



ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2020; 6(8): 254-259
www.allresearchjournal.com
Received: 04-05-2020
Accepted: 29-07-2020

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Analysis of factors influencing success of thrombolysis with INJ streptokinase in acute mipresenting in less than 3 hours in a tertiary care centre in North Chennai

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Abstract

Background: The incidence of MI in India is steadily increasing over the past few decades. Rural to urban ratio in rise in MI cases is around 2:9. This could probably be due to migration from rural to urban cities. Another major problem is the occurrence of MI at a younger age in the Indian population. STEMI is an emergency due to acute total occlusion of an epicardial coronary artery, most often due to atherosclerotic plaque rupture / erosion and subsequent thrombus formation. Compared to UA / NSTEMI, STEMI is associated with a higher in-hospital and 30 day morbidity and mortality. Left untreated, the mortality rate of STEMI can exceed 30 % and the presence of mechanical complications (papillary muscle rupture, ventricular septal defect, and free wall rupture) increases the mortality rate to 90%. Keys to treatment of STEMI include rapid recognition and diagnosis, coordinated mobilization of health care resources, and prompt reperfusion therapy. Mortality is directly related to total ischaemia time. Thrombolysis by fibrinolytic agents is still the preferred mode of treatment in India. Only 15% to 20% of patients with MI are able to undergo primary PCI, available in only a few tertiary hospitals in the city limits. Several factors contribute to success of re-perfusion in a case of STEMI – age, sex, time taken from onset of pain to treatment, co-morbidities like diabetes and systemic hypertension, lifestyle changes like smoking, whether AWMi OR IWMI, etc. So, in the following study, the influence of each of these factors on the success of thrombolysis by Inj. Streptokinase in STEMI patients have been analysed, especially those presenting in less than 3 hours of onset of chest pain.

Methodology: Patients presenting to hospital with complaints of chest pain of less than three hours duration were lysed with Inj Streptokinase and treated as per AHA/ACC and WHO guidelines. The various factors influencing the success of Thrombolysis like age, gender, smoking history, hypertension and diabetes were analysed in those presenting within a window period of 3 hours. The success of thrombolysis was analysed as per ECG criteria i) reduction of j point elevation of >50% in AWMi and ii) Reduction of j point by >30% in IWMI, 90 minutes post Inj Streptokinase infusion. The results were then analysed and seen for any statistical significance.

Results: On analyzing the data of 102 patients thrombolysed in the time period of 4-5 months in intensive care unit of Tertiary Care Centre, it was found that 70 patients (68.6%) were successfully thrombolysed while 32 patients (31.4%) had a failure in thrombolysis using Inj. Streptokinase as thrombolysing agent. Among them, 43 patients presented in less than 3 hours of onset of chest pain. The influence of various factors on thrombolysis, in those presenting in less than 3 hours were analysed. Younger age, Non-Diabetics and patients presenting with IWMI had better success rate in thrombolysis, with the latter showing statistical significance. Gender, smoking history and hypertension did not influence the success of thrombolysis much in this study.

Keywords: Thrombolysis, streptokinase, myocardial infarction, window period

Introduction

Coronary heart disease (CHD) is a worldwide health epidemic. Mortality data from Global Burden of Diseases Studies have revealed that cardiovascular diseases especially coronary heart disease are important causes of death in India. Worldwide 30 percent of all deaths can be attributed to cardiovascular disease, of which more than half are caused by CHD, and the forecasts for the future estimate a growing number as a consequence of lifestyle changes in developing countries. In the absence of reliable mortality data in India, estimates of the burden of coronary heart disease have mostly been based on morbidity indicators from

population based cross-sectional surveys. Nevertheless, the prevalence of MI has been increasing over the past few decades. Rural-urban comparison shows that while prevalence has increased two-fold in rural areas and the prevalence in urban areas has increased nine-fold. There is evidence of increase in coronary heart disease as subjects migrate from rural to semi-urban to urban areas with the highest prevalence reported from metropolises. As epidemiological studies exclude many patients with silent and asymptomatic disease the actual numbers may be much greater. Another major concern is occurrence of first event at younger age in Indians and presence of diffuse coronary artery disease at presentation. The early (30-day) mortality rate from AMI is 30%, with more than half of these deaths occurring before the ill-fated individual reaches the hospital. Although the mortality rate after admission for AMI has decreased by over 30% in the past two decades, approximately 1 of every 25 patients who survives the initial period dies in the first year after AMI. Mortality is approximately fourfold higher in elderly patients (over age 75) when compared with younger patients. Mortality is directly related to total ischemia time. Mortality and morbidity were comparatively lower in those presenting early to Hospital (within 3 hours of onset of chest pain) than those presenting late.

