PREVALENCE OF MODIFIABLE CARDIOVASCULAR RISK FACTORS AMONG MALAYSIAN PATIENTS WITH ACUTE CORONARY SYNDROME
Mehrunnissa Khanom¹  Wan Azman Wan Ahmad²

Summary
The growing epidemic of coronary heart disease in Asian countries can be prevented and controlled by identification and management of potentially modifiable risk factors. This article provides a single centre statistics of major modifiable risk factors among Malaysian patients presenting with acute coronary syndrome (ACS) and gives a brief discussion on preventive strategies. A single centre, prospective, observational, cohort study model was used. The subjects were patients of 18 years old or above who were admitted to University Malaya Medical Centre (UMMC), Malaysia within January 2009 to December 2010 and recruited under national ACS registry. Among 1525 consecutive ACS patients, 93% had at least one modifiable risk factor and nearly 70% had three or more risk factors. Overall, the prevalence of risk factors in descending order were: hypertension (70%), smoking (47%), diabetes (43%), dyslipidaemia (23%) and Body Mass Index (BMI)>24 (17%). Majority of male patients were smokers (67%) and most of the females were hypertensives (77%). Hypertension was the strongest predictor of mortality among all ACS patients [odds ratio 2.42, 95% CI, (1.43-4.10)]. Identification and primumal prevention of these risk factors are mandatory for prevention of coronary heart disease in the population.

Key words
Acute coronary syndrome; Hypertension; Dyslipidaemia.

Introduction
Coronary heart disease is a public health challenge of 21st century. Being the leading cause of death and major cause of disability, it claims about 7.2 million lives in a year across the globe and the number is increasing alarmingly in the developing world [1-3]. The pathogenesis of coronary heart disease has been studied over decades and the end result is proved to be the atherosclerosis of coronary arteries, provoked by cardiovascular risk factors [4]. Extensive clinical studies have identified several cardiovascular risk factors: major modifiable risk factors are smoking, hypertension, dyslipidemia, diabetes, obesity, sedentary life-style and major non-modifiable risk factors are increasing age, male sex and positive family history of coronary artery disease [5-9]. Hence most of the identified risk factors are potentially modifiable, it is essential to adopt effective preventive strategies with adequate awareness. Though there is plenty of data available from industrialized countries [10-13], such data are lacking in developing countries, hence, awareness is also lacking here [14-16]. The purpose of this article is to explore and analyze the major modifiable risk factors in patients presenting with ACS (Acute coronary syndrome) in a representative centre in Malaysia as well as to emphasize on the importance of preventive measures.

Materials & methods
Study population: The study included all consecutive patients of 18 years old or above who were admitted to University Malaya Medical Centre (UMMC), Malaysia between January, 2009 to December, 2010 and had been diagnosed as ACS based on the definition of joint Committee of the European Society of Cardiology / American College of Cardiology [17].

UMMC is a university hospital located in Kuala Lumpur, Malaysia and it has been recruiting the highest number of ACS patients under National Cardiovascular Disease Database-Acute Coronary Syndrome (NCVD-ACS) registry since 2006 [18].

Study design and protocol: It was a single centre, prospective, observational study and the data were collected using the structured questionnaire in the case report form of National Cardiovascular Disease Database-Acute Coronary Syndrome (NCVD-ACS) registry. The concept and details of NCVD-ACS registry has been previously published [19]. All patients gave informed consent to process their anonymous data and the study was approved by the local research ethical committee.
**Table I:** Multivariate analysis of modifiable cardiovascular risk factors among ACS spectrum.

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>ACS (n=125)</th>
<th>STEMI (n=94)</th>
<th>NSTEMI and UA (n=121)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>47%</td>
<td>60%</td>
<td>1.47 (1.17-1.84)</td>
<td>44%</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>22%</td>
<td>22%</td>
<td>0.28 (0.21-0.36)</td>
<td>24%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>70%</td>
<td>55%</td>
<td>1.24 (0.94-1.58)</td>
<td>70%</td>
</tr>
<tr>
<td>DM</td>
<td>6%</td>
<td>40%</td>
<td>0.55 (0.44-0.70)</td>
<td>44%</td>
</tr>
<tr>
<td>BMI&gt;24</td>
<td>17%</td>
<td>22%</td>
<td>0.28 (0.22-0.37)</td>
<td>1%</td>
</tr>
</tbody>
</table>

OR= Odds Ratio, CI= 95% Confidence Interval
P value <0.05 was considered significant.

**Table II:** Distribution of cumulative risk factors among all ACS patients (n=1525) admitted to University Malaya Medical Centre, Malaysia. (January 2009 - December 2010.)

