International Journal of Medical and Health Research
ISSN: 2454-9142
Received: 12-10-2018; Accepted: 15-11-2018
www.medicalsciencejournal.com
Volume 4; Issue 12; December 2018; Page No. 48-52

Evaluation of mortality related to acute myocardial infarction in a tertiary care centre in south India: A descriptive study

Dr. Abhishek Sharma[1], Dr. MN Bhat[2*]
[1] Senior Registrar, Cardiology, KMC hospital, Mangalore, Karnataka, India
[2] Associate Professor, Cardiology KMC hospital, Mangalore, Karnataka, India

Abstract
India has a growing trend of acute myocardial infarction (AMI) due to shifting lifestyle.
Objective: To evaluate the mortality in patients with AMI and to find its clinical risk correlates.
Methods: This study was conducted on 126 consecutive AMI cases admitted in the tertiary care centre in south india. During inpatients management, outcomes were followed up from admission till discharge or expiry.
Results: Of the total 126 cases, majority (55.55%) had Inferior wall MI; mean age of 12 deaths was 58.01 ± 13.60. Maximum patients belonged to the age group of 56 to 65 years (38.4%). Reportedly 83.10% had some physical activities; 16.52% were vegetarian; 40.5% were smokers; 34.6% had family history of AMI, 64.3% were diabetics; and 21.4% were hypertensives. Lifestyle-related risk factors, physical activity, and vegetarian diet were not protective; family history and addiction to smoking were significantly associated with AMI deaths. Revascularization with primary PCI led to less mortality as compared to thrombolysis (p value 0.046).
Conclusions: Acute STEMI had male and middle-age predominance with mortality being associated with family history, smoking, diabetes, and hypertension.

Keywords: acute myocardial infarction, st-elevated myocardial infarction

Introduction
Acute myocardial infarction is an important global cause of death and also the major cause of morbidity and mortality in India. The prevalence of coronary heart disease (CHD) in India has increased considerably and occurred at a much younger age as compared to North America and Western Europe [1, 2]. CHD global fatality was estimated to be 17.5 million/year, 31% of deaths - 75% in low- and middle-income countries [3], the prevalence of CHD in rural India was estimated to be 3%–4% and 8%–10% in urban areas [4, 5]. Revascularisation therapy including primary PCI and are proven therapies for acute myocardial infarction (AMI) cases with ST elevation in electrocardiogram. This study was hence conducted to evaluate the clinical profile and risk factors associated with mortality in patients of myocardial infarction in tertiary care centre in south india.

Materials and Methods
This study was conducted on 126 patients with AMI admitted in KMC hospital, mangalore over a period of 10 months from Jan 2018 to Oct 2018. These patients were followed up from admission till discharge or death. The World Health Organization definition was followed for the diagnosis of AMI in this study. Initial 12 lead ECG was recorded, immediately on admission and subsequently at 8 hourly intervals on the 1st day, thereafter as per need; also before and after the primary PCI / thrombolytic therapy.
Other investigations were done as follows:
- Urine routine analysis (sugar, albumin, and microscopy)
- Blood routine (hemoglobin percent, total and differential leukocyte count, erythrocyte sedimentation rate)
- Random blood sugar (or fasting/postprandial blood sugar), blood urea, serum creatinine
- Lipid profile
- Echocardiography (two-dimensional) was done to confirm myocardial infarction
- Coronary angiography
- Chest X-ray (if required)
- Serum electrolytes (if required).

Inclusion criteria
All consecutive patients with a diagnosis of AMI.

Exclusion criteria
Those cases with proven noncardiac chest pain and those discharged before completion of the treatment for any reason.
Operational definitions: ST-elevated myocardial infarction (STEMI) was defined by characteristic symptoms of myocardial ischemia in association with persistent ECG ST elevation and consequent release of biomarkers of myocardial necrosis [7].
Primary Percutaneous coronary intervention: Primary Percutaneous coronary intervention was done in all the patients unless contraindicated or not possible due to financial restraints of patients. All patients were given loading dose of antiplatelets on admission, GPIIb/IIIa inhibitors were used depending on thrombus burden and periprocedural events like slow flow or no flow. Unfractionatyed heparin was used as

anticoagulant during and after the procedure. DES was used in all the patients undergoing PCI.