Materials and Methods

Place of study: The study was undertaken in ICCU, Department of Cardiology, Stanley medical college and hospital, Chennai

Study Design: Prospective open label observational study
Duration of study: 4-5 months

Study group: 20 to 75 years age group complaining of chest pain and ECG showing ST elevation (AWMI / IWMI) and presenting in less than 3 hours of onset of chest pain

Study setting: ICCU, Department of Cardiology, Stanley Medical College and Hospital, Chennai

Inclusion criteria

All patients with symptoms of Myocardial Infarction and showing ECG features of ACS STEMI – ST segment elevation in leads and presentation of less than 3 hours from onset of chest pain

1. ST segment elevation two consecutive ECG leads
 - Men > 40 yrs, “ST segment elevation “at the J point > 2mm in leads V2 and V3, > 1 mm in all leads
 - Men < 40 yrs, “ST segment elevation” at the J point > 2.5 mm in leads V2 and V3
 - In women, “ST segment elevation” at the J point > 1.5mm in leads V2 and V3, > 1 mm in all leads
2. Evidence of posterior MI
 - Threshold for abnormal ST elevation at the J point is > 0.5 mm

Exclusion criteria

1. Known case of Coronary artery disease and already taking Cardiac drugs
2. Previous history of re-vascularisation

3. Contraindication to thrombolysis
4. NSTEMI and Unstable Angina patients

Procedure Methodology

The participants were explained about the study and informed consent was obtained. Then they were interviewed and analysed for inclusion / exclusion criteria. Cases which met the inclusion criteria and did not have any exclusion criteria were selected to participate in the study. Detailed history regarding patient's age, time of presentation to hospital from the onset of symptoms, lifestyle, history of smoking, history of drug intake for hypertension or diabetes were asked. Patients with low physical activity and low commuting activity were taken as leading a sedentary lifestyle. Those who smoked > 5 cigarettes per day were considered as smokers. Symptom to needle time was taken for window period. Blood pressure was recorded and patients were auscultated for tabulating the patient as per Killip classification.

Results and analysis

- 100 acute “ST elevation myocardial infarction” cases were included in the study, of which 43 presented in less than 3 hours of onset of chest pain.
- Detailed history regarding patient's age, time of presentation to hospital from the onset of symptoms, lifestyle, history of smoking, history of drug intake for hypertension or diabetes were asked.
- Blood pressure was recorded and patients were auscultated for tabulating the patient as per Killip classification.
- ECG was taken to classify them as AWMI or IWMI or LWMI or PWMI.
- The various data were compared with successful / unsuccessful thrombolysis and their influence analysed.
- The available data was subjected for statistical analysis.
- The statistical comparison was done using “SPSS”.
- The “p value of less than 0.05” was considered as statistically significant.
- Charts and bar diagrams are shown to bring out the significance and understand them more easily.

Result

Influence of age on thrombolysis in presentation < 3 hours)

In our study, of the 43 patients thrombolysed who presented within 3 hours of the onset of chest pain, 11 were < 40 years of age, 23 were between 40 to 60 years of age and 9 were > 60 years of age.

The success and failure rate of thrombolysis in those who presented within 3 hours and those who were < 40 years of age were found to be 81.8% and 18.2% respectively, those between 40 to 60 years were found to be 91.3% and 8.7% respectively and, those who presented with age > 60 years were found to be 66.7% and 33.3% respectively. The success rate was found to be higher for those with age less than 60 years than with age more than 60 years. On statistical analysis, there was no significant relationship between age and result of thrombolysis using Inj. Streptokinase in those who presented in less than 3 hours (p = 0.232).

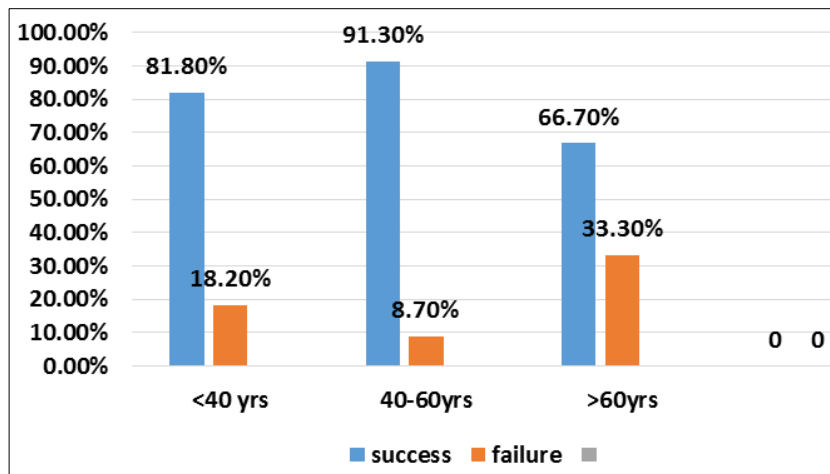


Fig 1: Agewise – success and failure rate (< 3hrs)