<table>
<thead>
<tr>
<th>Number of risk factor</th>
<th>Population (n=1525)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. risk factors</td>
<td>24%</td>
</tr>
<tr>
<td>2. risk factors</td>
<td>36%</td>
</tr>
<tr>
<td>3. risk factors</td>
<td>26%</td>
</tr>
<tr>
<td>4. risk factors</td>
<td>6%</td>
</tr>
<tr>
<td>5. risk factors</td>
<td>1%</td>
</tr>
<tr>
<td>No risk factor</td>
<td>7%</td>
</tr>
</tbody>
</table>

Risk factors include Smoking, Dyslipidemia, Hypertension, Diabetes mellitus and BMI >24.
Table III: Multivariate analysis of modifiable cardiovascular risk factors for in-hospital mortality

<table>
<thead>
<tr>
<th>Modifiable risk factor</th>
<th>No of death in presence of risk factor</th>
<th>Odds Ratio</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>32</td>
<td>0.96</td>
<td>0.60-1.57</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>14</td>
<td>0.27</td>
<td>0.15-0.49</td>
</tr>
<tr>
<td>Hypertension</td>
<td>48</td>
<td>2.42</td>
<td>1.43-4.10</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>28</td>
<td>0.76</td>
<td>0.47-1.23</td>
</tr>
<tr>
<td>BMI &gt; 24</td>
<td>10</td>
<td>0.18</td>
<td>0.09-0.35</td>
</tr>
</tbody>
</table>

Fig 1: Distribution of modifiable cardiovascular risk factors among male and female patients of ACS in University Malaya Medical Centre, Malaysia

Fig 2: Distribution of modifiable cardiovascular risk factors among ACS patients of UMMC (Malaysia), Middle Eastern countries, Thailand and GRACE

UMMC: University Malaya Medical Centre.

Middle Eastern Countries:


Discussion
The sample size of current study represents 23.5% of Malaysia national ACS registry during the closest timeline. The demographics of sample population followed almost similar pattern as national ACS registry. However, when compared to census, disproportionately increased percentage of Indians was noted in both sample and national ACS registry; the finding that correlates with the previous reports mentioning high risks of cardiovascular disease among migrant Indians [23,24].

Prevalence of modifiable cardiovascular risk factors varies according to type of ACS and gender. There was association of smoking and hypertension with STEMI [OR 1.47, 95% CI (1.17-1.84) and [OR 1.24, 95% CI (0.98-1.54) respectively]; Hypertension was associated with NSTEMI and UA [OR 2.75, 95% CI (2.42-3.13)] (Table II). Males had remarkably higher prevalence of smoking (67%) and most of the females were hypertensive. (77%) (Figure 1).

Cumulative risk analysis shows the striking result of 93% of subjects with at least one modifiable risk factor and nearly 70% with three or more risk factors. The high prevalence of multiple risk factors explains relatively younger age and predicted poor outcome of Asian patients with ACS [25,26].

Hypertension was the strongest predictor of mortality among all ACS patients [OR 2.42, 95% CI (1.43-4.10)].

Figure 2 compares the prevalence of modifiable cardiovascular risk factors among patients from Malaysia (UMMC), other Asian countries (Thailand, Middle eastern countries) and GRACE (Global Registry of Acute Coronary Events). Among Asians, Malaysians had highest prevalence of smoking (47%), Thais had highest prevalence of dyslipidemias (64%), hypertension (71%) and diabetes (52%). However, the patients of GRACE had overall highest prevalence of smoking. When compared to middle eastern countries, Malaysian patients had higher prevalence of all risk factors except dyslipidemia. Conversely, Thailand, which is geographically attached to Malaysia and share similar demographic features, showed remarkably higher prevalence of all risk factors except smoking [14,15]. However, sample sizes of different registries were variable, which might limit the degree to which samples represented the country. The GRACE is the largest, multinational ACS registry across four continents. When compared with GRACE, Malaysians had higher prevalence of hypertension and diabetes. Since different registries had different cut-off limits for BMI, it was not considered for comparison among the countries.
Limitations of the Study
Since most of the information in this study was collected from self-reported history on admission, it did not include newly diagnosed hypertension, diabetes or dyslipidemia. Physical inactivity and dietary score were not included in the study, which would make it more reasonable.

Conclusion
This article presents the findings of a prospective, observational cohort study regarding the prevalence of modifiable risk factors on ACS patient at a university hospital in Malaysia in the year 2009 to 2010. It shows that among 1525 patients, 93% had at least one modifiable risk factor and nearly 70% had three or more risk factors. Smoking and hypertension were mostly associated with STEMI. Among NSTEMI and UA group, most significant association was with hypertension. While smoking and high BMI were more prevalent among male, the other risks were higher among female patients. It is shown that there was uneven distribution of modifiable risk factors among Asian countries. Analysis of complex associations among different modifiable as well as non-modifiable risk factors and their potentiating impacts on outcome of ACS patients are expected in future studies.

Disclosure
All the authors declared no competing interest.

References


