ORIGINAL ARTICLE

CHANGING TREND OF PRESENTATION OF ACUTE CORONARY SYNDROME IN PESHAWAR OVER THE LAST SIXTEEN YEARS

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Background: Once considered as disease of the affluent and developed countries, coronary artery disease is emerging as epidemic in the developing world in general and South Asia in particular. **Objective:** To observe the trend of presentation of acute coronary syndrome in the local population over the last 16 years. **Material and Methods:** Clinical audit from 1995 to 2010 was carried out in which the data was retrieved from the computerised database of the Department of Cardiology, Lady Reading Hospital Peshawar. The period was divided into four quartiles, and the data of each quartile was analyzed for the total number of admissions, the type of ACS, whether ST-elevated MI or non-ST elevated ACS (comprising unstable angina and non-STEMI), age, gender and mortality. **Results:** The total admissions into the unit in the first quartile (1995–1998) were 23,827, in the second quartile (1999–2002) 29,005, in the third quartile (2003–2006) 33,206 and in the fourth quartile (2007–2010) were 40,110. Total ACS brunt constituted 8340 (35%), 10,384 (35.8%), 12,180 (36.68%) and 14,920 (37.2%) patients respectively. The mean age of patients was 49.70±6.4 years, 48.21±7.2 years, 47.38±7.1 years and 46.81±6.2 years respectively. Women were 2356 (28.25% of the total ACS burden) in the first quartile, increasing to 3554 (34.225%), 4817 (39.55%) and 6281 (42.1%) in the following quartiles. STEMI constituted 45.88% (3826) of the total ACS presentations in the first quartile, 47.24% (4905) in the second, 49.55% (6035) in the third and 49.87% (7440) in the last quartile. The mortality rate, however, remained constant throughout (8.4% to 8.8%). **Conclusion:** An increasing trend is seen in the burden of CAD in the local population with increasing presentation as STEMI. It is also evident that CAD is occurring at younger ages and more so in the female population.

Keywords: Coronary artery disease, myocardial infarction, unstable angina

INTRODUCTION

As the twentieth century drew to a close, it had become clear that coronary artery disease (CAD) became a ubiquitous cause of morbidity and a leading contributor to mortality in most countries.[1,2] The emergence of the CAD epidemic in the developing countries during the past three to four decades has attracted less comment and little public health response, even within these countries. It is not widely realised that at present, the developing countries contribute a greater share to the global burden of CAD than the developed countries.[1,3,4] It has been estimated that 5.3 million deaths attributable to CAD occurred in the developed countries in 1990, whereas the corresponding figure for the developing countries ranged between 8 to 9 million (i.e., a relative excess of 70%).[1] Although the inadequacies and imperfections of cause-specific mortality ascertainment methods currently used in many developing countries call for cautious interpretation of these estimates, the conservative assumptions made by the analysts suggest that the absolute burden of CAD mortality is indeed likely to be high in developing countries. Pakistanis are part of an ethnic group which suffers from the highest prevalence rates of coronary artery disease compared to any throughout the world-CAD manifests at a younger age with a significant narrowing of the gender difference.[3] Insight into the study of CAD disease pattern of expatriate Pakistanis living abroad has given a wealth of data, which may be relevant to our native population.[3] We, therefore, decided to observe the trend of presentation of CAD in our local population by carrying out an audit of the pattern of presentation of CAD at Lady Reading Hospital, Peshawar over the last sixteen years.

MATERIAL AND METHODS

Sixteen years data from 1995 to 2010 was retrieved from the computerised database of the Department of Cardiology, Lady Reading Hospital (LRH), Peshawar. All patients admitted into the Cardiology unit of LRH with the diagnosis of Acute Coronary Syndrome (ACS) were included in the study. The 16 years period was divided into 4 quartiles, (1995–1998), (1999–2002), (2003–1006) and (2007–1010), and the data of each quartile was analysed for the trends of coronary artery disease pattern, the total number of admissions, the type of ACS, whether ST-elevated MI or non-ST elevated ACS (comprising unstable angina and non-STEMI), age, gender and mortality Statistical analyses of the results were carried out using SPSS-15.