Influence of sex on thrombolysis in presentation < 3 hours

In our study, of the 43 patients thrombolysed who presented within 3 hours of the onset of chest pain, 33 were male and 10 were female. The success rate of thrombolysis in males and females and those who presented within 3 hours were found to be 81.8% and 90% respectively and failure rate of thrombolysis in males and females and those who presented within 3 hours were found to be 18.2% and 10% respectively. On statistical analysis, there was no significant relationship between sex and result of thrombolysis using Inj. Streptokinase in those who presented in less than 3 hours (p = 0.476)

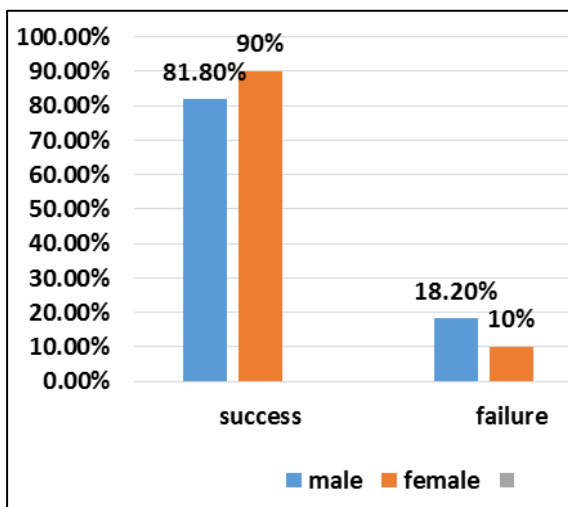


Fig 2: Sexwise – success and failure rate (< 3hrs)

Influence of smoking on thrombolysis in presentation < 3 hours:

In our study, of the 43 patients thrombolysed who presented within 3 hours of the onset of chest pain, 15 were smokers and 28 were non-smokers. The success rate of thrombolysis in smokers and non-smokers and those who presented within 3 hours were found to be 98.3% and 78.6% and failure rate of thrombolysis in smokers and non-smokers and those who presented within 3 hours were found to be 6.7% and 21.4% respectively. The success rate was found to be a bit higher in smokers than in non-smokers. On statistical analysis, there was no significant relationship between smoking and result of thrombolysis using Inj. Streptokinase in those who presented in less than 3 hours (p = 0.212).

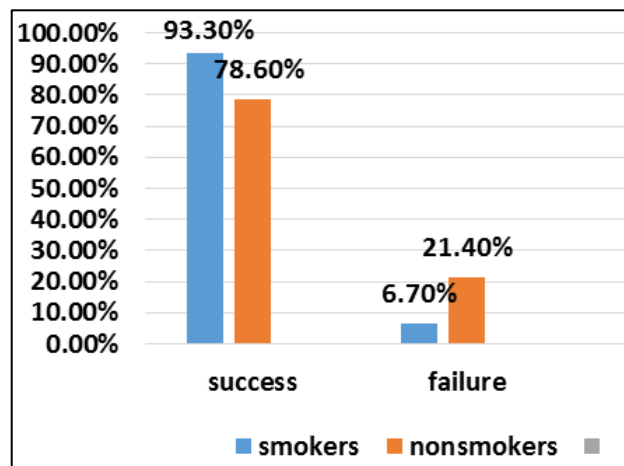


Fig 3: Smoking influence – success and failure rate (< 3hrs)

Influence of systemic hypertension on thrombolysis in presentation < 3 hours

In our study, of the 43 patients thrombolysed who presented within 3 hours of the onset of chest pain, 7 were hypertensives and on medications and 36 were non-hypertensives. The success rate of thrombolysis in hypertensives and non-hypertensives and those who presented within 3 hours were found to be 71.4% and 86.1% respectively and failure rate of thrombolysis in hypertensives and non-hypertensives and those who presented within 3 hours were found to be 28.6% and 13.9% respectively. On statistical analysis, there was no significant relationship between systemic hypertension and result of thrombolysis using Inj. Streptokinase in those who presented in less than 3 hours (p = 0.318).