Thrombolytic intervention: AMI cases, which presented within 12 h of the appearance of symptoms with persistent ST elevation, who were not suitable for primary PCI were administered streptokinase/tenecteplase.

Absolute contraindications for thrombolysis in STEMI (a) prior intracranial hemorrhage, (b) known structural cerebral vascular lesion, (c) known malignant intracranial neoplasm, (d) ischemic stroke within 3 months, (e) suspected aortic dissection, (f) active bleeding or bleeding diathesis, (g) significant closed head trauma or facial trauma within 3 months, (h) severe uncontrolled hypertension (HTN), and (i) intracranial or intraspinal surgery within 2 months.

Relative contraindications (a) history of chronic, severe, poorly controlled HTN; (b) significant HTN on presentation >180/110 mmHg; (c) traumatic or prolonged (more than 10 min) cardiopulmonary resuscitation or major surgery <3 weeks previously; (d) history of prior ischemic stroke not within the last 3 months; (e) dementia; (f) recent (within 2–4 weeks) internal bleeding; (g) pregnancy; (h) no compressible vascular punctures; (i) active peptic ulcer; and (j) current use of an anticoagulant that has produced an international normalized ratio >1.7 or a prothrombin time longer than 15 s [6, 8].

Ethical considerations

Ethical principles were adhered to while gathering the information with strict confidentiality.

Statistical methods

All data was analysed with SPSS software version 17. Continuous data was presented as mean ± standard deviation and categorical data was presented as frequencies and percentages. Differences in baseline characteristics between patients were evaluated using the unpaired Student's t-test and chi-square test.

Multivariate binary logistic regression was carried out to find a relation between the risk factors with the outcomes, considering the alpha level of error as 5%.

Results

The mean age of 114 survived cases was 56.75 ± 10.47 while in 12 deaths, it was 58.01 ± 13.60. Maximum patients belonged to the age group of 56 to 65 years (38.4%) followed by 46 to 55 years (26.19%) and only 8.4% were 40 years and below. Majority (63.4%) of cases were males across all age groups. Chest pain was the most predominant symptom in study group which was present in all of the patients where as palpitations was the least common, present only in 23.8% of cases. Diabetes mellitus, dyslipidemia and smoking were the most common risk factors in the study group, present in 64.30%, 59.50% and 40.5% patients respectively where as tobacco chewing was least common risk factor, seen in only 9.5% patients. 83.10% reported some form of physical activities and only 16.52% were vegetarian. Of the 126 cases, 70 patients (55.5%) and 56 patients (44.4%) had anterior and inferior wall MI respectively; one patient had IWMI with dextrocardia. Maximum patients (55.5%) had LAD involvement. 48 out of 70 patients having inferior wall MI had RCA was the culprit artery whereas only 22 patients had LCX. involvement.

Table 1: Showing mean ± SD and range of values in various variables

Variables	Min	Max	Mean	SD
Duration of hospital stay (days)	3	12	5.74	1.639
Symptom duration (hours)	1	32	10.62	8.03
Pulse	34	128	96.19	20.51
Systolic blood pressure	72	174	121.33	23.79
Diastolic blood pressure	48	112	82.14	12.59
Hemoglobin	9.7	17.5	13.68	1.71
Creatinine	1	2	1.05	0.21
Total cholesterol	104	302	226.21	57.35
Low density cholesterol	49	188	144.69	34.45
High density cholesterol	12	74	44.07	9.25
Triglyceride	48	201	141.83	50.86
Fasting sugar	98	390	180.14	78.56