RESULTS

The baseline characteristics of our study population are shown in Table-1. The mean age of patients was 49.70±6.4 years, 48.21±7.2 years, 47.38±7.1 years and 46.81±6.2 years respectively. Women were 2356 (28.25% of the total ACS burden) in the first quartile, increasing to 3554 (34.225%), 4817 (39.55%) and 6281 (42.1%) in the following quartiles. The mortality rate, however, remained constant throughout the sixteen years' period (8.4% to 8.8%) as shown in Table-1. The total admissions into the unit in the first quartile (1995–1998) were 23,827, which increased to 29,005 in the second quartile (1999–2002), 33,206 in the third quartile (2003–2006) and 40,110 in the fourth quartile (2007–2010), as evident in Figure-1. Total ACS brunt constituted 8340 (35%) in the first quartile, which increased to 10,384 (35.8%) in the second quartile, 12,180 (36.68%) in the third and 14,920 (37.2%) patients in the fourth quartile, as shown in Figure 1. As depicted in Figure 2, STEMI constituted 45.88% (3826) of the total ACS presentations in the first quartile, 47.24% (4905) in the second, 49.55% (6035) in the third and 49.87% (7440) in the last quartile.

Table-1: Baseline characteristics

Quartile	Mean age (years)	Females (%)	Mortality (%)
'95–'98	49.70±6.4	28.25	8.4
'99–'02	48.21±7.2	34.22	8.6
'03–'06	47.38±7.1	39.55	8.45
'07–'10	46.81±6.2	42.1	8.8

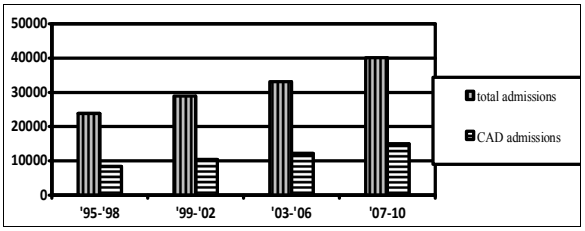

Figure-1: Total CAD burden in LRH

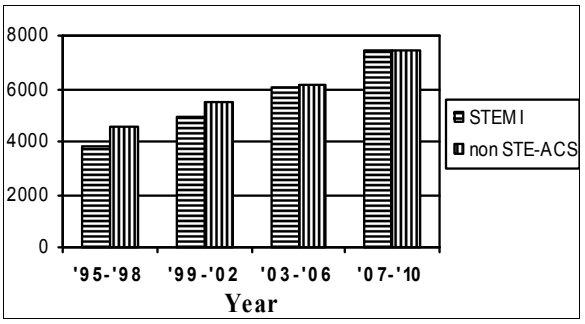

Figure-2: ST elevated *vs* non-ST elevated ACS

DISCUSSION

In the year 2000, cardiovascular diseases (CVDs) accounted for 16.7 million deaths globally.[5] Two thirds of CVD mortality arises from developing countries with a rapid rise expected towards 2020. South Asians are reported to have one of the highest rates of coronary artery disease (CAD)[6], and it is therefore unsurprising that CAD is now the leading cause of death in the Indo-Pak subcontinent[7].

