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Original Article

Changing patterns in the prevalence and management of cardiovascular risk factors in India and their comparison with the rest of the world along with clinical outcomes at 5-year: An analysis of stable coronary artery disease patients from The Prospective Observational Longitudinal Registry of patients with stable coronary artery disease (CLARIFY) registry

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ABSTRACT

Objective: Present paper describes trends in prevalence and control of cardiovascular risk factors and clinical outcomes at 5-years for CLARIFY Indian cohort compared with rest of the world (ROW).
Method: CLARIFY is an international, prospective-observational, longitudinal cohort study in stable coronary artery disease outpatients. The 5-year data of both cohorts were compared, and evaluated.
Results: In Indian cohort, the angina prevalence declined significantly. There are few favorable changes in the pattern of receiving guideline-recommended therapy over 5 years, and the Indian cohort exhibited significantly lower adverse clinical outcomes than ROW.
Conclusion: The 5-year trend of CLARIFY India registry indicate varying trends in prevalence and control of cardiovascular risk factors, the need for approaches to improve control of all modifiable risk factors, and increase in long-term use of essential primary and secondary prevention medications in clinical practice as emphasized in the latest Indian guidelines for management of stable CAD.

1. Introduction

Among cardiovascular (CV) diseases, coronary artery disease (CAD) remains the leading cause of mortality worldwide,[1,2] and in India.[3,4] The burden of CAD is growing remarkably in India which is evident by more than doubling of mortality and disability rates from CAD in the last 30 years.[5] In line with this fact, the World Health Organization (WHO) has projected a loss of about 237 billion USD with the current encumbrance of CV diseases over a 10-year period (2005–2015), which is 1.5% of India's GDP.[6]

Though there is enormous evidence available for managing acute CAD patients, the information on long-term outpatient management of stable coronary artery disease (SCAD) patients is less well documented. Principally, all patients with SCAD require life-long supervised interventions, which include; control of modifiable CV risk factors by lifestyle modification and appropriate use of primary and secondary prevention medicines. Moreover, there has been geographical disparity observed in prevalence and control of these risk factors.[7] Noticeable variations in metabolic (raised triglycerides and low density lipoproteins (LDL), and low high density lipoproteins (HDL)), clinical (visceral obesity characterized by larger waist-to-hip (WH) ratio), and biochemical (insulin resistance, low adiponectin and high C-reactive protein) characteristics of Asian Indian phenotype have been demonstrated.[8] In addition, CV disease tends to affect

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people at a younger age in Asian Indians, which has been cause of concern for experts across India and also acknowledged in current India specific SCAD guidelines.[9,10]

Implementing nation-wide policies becomes essential to control CAD that necessitates a comprehensive assessment of various aspects such as disease burden, manifestations, treatment patterns and clinical outcomes. Multiple longitudinal, epidemiological studies may provide valuable insights into these data and form the foundation for healthcare policies and practices. There is, however, relatively little contemporary information available in India on the management of SCAD patients and associated use of evidence-based medications in primary and secondary prevention. Above all, the existing evidence does not refer to SCAD.[11,12]

The Prospective Observational Longitudinal Registry of patients with stable coronary artery disease (CLARIFY) registry was initiated with the aim to achieve information on clinical characteristics and management of SCAD. The registry also intends to study clinical outcomes of these patients and identify the long-term prognostic factors determining the clinical outcomes. In the present paper, we sought to examine trends in CV risk factor prevalence and pattern of use of the appropriate treatment in India compared with rest of the world (ROW) over 5 years using data from the international CLARIFY registry.

2. Methodology

2.1. Study design

The rationale and study design of CLARIFY registry have been published previously. 13 The global CLARIFY registry included a total of 32703 analysable patients, among these Indian cohort included 709 (2.2%) patients and remaining 31994 (97.8%) patients comprised the ROW cohort.

2.2. Patient selection: inclusion and exclusion criteria

The SCAD patient eligibility for inclusion in the study were, presence of at least one of the following: coronary stenosis >50% on coronary angiography; documented myocardial infarction (MI, >3months ago); chest pain with myocardial ischemia proven using stress electrocardiogram (ECG), stress echocardiography (Echo), or myocardial imaging; history of coronary artery bypass graft surgery (CABG) or percutaneous coronary intervention (PCI; performed >3months ago). The patients excluded were those hospitalized for CV disease (including revascularisation) 3 months prior to enrolment, patients with planned revascularisation, and the patients with conditions anticipated to impede 5-year follow-up (e.g. serious non-CV disease, conditions limiting life expectancy, limited cooperation or legal capacity, or severe CV disease [advanced heart failure, severe valve disease, history of valve repair/replacement, etc.]).