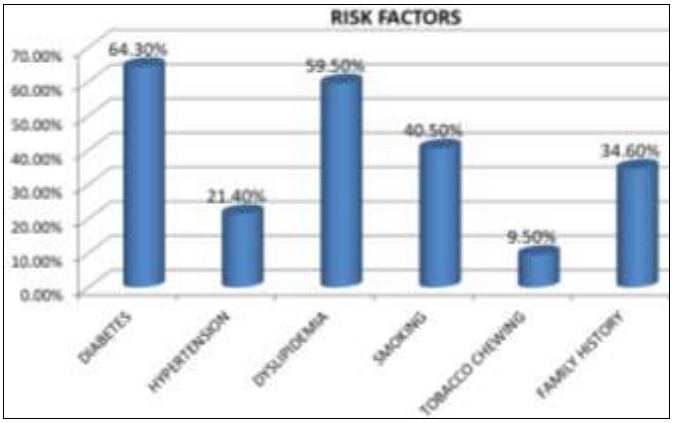

Fig 1: Showing presence of risk factors in the study group

Out of all admitted cases, deaths was in 12 (9.5%); mortality probability among females was more (19.17%) as compared to males (7.6%). Case fatality rates were the lowest in the age group 27–36 years with no deaths whereas as maximum deaths occurred in patients belonging to age group 56 to 65 years. Of the fatal cases, 8 (66.6%) were males across all age groups. Association between demographic, comorbidity, and lifestyle-related variables was tested using Chi-square test. ACS deaths were significantly associated with diabetes, HTN, smoking and family history, and not so with gender, religion, dietary habits, and physical activity.

On multivariate binary logistic regression it was noted that physical activities and vegetarian diet were not protective; whereas addiction to smoking was significantly (P = 0.012) associated with death. Among comorbidities, diabetes and hypertension were most significantly (P = 0.01 and 0.005 respectively) associated with death. A family history of myocardial infarction was also found to be significant as a risk factor (P = 0.030).

Thrombolytic was administered to 16 (12.6%) cases, out of which 12 (75%) survived, while out of 110 patients who underwent primary PCI 92.7% survived. Survival was significantly better with primary PCI (p value 0.046).

Table 2: Association of study variables with outcome

		Survived	Died	P value
Sex	Male	72	8	1.00
	Female	42	4	
Diabetes	Yes	72	12	0.0083
	No	42	0	
Hypertension	Yes	13	8	0.0001
	No	101	4	
Smoking	Yes	41	9	0.0123
	No	73	3	
Diet	Veg	17	3	0.406
	Non veg	97	9	
Family History	Yes	34	10	0.0004
	No	80	2	
Physically active	Yes	98	8	0.0983
	No	16	4	
Revascularisation	PCI	102	8	0.046
	Thrombolysis	12	4	

Discussion

In our study, the highest number of cases was among 56–65 years (38.4%). Mean age of survived cases was 56.75 ± 10.47 and among dead 58.01 ± 13.60; these findings were comparable to CREATE registry [11, 12], and two studies reported from Pakistan [13, 14] and Chennai study [15]. On the contrary studies on migrant Asian Indians showed higher prevalence of AMI at relatively younger ages.[16,17] Research group from South India noted maximum patients in 51–60 years (31%), followed by 41–50 years (26%) [18]. Another South Indian study showed comparable age distribution [19]. The mean age of ischemic heart disease (IHD) cases in Bengal was 52.8 years and increased with age; highest among 80 years or above (40.0%) and lowest in 40–49 year age group (5.4%) [20].

Males were 63.58% with male: female ratio 1.8:1 in our series, whereas Pakistani studies reported 78% and 88.5% males [13, 14]. Kerala study reported 72.9% males and male: female ratio 2.68:1 [10], though contrast was in Chennai study [15]. Gujarat study reported 71.7% males among STEMI cases with the male: female ratio 3.6:1 [17]. South Indian study noted maximum AMI among males (82%) with the male: female ratio 4.5:1 [18]. In North Bengal study, higher prevalence of coronary artery disease (CAD) was noted among males [20]. Male preponderance among STEMI cases in all age groups was observed in North India [21].