The South-Asian countries of India, Pakistan, Bangladesh, Sri Lanka, and Nepal account for about a quarter of the world population and contribute the highest proportion of the burden of cardiovascular diseases compared with any other region globally.[8,9] South Asian migrants living in several countries have higher death rates from coronary artery disease (CAD) at younger ages compared with the local population despite apparently lower levels of conventional risk factors.[10–12] Deaths related to cardiovascular disease also occur 5 to 10 years earlier in South Asian countries than they do in Western countries.[3] This has raised the possibility that South Asians exhibit a special susceptibility for acute myocardial infarction that is not explained by traditional risk factors. The INTERHEART study[13] is uniquely positioned to address the reasons for the higher rates of CAD in native South Asians compared with those from other parts of the world because of its standardised protocol with extensive data collection and inclusion of a large number of cases from South Asian countries and other parts of the world. Migrant studies clearly show that individuals of South Asian (India, Pakistan, Bangladesh) descent are particularly vulnerable to CVD when moving to affluent countries, with rates at least 1.5- to 2-fold higher compared with native whites.[11] Explanations for this vulnerability include a combination of environmental and genetic factors, in particular insulin resistance, and may also account for the younger age at onset of disease.[14]

Although reliable estimates indicate a high prevalence of CAD risk factors in Pakistan[14,15], there are no data on the burden of CAD per se in this region. Most of the published studies that attempted to address the prevalence of CAD relied on self-reporting and, therefore, suffer from the flaw of not including subjects unaware of their condition. According to the most careful estimates based on sound scientific studies nearly one hundred thousand individuals suffered an acute myocardial infarction in Pakistan in the calendar year 2002.[15] Jafar *et al*[16] reported in 2005 that one in 4 middle-aged adults in Pakistan has prevalent CAD. Risks are uniformly high in the young and in women. Concerted efforts are needed to prevent the epidemic of cardiovascular disease in South Asia, focusing on hypertension, diabetes, smoking, and dyslipidemia. South Asians are individuals whose ethnic roots originate from a large geographic area that covers one fifth of the global population. It is, therefore, important to recognise that the term 'South Asian' refers to a heterogeneous population, with important differences in

diet, culture, and lifestyle among different South Asian populations and religions. Multiple studies of migrant South Asian populations have, however, confirmed a 3- to 5-fold increase in the risk for myocardial infarction and cardiovascular death as compared with other ethnic groups.[17,18]

In our present study, we found out that the total number of admissions into our unit with cardiovascular diseases (CVD), increased 1.7 times over a period of 16 years. This is in agreement with the INTERHEART study which showed that the rate of CVD have risen greatly in the low income- and middle-income countries with about 80% of the burden occurring in these countries.[13] Previous studies by Pirzada[19], Beg[20], Nasir[21] and Nishtar[3] have also revealed highest prevalence rates of CAD in our part of the world. Pakistanis are a part of ethnic group in which CAD manifests at a younger age with a significant narrowing sex difference.[3] In the Study of Health Assessment and Risk in Ethnic groups (SHARE), individuals of South Asian, Chinese, and European origin were randomly selected from telephone directories in 3 Canadian cities to volunteer for laboratory and clinical testing. South Asians were found to have a higher prevalence of sub-clinical atherosclerosis, and South Asian ethnicity was an independent predictor of cardiovascular disease.[11]

A noteworthy trend seen in our data is that the mean age for CAD decreased from 49.7 to 46.8 years over a period of sixteen years. This has also been noted previously among individuals living in the United Kingdom, where the earlier onset of CAD among South Asian migrants was not considered an artefact of differences in the population distribution because the higher incidence of CAD was most marked in those younger than age 40 years (about a 3-fold difference), whereas it was less marked in those older than 60 years (about a 1.5-fold difference) based on an analysis of UK mortality data.[3] Despite documenting the higher rates of earlier CAD in South Asians, few studies have been able to shed light on its reasons. Most studies do not include information on diet, physical activity, abdominal obesity, psychosocial factors or apolipoprotein levels, and do not have sufficiently large numbers of clinical events to reliably assess the comparative effects of the various risk factors at various ages in South Asians compared with other ethnic groups.[15,22]

