is already in force in certain cases where intended pilgrims from Turkey and Malaysia with severe heart conditions are

prevented from performing the Hajj. It is important that the main objectives of Hajj could not be achieved either individually or collectively, if health authorities are not care full. It is worth to note that the health ministry of Saudi Arabia is spending millions of Riyals on best care of these pilgrims in Makkah and Madinah, coming from all around the world. However, during main Hajj Ritual period, emergency admissions in hospitals offer great difficulty to pilgrims themselves and challenge to the local health authorities. This situation clearly reflects carelessness of health authorities or Hajj missions belonging to the home countries of these Pilgrims. The Pilgrims from Malaysia and Turkey with heart diseases are prohibited from coming to perform Hajj. However, only one Hajji from Malaysia was admitted to al-Noor hospital with acute coronary syndrome with no previous history of heart disease.

This is a pilot study with limitations. It highlights only those cases admitted in Mena

emergency hospital for the year 1429H and refers to a previous studies for the year 1427H, 1429H (**Serafi, 2008; 2010**)¹. It is only a reflection of status of Hajj pilgrims and their heart diseases from our perspective. Pilgrims are somewhat careless about their health matters, as they want to avail every single minute to perform rituals. However, they are forced to seek medical care when they fall ill. Approximately 507 patients were admitted during 1429H in this emergency medical care center (Mena emergency hospital).

Treatment of HF can be challenging, especially since common symptoms and signs have only limited specificity. For that reason, a sensitive, objective, and cost-effective measure of patient status is highly desirable. The cardiac-derived natriuretic peptide BNP and its related peptides may be such markers. Given that myocardial stretch stimulates BNP production and release, that the heart is the major source of BNP, and that BNP can easily be measured in plasma, there is a straightforward rationale for evaluating circulating BNP as a biomarker for cardiac overload (**Dickstein et al., 2008; Maisel et al., 2008**).

We found that majority of admissions were males. Maximum numbers of admission were observed in CCU suggesting that these patients were in acute stage whether this was a new acute episode or a de compensation of old heart diseases. A total number of 507 patients were admitted to the hospital including 120 patients with heart diseases, 85 of them were admitted in CCU and 35 in cardiology ward. The patients suffering from various cardiac diseases were in the following order: heart failure cases 70%; ischemic heart disease 20%; and valvular heart disease 10%. Brain Natriuretic Peptide (BNP) was significantly increased in all patients with heart failure. By analyzing the questionnaire in patients who have HF with high BNP we found that 80% of them admitted to the hospital after they perform physical effort and more than 50% of them had started the symptoms they have after they throwing pebbles. It is known that patients with controlled hypertension can go easily into decompensation and presented with heart failure after an exertion and that was the case in our study as majority of patients developed their symptoms after performing physical efforts.

Gazzaz et al. (2004) have recorded 20% of admissions to Al-Noor specialist hospital is due to heart diseases during the Hajj 1422. **Al-Ghamdi et al. (2003)** conducted a study during the Hajj 1422 session but for the hospitals of Al-Mashaer areas (four in Mena and three in Arafat) and gave similar results. These are considered as primary and secondary care facilities that cater to the urgent medical needs of pilgrims. Although this is a small

study and needs further research in different aspects of Hajj and in other hospitals, it provides a brief overview of heart diseases in pilgrims. Screening of patients with shortness of breath by measuring BNP in their blood could help in diagnosing more patients and send them early to cardiac clinics so my lead to reducing the length of stay and prevent complications.

Conclusions:

It is concluded that hospitalized patients in Mena emergency hospital for Hajj 1429H, were already suffering from most common cardiac diseases before coming for Hajj, and belongs to different countries over the globe. It clearly indicates loop holes in the health services of their home countries that did not verify the physical fitness of their pilgrims and allowed them to proceed for Hajj.

This study will also serve as a helping tool for the Ministry of Hajj in Saudi Arabia to take appropriate measures for demanding strictness for the physical fitness of Hajj pilgrims and anticipated health services for them. It is recommend that Health authorities of other countries should undertake counseling & medical testing of all persons planning for Hajj beforehand (at least six months earlier to the start of their journey for Hajj) and arrange an awareness program to advise and educate Hajj pilgrims regarding health care. And do not allow cardiac risk patients to proceed for Hajj unless they obtain acceptable vital values with medicine and care. Such patients should also possess a medical card with them; stating brief history regarding their main cardiac problem and medicines (generic/chemical names) prescribed to them. This will reduce hospitalization rate and the burden on health services in Makkah and Medina during Hajj season. This study will also serve as a helping tool for the Ministry of Hajj in Saudi Arabia to take appropriate measures for demanding strictness for the physical fitness of Hajj pilgrims and anticipated health services for them.

Prevention is better than cure 'theorem is completely honest and this research may help heart patients that may predict complications and try to acquire them and protect them by regulating the treatment and lack of exposure to physical stress and refer them to clinics early to prevent complications. There are great economic importance as well as early diagnosis may reduce the complications of the heart diseases and that will help states and individuals and health care institutions and institutions of health insurance for early treatments, prevent complications of heart disease, such treatments are invasive and costly especially for cases of heart failure and

coronary artery disease which reduces the cost as a result for early diagnosis of this deadly disease.

Recommendations:

1. Young and healthy pilgrims to substitute the elderly patients to throw pebbles.
2. Transfer the elderly and the sick pilgrims by cars to throw pebbles.
3. Use of an electrical course to and from the Jamarat to transport pilgrims

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