In our series, 64.30% had diabetes among AMI cases, which was supported by the global literature [22]. Kerala study reported diabetes among 31.47% cases with STEMI with the hypothesis of positive relation [10]. Other studies from India showed diabetes as an important determinant of CAD [11, 15, 17, 18]. In our series, 21.4% were hypertensive among AMI cases. Global researchers observed HTN as major risk factor for STEMI cases; with an exception in South Asian population. Indian studies noted significant association of CVD cases with HTN [10, 11, 15, 17, 18, 20]. Studies reported higher numbers of females with STEMI, having HTN [19].

In our series, 40.5% reported tobacco smoking; International Research Groups noted smoking or smokeless tobacco as major risk factor for STEMI. Researchers linked cigarette smoking with an increased risk of CHD among diabetic women; quitting smoking declined this additional risk [23]. In Kerala study, smoking was a risk factor among 52.55% of cases [10], Gujarat study 28.3% [17], South Indian study 76% [18], yet smoking found no association with CAD cases in Chennai study [11, 15]. In North Bengal study, the prevalence of IHD among smokers was significantly higher than in nonsmokers [20]. Other published literature correlated smoking to be an important risk factor for CAD in Indian population [24].

Out of all patients only 16.52% were vegan. International Research Group reported that vegetarian diet reduced the risk of CAD, due to avoidance of meat [25]. Different research groups perceived that vegetarian diet reduces the incidence of CAD and recommended restriction of dietary saturated fats. Research groups in India observed that low consumption of fruits and vegetables was important determinants of CVD [11, 24, 26] although North Bengal study could not find any such relationship [20]. "The Seven Countries Study" believed that the force of a risk factor such as dietary saturated fat and antioxidant deficiency may vary among population groups [27]. Rising incidence of ACS was related to Westernized food practices in India [10].

83.09% of our patients reported regular physical activity. Since last six decades, International Research Groups observed the protective role of physical activities with the onset of the CVDs; active people had lower rates of CVD [28-31]. The Seven Countries Study indicated the potential protective effect of physical activity on CAD [27]. Rising incidence of ACS in Indians has been related to lifestyle changes [10]. Literature reported sedentary lifestyles as important determinants of cardiovascular diseases in India [11]. It is also possible that the risk factors differed with lifestyle changes among migrants [15]. However, no significant relation was found between physical activities and IHD in a population-based study from North Bengal, India [20].

When family history is taken into account, 34.6% of the AMI cases reported having a family history. INTERHEART study indicated the importance of family history for CAD among young Indians [9]. Researchers from India reported less (7%) family history of among AMI cases [18]. The rising incidence of ACS in Indians may be related to familial hereditary factors acting upon modifiable risk factors [10]. an important independent risk factor for CAD in younger cases [32, 33, 34, 35].

Revascularisation therapy is indicated with evidence of STEMI as early as possible with thrombolysis within 12 h of the onset of symptoms, and the goal is a door-to-needle time of below 30 min and door to balloon time within 90 minutes to minimize the time to therapy. 16 (12.6%) patients were thrombolysed where as 110 (87.3%) patients underwent primary PCI.A good number of STEMI cases arrived early with survival benefit to the recipient compared to other studies [6]. In our study survival was significantly better with primary PCI. Treatment in hospital with thrombolysis is more common in India than in other developing countries although injection streptokinase/tenecteplase to be administered under careful monitoring [36]. In centers with a higher prevalence of primary angioplasty, an estimated 7.5% of AMIs are treated with angioplasty in India to avoid prohibitive costs [12]. In Kerala study 68.97% [10], in Gujarat 79.7% of cases were thrombolyzed, higher than CREATE registry [17]. A systematic review from India had shown that streptokinase is highly cost

effective [37], Despite the availability of guidelines, there is a need to evaluate striking practice variations in different centers present in the use of thrombolytic therapies [38].