2.3. Data collection

The data collected encompassed demographic characteristics; risk factors and lifestyle; medical history; physical examinations; cardiac measurements included heart rate (HR) by pulse palpation and the resting ECG within the previous 6 months, systolic blood pressure (SBP) and diastolic blood pressure (DBP), and ECG rhythm; presenting symptoms; laboratory values (e.g. HbA_1c, fasting blood glucose, triglycerides, cholesterol, hemoglobin, and serum creatinine, if available); and current medications taken regularly by the patient for ≥7 days before entry in the registry. The available data were again recorded at each visit, annually up to 5 years.

2.4. Ethics

The study was performed in accordance with the principles of the Declaration of Helsinki with due approval by the National Research Ethics Service, Isle of Wight, Portsmouth, and Southeast Hampshire Research Ethics Committee, UK. Written informed consent was obtained from all the patients. The study has been registered to ISRCTN with the registration number: ISRCTN43070564.

2.5. Statistical analysis

Data are summarised as means with standard deviations or medians with interquartile ranges. Categorical data are presented as counts and percentages. Data were analyzed by $\chi 2$ tests or

Table 1
Cardiac symptoms and measurements at 5-year.

	India (n = 450)		ROW (n = 21982)		*p*-Value
	N	n (%)	N	n (%)	
Angina	427	48 (11.2)	21500	3109 (14.5)	0.06
Angina CCS class					
Class I		2 (4.2)		804 (25.9)	<0.00008
Class II		41 (85.4)		1824 (58.7)	
Class III		5 (10.4)		458 (14.7)	
Class IV		0 (0.0)		21 (0.7)	
CHF	427	27 (6.3)	21487	3459 (16.1)	<0.0001
NYHA class if CHF symptoms					
Class II		24 (88.9)		2770 (80.1)	N.A
Class III		3 (11.1)		635 (18.4)	
Class IV		0 (0.0)		54 (1.6)	
SBP (mmHg), Mean ± SD	371	128.3 ± 11.2	20006	130.2 ± 14.8	0.01
DBP (mmHg), Mean ± SD	371	77.7 ± 6.6	20006	76.1 ± 9.2	0.0009
HR by pulse palpation (bpm), Mean ± SD	371	73.8 ± 8.9	19939	67.2 ± 9.5	<0.0001
HR on ECG (bpm), Mean ± SD	170	73.2 ± 11.3	13682	66.1 ± 10.1	<0.0001
LBBB if ECG available	170	8 (4.7)	13679	565 (4.1)	0.71
ECG Rhythm if ECG available 170		13675			
Sinus rhythm		162 (95.3)		12645 (92.5)	0.25
Atrial Fibrillation/Flutter		7 (4.1)		708 (5.2)	
Paced rhythm		1 (0.6)		322 (2.4)	

Values represent n (%) unless specified.
N represents patients with data available.
CCS, Canadian cardiovascular society; CHF, congestive heart failure; DBP, diastolic blood pressure; HR, heart rate; LBBB, left bundle branch block; NYHA, New York heart association; SBP, systolic blood pressure.

Fisher's exact test for categorical and *t*-test or Mann–Whitney *U* test for continuous variables using 2-sided tests at a significance level of 5% using Statistical Analysis Software (version 9.2). The 5-year clinical outcomes were calculated by COX proportional hazard regression model.

3. Results

The detailed baseline demographic characteristics and medical history of patients in India and ROW have been published previously.[14]

3.1. Cardiac measurements

3.1.1. 5-year trend in India

The prevalence of angina has decreased from 27.8% to 11.2% over a 5-year period in India ($p < 0.0001$). A persistent decline in mean SBP, DBP and HR measured by pulse palpation was observed over 5 years. However, there was no significant change in mean HR measured by ECG ($p = 0.1330$).

