

# Clinical and Therapeutic Profiles of Heart Failure Patients admitted to a Tertiary Hospital, Aseer Region, Saudi Arabia

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## الشائكة السريرية والعلاجية لمرضى قصور القلب الذين تم إدخالهم إلى مستشفى ثالثي في منطقة عسير (المملكة العربية السعودية)

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**الملخص:** الهدف: معرفة الشائكة السريرية والعلاجية للمرضى المصابين بحالات قصور القلب الذين تم إدخالهم في مستشفى عسير المركزي، المملكة العربية السعودية. الطريقة: أجريت هذه الدراسة الاستيعابية على 300 حالة متتابعة من المرضى المصابين بقصور القلب في مستشفى عسير المركزي الفترة مابين 1 يونيو 2007 و 31 مايو 2009، وقد تم تجميع المعلومات عن المتغيرات الديموغرافية والمسببات وعوامل الاختطار والشائكة العلاجية للمرضى، ثم تحليلها إحصائياً. النتائج: كان متوسط العمر للمرضى  $(67.4 \pm 13.7)$  عاماً وكان (68.7%) منهم ذكورا. أكثر المسببات لداء قصور القلب كان داء القلب الإقفاري في (38.3%) يليه ارتفاع ضغط الدم في (33.3%) من المرضى. كان (61.3%) من الحالات مصابة بداء السكري. عوامل الاختطار الأخرى شملت الفشل الكلوي (9.7%)، والرجفان الأذيني (13%) وفقر الدم (48.3%). أجري تخطيط صدى القلب عند (98.7%) من المرضى وكان متوسط الكسر القذفي  $(33 \pm 17)$ . استخدمت مثبطات إنزيم تحويل الأنجيوتنسين أو مُحصرات الأنجيوتنسين 2 في (68.3%) من الحالات ومُحصرات بيتا والديجوكسين في (51.6%) و(28.3%) من الحالات بالترتيب. الخلاصة: الأسباب الرئيسية لداء قصور القلب في هذه الدراسة داء القلب الإقفاري وارتفاع ضغط الدم. أما داء السكري وفقر الدم فكانا من عوامل الاختطار الشائعة. وشكلت مجموعة المرضى مجموعة متوسطة الخطورة بكسر قذفي يعادل (33%). استخدمت أدوية هامة مثل مثبطات إنزيم تحويل الأنجيوتنسين ومُحصرات بيتا والديجوكسين كانت مستعملة بشكل محدود. تعزيز مثل هذا العلاج في الممارسة العملية سيؤدي إلى نتائج أفضل في علاج مرضى قصور القلب. كما كان فقر الدم عامل اختطار مهم عند المرضى الذين يعانون من قصور عضلة القلب وينبغي أن يعالج بشكل فعال.

**مفتاح الكلمات:** قصور القلب، المداواة، المملكة العربية السعودية.

**ABSTRACT: Objectives:** This study aimed to investigate the clinical and therapeutic profiles of heart failure (HF) cases admitted to Aseer Central Hospital (ACH), Saudi Arabia. **Methods:** A retrospective cohort of 300 consecutive patients admitted with the diagnosis of HF to ACH from 1 June 2007 to 31 May 2009 were included in the study. Data on demographic variables, aetiologic factors, risk factors, and therapeutic profiles of patients with HF were collected and analysed. **Results:** The patients' mean age was  $67.4 \pm 13.7$  years and 68.7% of them were male. The commonest aetiologies for HF were ischaemic heart disease (IHD) and hypertension in 38.3% and 33.3% of patients, respectively. A total of 61.3% of patients were diabetics. Other risk factors for HF included renal failure in 9.7%, atrial fibrillation in 13%, and anaemia in 48.3% of patients. Echocardiography was performed in 98.7% of cases: the average ejection fraction (EF) was  $33 \pm 17$ . Angiotensin converting enzyme inhibitors (ACEI) or angiotensin 2 receptor blockers were used in 68.3% of cases,  $\beta$ -blockers in 51.6% of cases and digoxin in 28.3% of cases. **Conclusion:** The major causes of HF in our study were IHD and hypertension. Diabetes and anaemia were common risk factors. The cohort constituted an intermediate HF risk group (ejection fraction (EF) 33%). Important therapeutic agents like angiotensin converting enzyme inhibitor I,  $\beta$ -blockers and digoxin were underutilised. Fostering such therapy in practice will lead to a better outcome in the management of HF patients. Anaemia was a significant risk factor in our HF patients and should be managed properly.