It has also been noted in our study that there is a tremendous increase in the occurrence of CAD in female patients in our population. The burden of CAD in women has received considerable interest in the last decade.[10,23–25] The frequency of AMI has increased 1.5 times in women in our study population in just sixteen years. It has been predicted in the INTERHEART study that by 2040, women will represent a higher (54.6%) of the cardiovascular deaths than men.[13] An analysis of the California Mortality Database between 1990 and 2000 showed that Asian Indian men and women had the highest proportional mortality ratios for CAD compared with 6 other racial groups. Although CAD mortality declined in all groups between 1985 and 1990, Asian Indian women actually experienced a 5% increase in CAD mortality during this period.[26]

As far as the type of ACS is concerned, we observed in our study that an increasing trend of presentation with ST elevated myocardial infarction (STEMI) was present throughout the sixteen years of study as compared to non-ST elevated ACS (shown in Figure-2). Despite impressive advances in diagnosis and management over the last four decades, STEMI continues to be a major public health problem in the industrialised world and is becoming an increasingly important problem in the developing countries.[27–29]

Available data suggest that economically developing countries are being burdened with escalating epidemics of coronary heart disease morbidity and mortality so that urgent steps need to be taken to treat and modify risk factors for CAD.[30] In our study, the mortality, however, has remained constant throughout the study period, i.e., 8.4 to 8.8%. This is in contrast to the recent decline of the CVD epidemic in the developed countries.[3,4] The identification of major risk factors through population-based studies and effective control strategies combining community education and targeted management of high risk individuals have contributed to the fall in CVD mortality rates (inclusive of coronary and stroke deaths) that has been observed in almost all industrialised countries.[8] Such public health strategies need to be adopted by our community health services as well so as to decrease our CVD morbidity and mortality. There also is a clear need to develop cost-effective methods for the timely diagnosis and management of manifest disease. Suitable low-cost life-saving percutaneous interventions (e.g., primary or rescue PCI) must be widely available to and adopted by our health system. Thus, the new century dawns on a period of challenge and opportunity for the developing countries as they embark on their efforts to quell the emerging epidemic of CVD. National and international efforts must be coordinated to recognise this epidemic and respond without delay.

CONCLUSION

An increasing trend is seen in the burden of CAD in the local population with increasing presentation as STEMI. It is also evident that CAD is occurring at younger ages and more so in the female population.

