Abstract

Objective: The aim of this study was to find out the common risk factors associated with Acute Coronary Syndrome (ACS) in Northern Kingdom of Saudi Arabia (KSA).

Methodology: One hundred and fifty six patients with ACS were investigated in intensive care unit (ICU), at cardiac center in King Khalid Hospital, in northern KSA, city of Hail.

Results: Risk factors for ACS including; Hypertension, Ischemic Heart Disease (IHD), Smoking, Diabetes Miltus (DM), and Dyslipidemia were found in 68.6%, 34.6%, 20.5%, 59% and 83.3% of the patients, respectively.

Conclusion: The most common risk factors for ACS in northern KSA (Hail region) were dyslipidemia and hypertension. These favored the urgent need for intervention and control, which lower the burden of ACS.

Keywords: Acute Coronary Syndrome; Unstable angina; NSTEMI; STEMI

Introduction

ACS is a group of clinical symptoms well-matched with acute myocardial ischemia, representing the most important cause of death worldwide, with a great clinical and financial impact. The clinical types of ACS includes unstable angina and acute myocardial infarction (AMI) with or without ST-segment elevation [1].

The mechanism of ACS includes a complicated interaction among the endothelium, the inflammatory cells, and the thrombogenicity of the blood [2,3]. Angiographically, non-critical coronary lesions (<50% stenosis in the diameter of the vessel) may be accompanied with abrupt progression to severe or complete occlusion and may ultimately account for two-thirds of cases of ACS [4,5]. Factors such as, the severity of the plaque rupture, the lipid and tissue factor content of the plaque, the degree of inflammatory reactions at the site, and the blood flow in the area, are important in monitoring the amount of thrombus formation which defining whether a given plaque rupture will cause ACS [6-8]. Previous studies using intravascular ultrasonography have revealed that at least 80% of patients with ACS display multiple plaque ruptures distinct from the culprit lesion [9].

There are many modifiable risk factors for ACS. Most risk factors that initiate cardiovascular disease have genetic, physiologic, behavioral, and environmental components. Non-modifiable risk factors include age, genetics, and gender. Modifiable risk factors comprise smoking, dyslipidemia, hypertension, and diabetes, with obesity and metabolic syndrome are commonly involved [10-12]. The Saudi Project for assessment of coronary events recruited patients admitted with ACS from 17 hospitals in KSA from 2005 to 2007. A total of 4523 patients with ACS were investigated, of whom 905 (20%) had Congestive Heart Failure (CHF) [13]. With a lack of studies from KSA regarding ACS, Saudi population has diverse racial, socioeconomic, and demographic characteristics which might be risk factors for ACS in different KAS regions. Therefore, the aim of the present study was to assess risk factors associated with Acute Coronary Syndrome in Northern Saudi Arabia.

Materials and Methods

This is a retrospective descriptive study conducted in coronary care unit (CCU) at King Khalid Hospital-cardiac Centre, Hail, KSA. One thousand and nine hundred patients were referred to cardiac Centre during one year time, with suspected cardiac diseases. One hundred and fifty six patients were categorized as having acute coronary syndrome (ACS) and were further included as study subjects (cases). Records regarding patients with ACS were retrieved from patient’s files in CCU. The diagnosis of ACS was based on physical examination, electrocardiography, radiologic tests, cardiac biomarker estimations and patient’s history. On diagnosis ACS, ACS was further categorized into unstable angina (UA), none-ST-segment elevation myocardial infarction (NSTEMI), and ST-segment elevation myocardial infarction (STEMI). Data regarding the underlying risk factors such as a positive family
history, diabetes mellitus, smoking, hypertension, dyslipidemia and demographical characteristics, complications and outcome were also revised.

Statistical analysis
Data management was done using Statistical Package for Social Sciences (SPSS version 16). SPSS was used for analysis and to perform Pearson Chi-square test for statistical significant (P value P<0.5). The 95% confidence level and confidence intervals were used.