**Keywords:** Heart failure; Therapeutics; Saudi Arabia

### ADVANCES IN KNOWLEDGE

1. This study provides information on the pattern and aetiology of heart failure in Saudi Arabia and the pattern of risk factors for heart failure in Saudi population.
2. It highlights the underutilisation of important drug therapies in heart failure for Saudi patients.

**APPLICATION TO THE PATIENT CARE**

1. *This study highlights the need to improve the use of proven important drug therapies for heart failure.*
2. *Physicians should recognise and address the problem of drug underutilisation in heart failure management.*
3. *The study also provides information on important risk factors for heart failure development and how to improve their prevention.*

**H**EART FAILURE (HF) IS DEFINED AS a complex syndrome resulting from inability of the heart to meet peripheral tissues metabolic demands at a normal filling pressure.<sup>1</sup> It is a common final pathway of many chronic disorders namely hypertension, diabetes, and ischaemic heart disease (IHD).<sup>2</sup> The global prevalence of heart failure varies from 2.3% to 3.9% per annum.<sup>3-5</sup> Annually, an estimated 23 million people have heart failure worldwide and 2 million new cases are diagnosed each year. Due to therapeutic improvement in the treatment of acute myocardial infarction and hypertension and improved survival, the incidence of heart failure has increased and become a real public health issue.<sup>2,6-7</sup> It is characterised by decreased quality of life with high morbidity and mortality. The HF mortality rate is approximately 25% within one year of initial diagnosis.<sup>3-5,8</sup>

The aetiology of HF varies from different reports around the world, but ischaemic heart disease, hypertension, rheumatic heart disease and to a lesser extent cardiomyopathy and anaemia are the leading causes of HF. Ischaemic heart disease is becoming a major leading cause of heart failure in developed countries, where more than two thirds of HF cases are due to IHD.<sup>9,10</sup> Despite clear evidence of the beneficial effect of certain therapeutic agents like angiotensin converting enzyme inhibitors (ACEI),  $\beta$ -blockers and K-sparing diuretics on survival, these agents continue to be underutilised globally.<sup>11</sup>

The Aseer Region (population 1,200,000) is located in the southwest of Saudi Arabia covering an area of more than 80,000 km<sup>2</sup>. The region extends from the high mountains of Sarawat (with an altitude of 3,200 m above the sea level) to the Red Sea. Health services delivery in Aseer region is provided by a network of 244 primary health care centers, 16 referral hospitals and one tertiary hospital, Aseer Central Hospital (ACH). ACH, with 500 beds, is run by the Ministry of Health and the College of Medicine of King Khalid University (KKU), Abha.

We aimed in this study to analyse the demographic data, clinical and therapeutic profiles of patients admitted with the diagnosis of heart failure to Aseer Central Hospital (ACH) and to find out how close we were to the recommended international standards of management of heart failure.

## Methods

A retrospective cohort of all consecutive patients admitted to Aseer Central Hospital (ACH) with the diagnosis of heart failure according to medical records, during the two-year period 1 June 2007 to 31 May 2009, were included in this study. Approval of the local medical ethical committee was obtained. Demographic data, underlying aetiologies, risk factors for heart failure (diabetes, hypertension, anaemia, atrial fibrillation and renal failure), echocardiographic features and ejection fraction (EF) values were collected. Conventionally patients with EF < 30% were labelled as having severe left ventricular dysfunction, 30–44 % as moderate left ventricular dysfunction, and 45–54% as mild left ventricular dysfunction.<sup>12</sup>

Records on all medications used conventionally for treatment of heart failure were collected. The main angiotensin converting enzyme (ACE) inhibitor agent used was captopril, and the target recommended dose was considered to be one 50 mg tablet taken three times a day, with any lower dose considered to be below the target dose.<sup>13</sup> The main  $\beta$ -blocker agent used was carvedilol and the target recommended dose was considered to be one 25 mg tablet taken twice daily, with any lower dose considered to be below the target dose.<sup>14</sup>

Data were analysed using the Statistical Package for the Social Sciences (SPSS) software package (Version 15.0). Frequency, percentage, mean, standard deviation and median were used to present the data.