In our study, in-hospital mortality rate was 9.5% among admitted AMI cases; majority of deaths were in the age group 56 to 65 years (30.43%) though survival probability was less among males; this was much higher than CREATE registry (5.6%) [12]. Kerala study reported 8.04% death among MI cases, where coexistent cardiovascular risk factors, namely diabetes mellitus, HTN, and smoking history did not reveal any statistically higher risk for death [39]. CAD deaths change consequent to affluence and cultural changes due to migration [15]. Our mortality data correlated with literature from Pakistan [14] and India (Gujarat) both reported 13.2% [17]. Other studies also concurred high incidence of ACS among Indians, resulting in high mortality as compared to Global data [35, 40, 41, 42, 43].

Limitations of the study

This was a single center study with limited number of cases, however further studies are required to completely evaluate the causative risk factors for mortality associated with Acute myocardial infarction.

Conclusions

Acute myocardial infarction is a life threatening or disabling event which needs to be tackled with utmost importance. Identification of risk factors and social awareness regarding lifestyle modification and prompt utilization of healthcare services is of paramount importance. However even the tertiary care centers in the country need to be increased and be made available for the general population at a lower cost so that AMI patients can be better managed and hence the mortality related to it can be reduced.

There are no conflicts of interest.

References

1. Banerjee A. Coronary artery disease and its problems in management. J Indian Med Assoc. 2001; 99:474-5. [PubMed]
2. Geneva: World Health Organization; [Last cited on 2016 Mar 17]. The World Health Report. Making a Difference. Available, 1999, from: http://www. who.int/whr/ 1999/en/whr99_en.pdf.
3. Black C. Cardiovascular Diseases. WHO; [Last cited on 2016 Mar 13]. Available from: http:// www. who. int/ cardiovascular_diseases/en/
4. Gupta R. Burden of coronary heart disease in India. Indian Heart J. 2005; 57:632-8. [PubMed]
5. Gupta R. Coronary heart disease in India: Absolute numbers and economic burden. Rapid response to Ghaffar A, Reddy KS, Singhi M. Burden of non-communicable diseases in South Asia. BMJ. 2004; 328:807. [PMC free article] [PubMed]
6. Rivera-Bou WL, Cabañas JG, Villanueva SE, Schraga ED, Feied CF, Gossman WG, Handler JA, *et al*. editors. Thrombolytic therapy. The Heart.org Medscape. [Last cited on 2016 Mar 06; Updated: 2015 Dec 08]. Available from: http://www.emedicine.medscape.com/article/811234-overview#a2.
7. Thygesen K, Alpert JS, Jaffe AS, Simoons ML, Chaitman BR, White HD. Joint ESC/ACCF/AHA/WHF Task Force for the Universal Definition of Myocardial Infarction *et al*. Third universal definition of myocardial infarction. Circulation. 2012; 126:2020-35. [PubMed]
8. Gara PT, Kushner FG, Ascheim DD, Casey DE, Chung MK, Lemos JA, *et al*. CCF/AHA guideline for the management of ST-elevation myocardial infarction: A report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. Circulation. 2013; 127:e362-425. [PubMed]
9. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, *et al*. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): Case-control study. Lancet. 2004; 364:937–52. [PubMed]
10. Misiriya KJ, Sudhayakumar N, Khadar SA, George R, Jayaprakasht VL, Pappachan JM. The clinical spectrum of acute coronary syndromes: Experience from a major center in Kerala. J Assoc Physicians India. 2009; 57:377-83. [PubMed]
11. Gupta R. Recent trends in coronary heart disease epidemiology in India. Indian Heart J. 2008; 60(2 Suppl B):B4–18. [PubMed]
12. Xavier D, Pais P, Devereaux PJ, Xie C, Prabhakaran D, Reddy KS, *et al*. Treatment and outcomes of acute coronary syndromes in India (CREATE): A prospective analysis of registry data. Lancet. 2008; 371:1435–42. [PubMed]
13. Hafeez S, Javed A, Kayani AM. Clinical profile of patients presenting with acute ST elevation myocardial infarction. J Pak Med Assoc. 2010; 60:190-3. [PubMed]
14. Siddiuqi AH, Kayani AM. Acute myocardial infarction-clinical profile of 1000 cases. Pak Heart J. 2000; 32:42-5.
15. Mohan V, Deepa R, Rani SS, Premalatha G Chennai Urban Population Study (CUPS No.). Prevalence of coronary artery disease and its relationship to lipids in a selected population in South India: The Chennai Urban Population Study (CUPS No 5) J Am Coll Cardiol. 2001; 38:682-7. [PubMed]
16. Anand SS, Yusuf S, Vuksan V, Devanesen S, Teo KK, Montague PA, *et al*. 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. [PubMed]
17. Vaidya CV, Majmudar DK. A study of clinical profile of acute ST elevation myocardial infarction patients from GMERS medical college and hospital, Gandhinagar, Gujarat. Int J Adv Med. 2014; 1:113-6.
18. Seetharama N, Mahalingappa R, Ranjith Kumar GK, Veerappa V, Aravindh CL. Clinical profile of acute myocardial infarction patients: A study in a tertiary care centre. Int J Res Med Sci. 2015; 3:412-9.
19. Jose VJ, Gupta SN. Mortality and morbidity of acute ST segment elevation myocardial infarction in the current era. Indian Heart J. 2004; 56:210-4. [PubMed]
20. Mandal S, Saha JB, Mandal SC, Bhattacharya RN, Chakraborty M, Pal PP. Prevalence of ischemic heart