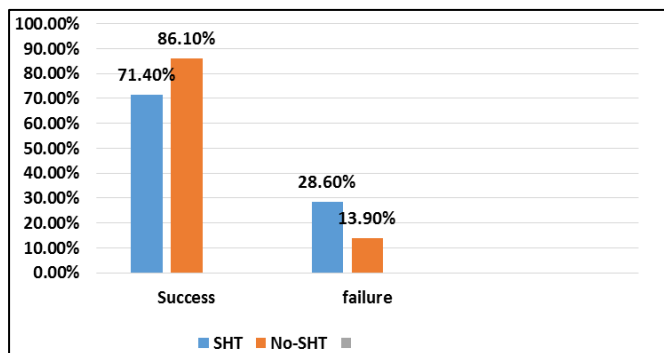


Fig 4: SHT influence – success and failure rate (< 3hrs)

Influence of diabetes on thrombolysis in presentation < 3 hours

In our study, of the 43 patients thrombolysed who presented within 3 hours of the onset of chest pain, 12 were diabetic and 31 were non-diabetics. The success rate of thrombolysis in diabetics and non-diabetics and those who presented within 3 hours were found to be 66.7% and 90.3% respectively and failure rate of thrombolysis in diabetics and non-diabetics and those who presented within 3 hours were found to be 33.3% and 9.7% respectively. The success rate was found to be a higher in non-diabetics than in diabetics. On statistical analysis, there was no significant relationship between diabetes and result of thrombolysis using Inj. Streptokinase in those who presented in less than 3 hours (p = 0.081).

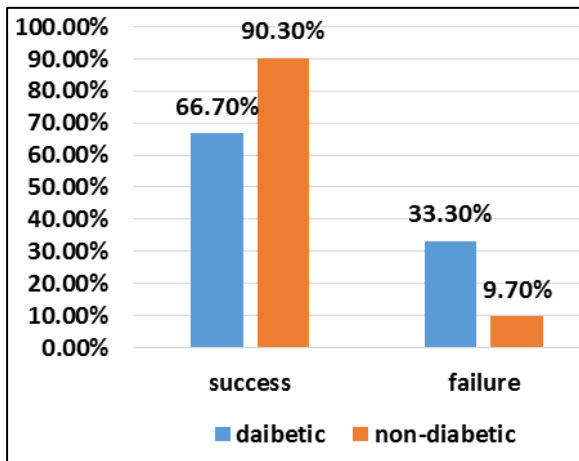


Fig 5: Diabetes influence – success and failure rate (< 3hrs)

Influence of localization of MI on thrombolysis in presentation < 3 hours

In our study, of the 43 patients thrombolysed who presented within 3 hours of the onset of chest pain, 23 had AWTMI and 20 patients had IWMI. The success rate and failure rate of thrombolysis in those who had AWTMI and those who presented within 3 hours were found to be 71% and 29% respectively and in those who had IWMI were found to be 95% and 5% respectively. The success rate was found to be a higher in those who presented as inferior wall myocardial infarction than in those who presented as anterior wall myocardial infarction. On statistical analysis, there was significant relationship between localization MI and result of thrombolysis using Inj. Streptokinase in those who presented in less than 3 hours (p = 0.05).

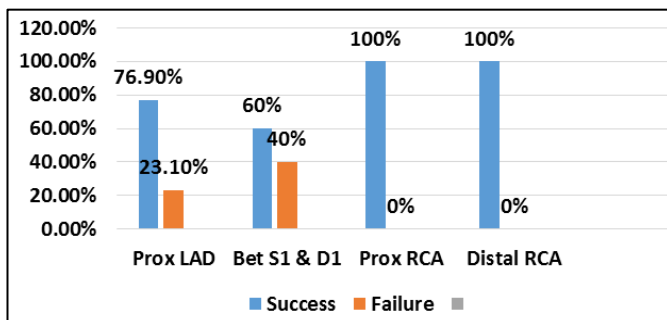


Fig 6: Anatomy influence – success and failure rate (< 3hrs)

Table 1: Factors influencing success of thrombolysis with Inj Streptokinase in Acute MI presenting in < 3 hours