**Table 1:** Demographic and clinical characteristics of heart failure patients in Aseer Region, Saudi Arabia

Demographic/clinical characteristic	No ( % )
Age, ( Mean $\pm$ SD)	67.4 $\pm$ 13.7
$\geq$ 60 years, No (%)	228 (76%)
Male gender	206 (68.7%)
<b>Aetiology</b>	
Ischaemic cardiomyopathy	115 (38.3%)
Hypertensive heart disease	100 (33.3%)
Dilated cardiomyopathy	30 (10%)
Valvular heart disease	9 (3%)
<b>Risk Factors</b>	
Diabetes	184 (61.3%)
Hypertension	177 (59%)
Anaemia	145 (48.3%)
Atrial fibrillation	39 (13%)
Renal failure	29 (9.7%)

## Results

The present study included 300 patients with the diagnosis of heart failure. The age ranged from 26 to 101 years with an average  $67.4 \pm 13.7$  years. A total of 206 patients (68.7%) were male. The commonest aetiology for heart failure was IHD in 38.5% of cases followed by hypertension in 33.3 % of cases. Other aetiologies included dilated cardiomyopathy in 10% and valvular heart disease in 3% of patients. The commonest risk factors were diabetes in 61.3%, hypertension in 59% and anaemia in 48.3% of patients. Other risk factors were atrial fibrillation in 13% and renal failure in 9.7% of patients. Table 1 shows the demographic and clinical characteristics of heart failure patients in Aseer region, Saudi Arabia.

Echocardiography was performed in 98.75% of patients and the average EF was  $33\% \pm 17$  for the study group. Our patients lay in the moderate left ventricular dysfunction group. Table 2 shows the distribution of heart failure patients according to their ejection fraction values. Table 3 shows the frequency of types of treatment used in HF patients in the study cohort.

The use of ACEI or angiotensin 2 receptor blockers (A2RB) was reported in 68.3% of patients, and among patients on ACEI, the majority (91.85%) were on lower than the target dose, thus only 8.15 % of patients were on the recommended target dose. Captopril was the main ACEI agent used in this cohort.

**Table 2:** Distribution of heart failure patients by ejection fraction value

Type of LVD	No (%)
Mild LVD (EF 45-54%)	29 (9.7%)
Moderate LVD (EF 30-44%)	83 (27.7%)
Severe LVD (EF < 30%)	141 (47%)
Normal (EF $\geq$ 55%)	43 (14.3%)
Echocardiography was not done	4 (1.3%)

Legend: LVD = left ventricular dysfunction; EF = ejection fraction

The rate of use of  $\beta$ -blockers in our study was 51.6%. Among those patients prescribed this treatment, 82% were on lower than the target dose, thus only 18% were on the recommended target dose. Carvedilol was the main  $\beta$ -blocker agent used in this cohort.

Other heart failure medications used were digoxin for 28.3% of patients; loop diuretics for 87%; K-sparing diuretics for 45.3%; vasodilator therapy (hydralazine or calcium channel blockers) for 13%; warfarin for 16%, and amiodarone for 1.3%.

## Discussion

The literature on clinical and therapeutic profiles of heart failure patients in Saudi Arabia is scarce. This makes it difficult to plan policies for the prevention and management of heart failure in Saudi Arabia. The only study in neighbouring countries was the Omani study which included 1,164 patients with symptomatic heart failure and showed a prevalence of heart failure in an Arab population to be 5.17/1,000 population.<sup>15</sup>

In our series, the mean age was 67.4 years which is similar to the Framingham series of a Western population, where the most susceptible age for the onset of HF was 60 years and older.<sup>16</sup> In our cohort, more than two thirds of patients were older than 60 years.

IHD and hypertension were the commonest aetiology of heart failure in our series, this concurs with similar findings both the Framingham<sup>16</sup> and the Omani study.<sup>15</sup>

Among risk factors for heart failure, we found the incidence of diabetes in our group to be high (61.3%); this data corroborates well with Al-Nozha's findings of a high prevalence of diabetes in Saudi society.<sup>17</sup>

An important relevant finding in our study

**Table 3:** Frequency of types of drugs used in treatment of heart failure patients

Drugs	No (%)
Loop Diuretics	261 (87%)
ACEI (angiotensin converting enzyme inhibitor) or A2RB (angiotensin 2 receptor blockers)	205 (68.33%)
$\beta$ -Blockers	155 (51.7%)
K-Sparing Diuretics	136 (45.3%)
Nitrates	91 (30.3%)
Digoxin	85 (28.3%)
Warfarin	48 (16%)
Hydralazine	21 (7%)
Amplodipine	18 (6%)
Amiodarone	4 (1.3%)

is the high prevalence of anaemia (defined as haemoglobin level less than 12 gm/dl in females and less than 13 gm/dl in males according to the WHO definition).<sup>18</sup> In our series, anaemia was detected in 48.3% of patients with heart failure. Evidence from previous studies showed that anaemia is a long term predictor of poor prognosis in patients with severe heart failure.<sup>19</sup> This group of patients requires special attention as correcting their anaemia will improve their clinical and haemodynamic status. The reasons for this relatively high prevalence of anaemia in our cohort could be due to different factors among them the fact that the Assir region is considered to be one of the major pockets of sickle cell genes in Saudi Arabia.<sup>20</sup> Other important risk factors for heart failure include atrial fibrillation and renal failure which we found in our series (13% and 9.7% respectively); similar incidences of these two disorders were reported in other studies.<sup>7</sup> These disorders were found to contribute to a high need of hospitalisation for elderly patients with heart failure.<sup>21,22</sup>