disease among urban population of Siliguri, West Bengal. Indian J Community Med. 2009; 34:19-23. [PMC free article] [PubMed]
21. Holay MP, Janbandhu A, Javahirani A, Pandharipande MS, Suryawanshi SD. Clinical profile of acute myocardial infarction in elderly (prospective study) J Assoc Physicians India. 2007; 55:188-92. [PubMed]
22. Steg PG, Goldberg RJ, Gore JM, Fox KA, Eagle KA, Flather MD, *et al*. Baseline characteristics, management practices, and in-hospital outcomes of patients hospitalized with acute coronary syndromes in the Global Registry of Acute Coronary Events (GRACE) Am J Cardiol. 2002; 90:358-63. [PubMed]
23. Al-Delaimy WK, Manson JE, Solomon CG, Kawachi I, Stampfer MJ, Willett WC, *et al*. Smoking and risk of coronary heart disease among women with type 2 diabetes mellitus. Arch Intern Med. 2002; 162:273-9. [PubMed]
24. Mitra A, Pradhan R, Mukherjee S. Importance of heart-healthy diet. J Hum Ecol. 2009; 27:53-61.
25. Chang-Claude J, Hermann S, Eilber U, Steindorf K. Lifestyle determinants and mortality in German vegetarians and health-conscious persons: Results of a 21-year follow-up. Cancer Epidemiol Biomarkers Prev. 2005; 14:963-8. [PubMed]
26. Rastogi T, Reddy KS, Vaz M, Spiegelman D, Prabhakaran D, Willett WC, *et al*. Diet and risk of ischemic heart disease in India. Am J Clin Nutr. 2004; 79:582-92. [PubMed]
27. De Backer G, Ambrosioni E, Borch-Johnsen K, Brotons C, Cifkova R, Dallongeville J, *et al*. European guidelines on cardiovascular disease prevention in clinical practice: Third joint task force of European and other societies on cardiovascular disease prevention in clinical practice (constituted by representatives of eight societies and by invited experts) Eur J Cardiovasc Prev Rehabil. 2003; 10:S1-S10. [PubMed]
28. Washington DC. Dept. of Health and Human Services; 2008. Physical Activity Guidelines Committee. Physical Activity Guidelines Advisory Committee Report.
29. Nocon M, Hiemann T, Müller-Riemenschneider F, Thalau F, Roll S, Willich SN. Association of physical activity with all-cause and cardiovascular mortality: A systematic review and meta-analysis. Eur J Cardiovasc Prev Rehabil. 2008; 15:239-46. [PubMed]
30. Sofi F, Capalbo A, Cesari F, Abbate R, Gensini GF. Physical activity during leisure time and primary prevention of coronary heart disease: An updated meta-analysis of cohort studies. Eur J Cardiovasc Prev Rehabil. 2008; 15:247-57. [PubMed]
31. Prevalence and Risk Assessment for Cardiovascular Diseases among Young Women and the Impact of Therapeutic Lifestyle Modification. [Last cited on 2016 Mar 16]. Available from: http://www.ir. inflibnet. ac.in: 8080/jspui/bitstream/10603/6686/7/07_chapter%202.pdf.