Ethical consent
The protocol of the present study was approved by the ethical committee at College of Medicine, University of Hail. The informed consent was agreed about by Pulmonary Medicine Department at King Khalid Hospital. All procedures performed this study were in accordance with the ethical standards of the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Results
The current study investigated 156 patients with ACS, their age ranging from 27 to 90 years with a mean age of 59 years old. Of the 156 patients, 130/156 (83.3%) were males and 26/156(16.7%) were females, giving males’ females’ ratio of 5.00:1.00. Most of the patients (both males and females) were diagnosed with STEMI followed by NSTEMI and UA, representing 83/156(53.2%), 43/156(27.6%), 30/156(19.2%), in this order. The males and females constituted 69/83(83%) & 14/83(17%) of STEMI, 38/43(88.4%) & 5/43(11.6%) and 25/30(83.3%) & 5/30(16.7%) of STEMI, NSTEMI and UA, respectively. Saudi civilian represent the majority of cases 137/156(87.8%). Of the 137 Saudi patients 74/137(54%), 39/137(28.5%) and 24/137(17.5%), were found with STEMI, NSTEMI and UA, respectively. Non-Saudi patients represented 19/156(12.2%). Among non-Saudi patients, most of the patients were detected with STEMI constituting 9/19(47.4%) followed by UA and NSTEMI, representing 6/19(31.6%) and 4/19(21%), respectively, as indicated in Table 1 and Figure 1.

In regard to the age, most of the cases of ACS were found among age group 56-65 years constituted 48/156(30.8%) followed by 46-55years and (both 66-75 and <45 years), representing 34/156(22%) and 29/156(19%), in this order, as indicated in Table 1 and Figure 2.

Table 2, summarizes the relationship between ACS and risk factors (Hypertension, IHD and Smoking). Hypertension was found in 107/156(68.6%) of the patients. Of the 107 patients, 53/107(49.5%), 28/107(26%) and 26/107(24.5%) were identified with STEMI, NSTEMI and UA, respectively. Ischemic Heart Disease (IHD) was found in 54/156(34.6%) of the patients. Of the 54 patients, 19/54(35%), 19/54(35%) and 16/54(30%) were identified with UA, NSTEMI, and STEMI, respectively. Tobacco smoking was identified in 32/156(20%) of the patients. Of the 32 patients, 16/32(50%), 11/32(34.4%) and 5/32(15.6%) were identified with STEMI, NSTEMI and UA, respectively, as indicated in Table 2 and Figure 3.

Table 3 summarizes the distribution of ACS by family history of IHD, DM and Dyslipidemia. Family history of IHD was identified in 10/156(6.4%) patients of whom 5/10(50%) were found with NSTEMI and 5/10(50%) with STEMI. DM was identified in 92/156(59%). Of the 92 diabetic patients with ACS, STEMI, NSTEMI and UA were revealed in 47/92(51%), 27/92(29.4%) and 18/92(19.6%), respectively. Dyslipidemia was specified in 130/156(83.3%) patients of whom, STEMI, NSTEMI and UA were determined in 71/130(54.6%), 37/130(28.4) and 22/130(17%), in this order as indicated in Table 3 and Figure 4.
Table 3: Distribution of ACS by Family history of IHD, DM and Dyslipidemia.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>UA</th>
<th>NSTEMI</th>
<th>STEMI</th>
<th>Total</th>
</tr>
</thead>
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<td>5</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>30</td>
<td>38</td>
<td>78</td>
<td>146</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>30</td>
<td>43</td>
<td>83</td>
<td>156</td>
</tr>
<tr>
<td>DM</td>
<td>Yes</td>
<td>18</td>
<td>27</td>
<td>47</td>
<td>92</td>
</tr>
<tr>
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<td>No</td>
<td>12</td>
<td>16</td>
<td>36</td>
<td>64</td>
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<tr>
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<td>37</td>
<td>71</td>
<td>130</td>
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<tr>
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<td>No</td>
<td>8</td>
<td>6</td>
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<td>26</td>
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</tbody>
</table>

Figure 1: Description of the ACS by Sex and Nationality.