Factors	Success Rate	Failure Rate	P Value
Age	<40 yrs	81.8%	0.232
	40-60 yrs	91.3%	
	>60 yrs	66.7%	
Gender	Male	81.8%	0.476
	Female	90%	
Smoking history	Smoker	98.3%	0.212
	Non- smoker	78.6%	
Diabetes	Diabetic	66.7%	0.081
	Non- diabetic	90.3%	
Hypertension	Hypertensive	71.4%	0.318
	Non-hypertensive	86.1%	
Localisation of MI	AWMI	71%	<0.05
	IWMI	95%	

Conclusion

1. Age-wise success rate was found to be higher in those less than 60 years of age than those of more than 60 years. But It was not statistically significant.
2. Gender was not found to influence the success rate of thrombolysis
3. Smokers had a slightly higher success rate than non smokers, but it did not reach statistical significance.
4. Presence or absence of systemic hypertension at the time of presentation for thrombolysis had no influence on the success or failure.
5. The success rate was higher in non-diabetics than in diabetics, though it was statistically insignificant.
6. Inferior wall myocardial infarction had a better success rate than anterior wall myocardial infarction and it was statistically significant.

Limitations of the study

1. Smaller sample size
2. Chances of confounding bias are more
3. No coronary angiogram to confirm the localization of thrombus in the coronary arteries, which is based on ECG features alone in this study.

5. References

1. Factors influencing the outcome of thrombolysis in acute myocardial infarction; Indian Journal of Basic and Applied Medical Research. 2015; 4(3):545-555
2. ISIS-2 (Second international study of Infarct survival) Collaborative group: Randomised trial of intravenous streptokinase; oral aspirin; both or neither among 17, 187 cases of suspected AMI: ISIS-2 Lancet. 1988; 2(8607):349-605.
3. Braunwald 11th edition; 1237
4. Hurst's The Heart 14th edition; 134
5. Gersh BJ, Stone GW, White HD *et al.* Pharmacological facilitation of primary percutaneous coronary intervention for acute myocardial infarction: is the slope of the curve the shape of the future? JAMA. 2005; 293:979-986.
6. A comparison of reteplase with alteplase for acute myocardial infarction. The Global Use of Strategies to Open Occluded Coronary Arteries (GUSTO III) Investigators. N Engl J Med. 1997; 337:1118-1123.