The rate of echocardiography performance was adequate in our series where the vast majority of heart failure patients (98.7%) underwent echocardiographic assessment.

The majority of our patients were in the moderate risk group according to the EF value categorisation.

In large trials, ACEI was clearly found to improve survival, functional capacity and to reduce the need for hospitalisation when given to heart failure patients.<sup>23-25</sup> Despite these studies, the drugs

are underutilised and, when used, the optimal dose is not achieved.<sup>24-28</sup> In the current study, only 68.3% of heart failure patients were prescribed ACEI, and the majority of them were not on the recommended target dose. In contrast to this finding, in the USA ACEI is used in 89% of patients with heart failure.<sup>29</sup> This low rate of use in our cohort can be due to several factors: 1) lack of awareness of the important role of ACEI in improving mortality in HF patients; 2) inappropriate broadening of the scope of the contraindications by clinicians; 3) lack of adherence to the recommended guidelines; 4) patient's poor compliance with medications, or the economic cost of prescribing multiple medications to heart failure patients.

Similar findings regarding the underutilisation of ACE inhibitors in heart failure patients was observed in other studies and multiple factors were found to contribute to such a practice; among these were the older age of patients, the presence of renal dysfunction, the presence of only diastolic dysfunction, and the substandard quality of care given to heart failure patients.<sup>30</sup>

$\beta$ -blockers were found to reduce mortality and frequency of hospital admissions when given to patients with heart failure.<sup>14,31-32</sup> The meta analysis of 21 trials showed that  $\beta$ -blockers improve left ventricular ejection fraction by 25%.<sup>33</sup> In our study, we found only 51.6% of HF patients were prescribed  $\beta$ -blockers, and the majority of those were not on the recommended target dose. The same reasons postulated for ACEI underutilisation can be applied to the underutilisation of  $\beta$ -blockers.

Digoxin was found to decrease the need for admissions, but did not reduce mortality when given to patients with heart failure.<sup>34-36</sup> Digoxin was used in only 28.3% of our cohort which is lower than the rate reported in the USA (50%).<sup>29</sup> This low rate in our series could be due to clinicians giving more priority to drugs that reduce mortality only and less importance to drugs that only improve morbidity.

The use of oral anticoagulation warfarin in HF patients, especially those with severe left ventricular dysfunction, was found to reduce stroke, sudden death, and myocardial infarction.<sup>37</sup> In large HF trials like SOLVD (Study of Left Ventricular Dysfunction), oral anticoagulation warfarin was used in 12% of patients.<sup>38</sup> In our series, it was used in 16% of patients which is close to the international figure.

Amiodarone was found to reduce arrhythmia,

but not mortality, in HF patients.<sup>39</sup> The rate of amiodarone use in large HF trials was 14.4%.<sup>38</sup> which is clearly higher than our rate of 1.3%. The reason for such a discrepancy is not obvious.

The observed underutilisation of different evidence-based therapeutic agents for the treatment of heart failure patients in our cohort was also reported in other larger studies such as the Euro Heart survey on heart failure.<sup>40</sup>

## Conclusion

In conclusion, we believe that this study shed some light on the clinical and the therapeutic profile of HF patients treated in the tertiary hospital in Aseer Region, Saudi Arabia. It has shown that IHD and hypertension were the leading causes of HF in this cohort. Diabetes is a highly prevalent risk factor and anaemia is a significant problem in our HF patients and should be corrected. Furthermore, this study showed underutilisation of the important treatment modalities used for HF, mainly ACEI,  $\beta$ -blockers and digoxin, and when used, the doses were not optimal. Awareness of this data will contribute to improvement in management of HF patients and encourage clinicians to adhere to the recommended guidelines for HF management. This study also calls for an urgent need to establish a national registry for heart failure in Saudi Arabia in order to evaluate the economic burden of such a common medical disorder and therefore plan a better health care system.

## CONFLICT OF INTEREST

The author reported no conflict interest.

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