REFERENCES

1. Lopez AD. Assessing the burden of mortality from cardiovascular disease. World Health Stat Q 1993;46:91–6.

2. Murray CJL, Lopez AD. Global Comparative Assessments in the Health Sector. Geneva, Switzerland: World Health Organization; 1994.
3. Nishtar S. Coronary artery disease burden in Pakistan -A review. J Pak Inst Med Sci 2001;8(12):592–4.
4. Whelton PK, Brancati FL, Appel LJ, Klag MJ. The challenge of hypertension and atherosclerotic cardiovascular disease in economically developing countries. High Blood Press 1995;4:36–45.
5. Lopez AD, Mathers CD, Ezzati M. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. Lancet 2006;367:1747–57.
6. Gupta M, Singh N, Verma S. South Asians and cardiovascular risk: what clinicians should know? Circulation 2006;113:924–9.
7. Joshi P, Islam S, Pais P, Reddy S, Dorairaj P, Kazmi K, *et al*. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. JAMA 2007;297:286–94.
8. Yusuf S, Reddy S, Ounpuu S, Anand S. Global burden of diseases, part 1: general considerations, the epidemiologic transition, risk factors and impact of urbanization. Circulation 2001;104:2746–53.
9. Reddy KS. Cardiovascular diseases in non-Western countries. N Engl J Med 2004;350:2438–40.
10. Noor L, Shah SS, Adnan Y, Sawar S, Din SU, Amina, et al. Pattern of coronary artery disease with no risk factors under age 35 years. JAMC 2010;22(4):115–9.
11. Anand SS, Yusuf S, Vuksan V. Differences in risk factors, atherosclerosis, and cardiovascular disease between ethnic groups in Canada: the Study of Health Assessment and Risk in Ethnic groups (SHARE). Lancet 2000;356:279–84.
12. Yusuf S, Reddy S, Ounpuu S, Anand S. Global burden of cardiovascular diseases, part II: variations in cardiovascular diseases by specific ethnic groups and geographic and prevention strategies. Circulation 2001;104:2855–64.
13. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, *et al*. INTERHEART Study Investigators. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART Study): case-control study. Lancet 2004;364:937–52.
14. Jafar TH, Levey AS, Jafary FH, White F, Asma G, Rahbar MH, et al. Ethnic subgroup differences in hypertension in Pakistan. J Hypertens 2003;21:905–12.
15. Ismail J, Jafar TH, Jafary FH, White F, Faruqui AM, Chatuurvedi N. Risk factors for non-fatal myocardial infarction in young South Asian adults. Heart 2004;90:259–63.
16. Jafar TH, Jafary FH, Jessani S, Chaturvedi N. Heart disease epidemic in Pakistan: Women and men at equal risk. Am Heart J 2005;150:221–6.
17. McKeigue PM, Miller GJ, Maromot MG. Coronary heart disease in South Asians overseas: a review. J Clin Epidemiol 1989;42:597– 609.
18. Harding S. Mortality of migrants from the Indian subcontinent to England and Wales: effect of duration of residence. Epidemiology 2003;14:287–92.
19. Pirzada. MA, Khan AH. Coronary Heart Disease in West Pakistan. Pak J Med Res 1962;2:9–37.
20. Beg MA, Siddique MKJ, Abbasi AS, Ahmad N. Atherosclerosis in Karachi. J Pak Med Assoc 1967;17:236–40.
21. Khan NA. Epidemiology of coronary heart disease in Peshawar. Pakistan Heart J 1973;6:64–7.
22. Patil SS, Joshi R, Gupta. Risk factors for acute myocardial infarction in a rural population of central India: a hospital-based case-control study. Natl Med J India 2004;17:189–94.
23. Schreiner PJ, Niemela M,. Miettinen H, Mahonen M., Ketonen M.,.Mmonen P, *et al*; Gender differences in recurrent coronary events; The FINMONICA MI Registers. Eur Heart J 2001;22:762–8.
24. Shah SS, Noor L, Shah SH, Shahsawar, Din SU, Awan ZA, *et al*. Myocardial infarction in young versus older adults: clinical characteristics and angiographic features. J Ayub Med Col 2010;22(2):187–90.
25. Khan MA, Hassan MU, Hafizullah M. Coronary artery disease, is it more frequently effecting younger age group and women? Pak Heart J 2006;39(1-2):17–21.
26. Palaniappan L, Wang Y, Fortmann SP. Coronary heart disease mortality for six ethnic groups in California, 1990–2000. Ann Epidemiol 2004;14:499 –506.
27. Rogers WJ, Canto JG, Lambrew CT. Temporal trends in the treatment of 1.5 million patients with myocardial infarction in the US from 1990 through 1999: The National Registry of Myocardial Infarction1, 2 and 3. J Am Coll Cardiol 2000;36:2056–61.
28. Kesteloot H, Sans S, Kromhout D. Evolution of all-causes and cardiovascular mortality in the age-group 75-84 years in Europe during the period 1970-1996: A comparison with worldwide changes. Eur Heart J 2002;23:384–9.
29. Marrugat J, Garcia M, Elosua R, Aldasoro E, Omro MJ, Zurriaga O *et al*. Short-term (28 days) prognosis between genders according to the type of coronary event (Q-wave versus non-Q-wave acute myocardial infarction versus unstable Angina pectoris). Am J Cardiol 2004;94:1161–5.
30. Aziz K, Azhar Masood AF, Manoli T, Davis CE, Abenathy J. Blood Pressure and Hypertension Distribution in a lower middle Class of urban community in Pakistan. J Pak Med Assoc 2005;55:333–8.

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