Figure 2: Description of the ACS by age.
Discussion

In the present study we found high proportions of different risk factors that associated with various categories of ACS. The most common factors were sex, age, hypertension, IHD, smoking, DM, and dyslipidemia. In the current study dyslipidemia scored 83.3% of the patients with ACS and this was the highest percentage among these risk factors. The great majority of patients with ACS in the current study were elderly males. Such relationship (the occurrence of ACS in elderly men) were well established in several studies [14]. In the present study, most of the males were found with STEMI, followed by NSTEMI and unstable angina respectively. On the other hand, most of the females were observed with STEMI but followed by UA. Compared to men, women with high-risk for ACS undergo less coronary angiography, and angioplasty. Further more women do not have higher incidence of cardiovascular death, recurrent MI, or stroke, thus, they undergo a higher rate of refractory ischemia and re-hospitalization [15]. It was documented that about 33% of all ACS episodes happen in patients over 75 years old and account for approximately 60% of total mortality due to ACS [16-18]. The incidence of ACS in the elderly is expected to rise due to improvements in prior ACS treatment in an aging population [18].
However, the presentation of dyslipidemia among patients with ACS, differ in different studies, which may indicate some sort of demographical factors influence. Moreover, the majority of cases of dyslipidemia were found with STEMI followed by NSTEMI. May studies have shown that dyslipidemia is one the major risk factors which is extensively prevalent in patients with ACS and is more predominant in males than in females [20]. In a study investigated the rate of incidence, clinical and angiographic characteristics, and long-term clinical outcome of ACS in Swiss hospitals. Current smoking (81%) and dyslipidemia (59%) were the most common risk factors [21,22].

Hypertension (68.6%) was one of the prominent risk factors in the present study. Notably, the great majority of patients with hypertension were found with STEMI followed by NSTEMI. In general, the prevalence of hypertension rises progressively with age in both men and women and ac as strong risk factor for ACS [23]. A previous study revealed a 63.4% prevalence of hypertension among ACS patients [24]. However, in patients with acute myocardial infarction (AMI), the prevalence of hypertension varies from 31 to 59% [25]. A recent study from Barazil has reported that the main risk factors were arterial hypertension (68%), smoking (67%), and dyslipidemia (43%) [26].

Our study revealed a 59% prevalence of DM among ACS patients. DM is a major independent risk factor for acute coronary syndrome (ACS). Diabetic patients with ACS suffer from higher mortality compared to their non-diabetic peers [27]. The presence of type 2 DM extends the risk associated with ACS, increasing the risk of recurrent cardiovascular events (CVEs) and doubling the risk of death. Managing cardiovascular risk factors has slight outcome on lowering the mortality risk in patients with type 2 DM [28]. According to proof obtained from large epidemiological studies, an incidence rate of ACS in diabetics is 2-3 times higher than in general population [29].

Our study revealed a 59% prevalence of history of IHD among ACS patients. At definite time periods following ischemic stroke (IS), ACS as IHD represents a higher risk of death than IS. Not all IS patients can undergo specific examination for IHD detection. IS patients are mostly endangered by stroke recurrence in the first 2 years after the onset of IS [30]. After this period, coronary death due to IHD, is the leading cause of the long-term mortality in IS patients, with an incidence of 3.5–5.4% [31]. Consequently, excessive efforts are dedicated to IHD identification and its proper management [32]. The majorities of initial presentations of CVD are neither AMI nor IS, yet most primary prevention studies focus on these presentations. Sex has divergent associations with diverse CVDs, with consequences for risk prediction and management strategies [33].

The present study has shown a 20.5% prevalence of DM among ACS patients. Smokers were more commonly diagnosed with ST-segment elevation MI (46.0%) than former smokers (27.4%) and non-smokers (30.2%) (P<0.001). Smokers were habitually men, were younger and more aggressively treated than ex-smokers and non-smokers through the three acute coronary syndrome groups [34]. Family history of IHD was identified in 6.4% of the patients ACS. Although, there is a debate about the role of positive family history as an independent risk factor for coronary artery disease, it was reported that, positive family history is a major risk factor for coronary artery disease which intensely predisposes to the atherosclerotic development at younger ages; therefore, these patients should be assessed and managed more intensively for other risk factors [35]. Family history of coronary heart disease (CHD) is a well-established risk factor for CHD. Nevertheless, the prognostic association of family history has not been proven evidently in patients with AMI [36].

**Conclusion**

There is substantial association of conventional CV risk factors, such as, dyslipidemia, hypertension, diabetes and smoking with ACS, and the high prevalence of these risk factors, mainly in relatively younger individuals, demands rapid consideration, and implementation of prevention programs to reduce the burden of CV morbidity and mortality in Northern Saudi Arabia, Hail Region.

**References**