7. Lange RA, Hillis LD. Reperfusion therapy in acute myocardial infarction. *N Engl J Med.* 2002; 346(13):954-955.
8. Armstrong PW, Colten D. Fibrinolysis for acute myocardial infarction: current status and new horizons for pharmacological reperfusion, part 1. *Circulation.* 2001; 103(23):2862-2866.
9. Armstrong PW, Colten D. Fibrinolysis for acute myocardial infarction: current status and new horizons for pharmacological reperfusion, part 2. *Circulation.* 2001; 103(24):2987-2992.
10. Ohman EM, Califf RM, Topol EJ *et al.* Consequences of reocclusion after successful reperfusion therapy in acute myocardial infarction. TAMI Study Group. *Circulation.* 1990; 82(3):781-791.
11. Yusuf S, Collins R, Peto R *et al.* Intravenous and intracoronary fibrinolytic therapy in acute myocardial infarction: overview of results on mortality, reinfarction and sideeffects from 33 randomized controlled trials. *Eur Heart J.* 1985; 6(7):556-585.
12. Tognoni G, White HD. Streptokinase in acute myocardial infarction. *Lancet.* 1986; 1(8483):738-739.
13. White HD, Norris RM, Brown MA *et al.* Effect of intravenous streptokinase on left ventricular function and early survival after acute myocardial infarction. *N Engl J Med.* 1987; 317(14):850-855.
14. Braunwald E. The open-artery theory is alive and well—again. *N Engl J Med.* 1993; 329(22):1650-1652.
15. The Gusto Angiographic Investigators. The effects of tissue plasminogen activator, streptokinase, or both on coronary-artery patency, ventricular function, and survival after acute myocardial infarction. *N Engl J Med.* 1993; 329(22):1615-1622.
16. The Gusto Investigators. An international randomized trial comparing four thrombolytic strategies for acute myocardial infarction. *N Engl J Med.* 1993; 329(10):673-682.
17. Simes RJ, Topol EJ, Holmes DR Jr *et al.* Link between the angiographic substudy and mortality outcomes in a large randomized trial of myocardial reperfusion. Importance of early and complete infarct artery reperfusion.
18. GUSTO-I Investigators. *Circulation.* 1995; 91(7):1923-1928.
19. Llevadot J, Giugliano RP, Antman EM. Bolus fibrinolytic therapy in acute myocardial infarction. *JAMA.* 2001; 286(4):442-449.
20. Staniforth DH, Smith RA, Hibbs M. Streptokinase and anisoylated streptokinase plasminogen complex. Their action on haemostasis in human volunteers. *Eur J Clin Pharmacol.* 1983; 24(6):751-756.
21. Brogden RN, Speight TM, Avery GS. Streptokinase: a review of its clinical pharmacology, mechanism of action and therapeutic uses. *Drugs.* 1973; 5(5):357-445.
22. Gonas SL, Einarsson M, Pizzo SV. Catabolic pathways for streptokinase, plasmin, and streptokinase activator complex in mice. In vivo reaction of plasminogen activator with alpha 2-macroglobulin. *J Clin Invest.* 1982; 70(2):412-423.
23. Mozaffarian D, Benjamin EJ, Go A *Set al.* Heart disease and stroke statistics—2016 update: a report from the American Heart Association. *Circulation.* 2016; 133(4):e36-360.
24. Fowkes FG, Rudan D, Rudan I *et al.* Comparison of global estimates of prevalence and risk factors for peripheral artery disease in 2000 and 2010: a systematic review and analysis. *Lancet.* 2013; 382:1329-1340.
25. Lackland DT, Elkind MS, D'Agostino R Sr *et al.* Inclusion of stroke in cardiovascular risk prediction instruments: a statement for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke.* 2012; 43:1998-2027.
26. Schaar JA, Muller JE, Falk E *et al.* Terminology for high-risk and vulnerable coronary artery plaques. Report of a meeting on the vulnerable plaque, June 17 and 18, 2003, Santorini, Greece. *Eur Heart J.* 2004; 25:1077-1082.
27. Lim SS, Vos T, Flaxman AD *et al.* A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet.* 2012; 380:2224-2260.
28. Murray CJ, Lopez AD. Measuring the global burden of disease. *N Engl J Med.* 2013; 369:448-457.
29. Yusuf S, Hawken S, Ounpuu S *et al.* Inter heart Study Investigators. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the Inter heart study): case-control study. *Lancet.* 2004; 364:937-952.
30. Ware JH. The limitations of risk factors as prognostic tools. *N Engl J Med.* 2006; 355:2615-2617.
31. Wald NJ, Morris JK, Rish S. The efficacy of combining several risk factors as a screening test. *J Med Screen.* 2005; 12:197-201.
32. Mortensen MB, Falk E. Real-life evaluation of European and American high-risk strategies for primary prevention of cardiovascular disease in patients with first myocardial infarction. *BMJ Open.* 2014; 4:e005991.
33. Lauer MS. Primary prevention of atherosclerotic cardiovascular disease: the high public burden of low individual risk. *JAMA.* 2007; 297:1376-1378.
34. Filion KB, Luepker RV. Cigarette smoking and cardiovascular disease: Lessons from framingham. *Global Heart.* 2013; 8:35-41.
35. General S. The health consequences of smoking-50 years of progress: A report of the surgeon general. US Department of Health and Human Services, 2014.
36. Ng M, Freeman MK, Fleming TD *et al.* Smoking prevalence and cigarette consumption in 187 countries, 1980-2012. *JAMA.* 2014; 311:183-192.
37. Ahmad OS, Morris JA, Mujammami M *et al.* A Mendelian randomization study of the effect of type-2 diabetes on coronary heart disease. *Nat Commun.* 2015; 6:7060.
38. Timmer JR, Ottervanger JP, de Boer MJ *et al.* Primary Coronary Angioplasty vs Thrombolysis-2 Trialists Collaborators Group. Primary percutaneous coronary intervention compared with fibrinolysis for myocardial infarction in diabetes mellitus: results from the Primary Coronary Angioplasty vs Thrombolysis-2 trial. *Arch Intern Med.* 2007; 167(13):1353-1359.
39. Malmberg K. for the DIGAMI Study Group. Prospective randomised study of intensive insulin treatment on long-term survival after acute myocardial infarction in patients with diabetes mellitus. *BMJ.* 1997; 314:1512-1515.

40. Mendis S, Puska P, Norrving B. eds. Global Atlas on Cardiovascular Disease Prevention and Control. Geneva: Switzerland: World Health Organization. 2011.
41. Santos AB, Gupta DK, Bello NA *et al.* Prehypertension is associated with abnormalities of cardiac structure and function in the Atherosclerosis Risk in Communities Study. *Am J Hypertens*, 2015, pii:hpv156.