32. Goel PK, Bharti BB, Pandey CM, Singh U, Tewari S, Kapoor A, *et al*. A tertiary care hospital-based study of conventional risk factors including lipid profile in proven coronary artery disease. Indian Heart J. 2003; 55:234-40. [PubMed]
33. Srivastava RK, Tiwari S, Singh P, Puri A, Chaudhary G, Ali W, *et al*. Gender risk profile in acute myocardial infarction – A prospective study in Indian population. Int J Sci Res Publ. 2014; 4:1-3.
34. Grover G, Gadpayle AK, Dutta R. A study of cardiovascular risk factors in Delhi, India. J Commun Dis. 2009; 41:71-80. [PubMed]
35. Sharma M, Ganguly NK. Premature coronary artery disease in Indians and its associated risk factors. Vasc Health Risk Manag. 2005; 1:217-25. [PMC free article] [PubMed]
36. Abdallah MH, Arnaout S, Karrowni W, Dakik HA. The management of acute myocardial infarction in developing countries. Int J Cardiol. 2006; 111:189-94. [PubMed]
37. Megiddo I, Chatterjee S, Nandi A, Laxminarayan R. Cost-Effectiveness of Treatment and Secondary Prevention of Acute Myocardial Infarction in India in Disease Control Priorities in Developing Countries. 3rd ed. [Last cited on 2016 Mar 08]. Working Paper #5. Available from: http://www.d cp.3.org/sites/default/ files/ resources/ami%20cea%20wp.pdf.
38. Budaj A, Brieger D, Steg PG, Goodman SG, Dabbous OH, Fox KA, *et al*. Global patterns of use of antithrombotic and antiplatelet therapies in patients with acute coronary syndromes: Insights from the Global Registry of Acute Coronary Events (GRACE) Am Heart J. 2003; 146:999-1006. [PubMed]
39. Monteiro P Portuguese Registry on Acute Coronary Syndromes. Impact of early coronary artery bypass graft in an unselected acute coronary syndrome patient population. Circulation. 2006; 114(1Suppl):I467-72. [PubMed]
40. Prabhakaran D, Yusuf S, Mehta S, Pogue J, Avezum A, Budaj A, *et al*. Two-year outcomes in patients admitted with non-ST elevation acute coronary syndrome: Results of the OASIS registry 1 and 2. Indian Heart J. 2005; 57:217-25. [PubMed]
41. Tan AT, Emmanuel SC, Tan BY, Teo WS, Chua TS, Tan BH. Myocardial infarction in Singapore: A nationwide 10-year study of multiethnic differences in incidence and mortality. Ann Acad Med Singapore. 2002; 31:479-86. [PubMed]
42. Mak KH, Chia KS, Kark JD, Chua T, Tan C, Foong BH, *et al*. Ethnic differences in acute myocardial infarction in Singapore. Eur Heart J. 2003; 24:151-60. [PubMed]
43. Lloyd-Jones DM, Leip EP, Larson MG, D'Agostino RB, Beiser A, Wilson PW, *et al*. Prediction of lifetime risk for cardiovascular disease by risk factor burden at 50 years of age. Circulation. 2006; 113:791-8. [PubMed]