3.1.2. Comparison with ROW

Though prevalence of angina was similar in India vs ROW at 5-year (11.2% vs 14.5%, $p = 0.06$), grading of angina was different with a greater proportion of patients presenting with Canadian Cardiovascular Society (CCS) class II in India than ROW (85% vs 58.7%, $P < 0.00008$) (Table 1). At the end of 5 years, the mean HR was significantly more elevated in India; measured by both palpation (73.8 ± 8.9 bpm vs 67.2 ± 9.5 bpm, $p < 0.0001$) and ECG (73.2 ± 11.3 bpm vs 66.1 ± 10.1 bpm, $p < 0.0001$). There was a significant difference in the mean SBP and DBP (128.3 vs. 130.2 mmHg, $p = 0.01$ and 77.7 vs. 76.1 mmHg, $p = 0.0004$, respectively) in patients from India and ROW at 5-year.

3.2. Medical therapies

3.2.1. 5-year trend in India

The 5-year trend of some of the guideline-recommended drugs for management of SCAD confirms a significant decrease in the use of β-blocker, aspirin and lipid lowering agents, while the increase in the use of HR-lowering agent ivabradine was observed (Supplementary Fig. 1).

3.2.2. Comparison with ROW

The use of selected CV medications in India and ROW at 5-year is detailed in Table 2. The percentage of patients receiving ivabradine was similar in India vs ROW; $p = 0.07$. The use of β-Blockers, lipid-lowering agents and angiotensin-converting enzyme inhibitors in India was significantly lesser than ROW. However, statin use remained similar at 5-year ($p = 0.22$) and the use of thienopyridine ($p < 0.0001$), combination of aspirin and another antiplatelet agent ($p < 0.0001$), and combination of antiplatelet agent and anticoagulant ($p < 0.0001$) were significantly high in India versus ROW (Table 2).

3.3. Risk factors and their control

3.3.1. 5-year trend in India

There was no significant change in the trend of prevalence of risk factors such as overweight and obesity and their control (Fig. 1 and 2, respectively) from baseline to 5-year in India. The proportion of patients with raised blood pressure and HbA1c >7% decreased at 5-year compared to baseline (40.5% vs 25.3% and 24% vs 16.4% respectively). The proportion of patients with raised LDL cholesterol did not decrease, while the patients with lowered HDL (41.6% vs 31.6%) decreased significantly in India at 5-year. Moreover, the target of lowered LDL (< 1 g/L, 2.6 mmol/L) was improved at 5-year (60.3% vs 73.9%). Significant reduction in the percentage of patients with elevated HR (≥70 bpm) from baseline to 5-year was observed in India. Nevertheless, the control of HR (≤60bpm) remained poor even at 5-year in India (2.6 to 2.1%, $p = 0.43$).

3.3.2. Comparison with ROW

The prevalence of CV risk factors in India compared to ROW is presented in Table 3. The proportion of overweight and obese patients was greater in the ROW than India at 5-year. Almost similar percentage of patients had raised LDL ($p = 0.2$) in India vs

Table 2
Medical therapy at 5-year.

	India (n = 450)		ROW (n = 21982)		*p*-Value
	N	n (%)	N	n (%)	
Aspirin	388	281 (72.4)	20435	16232 (79.4)	0.0005
Thienopyridine	388	129 (33.2)	20429	3691 (18.1)	<0.0001
Other antiplatelet agents	388	39 (10.1)	20428	1860 (9.1)	0.29
Aspirin and another antiplatelet agent	388	123 (31.7)	20438	3825 (18.7)	<0.0001
Oral anticoagulant	388	50 (12.9)	20436	2214 (10.8)	0.11
Antiplatelet agent and anticoagulant	388	42 (10.8)	20442	1154 (5.6)	<0.0001
β-Blockers	388	253 (65.2)	201142	14705 (71.9)	0.002
Ivabradine	388	69 (17.8)	20436	3051 (14.9)	0.07
Calcium antagonists	388	96 (24.7)	20436	5743 (28.1)	0.08
Verapamil or Diltiazem	388	25 (6.4)	20436	903 (4.4)	0.04
ACE inhibitors	388	147 (37.9)	20439	9635 (47.1)	0.0002
Angiotensin II receptor blockers	388	101 (26.0)	20438	5751 (28.1)	0.20
Lipid-lowering drugs	388	312 (80.4)	20441	18039 (88.2)	0.0001
Statins if on lipid lowering agents	312	271 (86.9)	18039	15954 (88.4)	0.22
Other antianginal agents	388	71 (18.3)	20441	3170 (15.5)	0.08
Trimetazidine	388	30 (7.7)	20441	2412 (11.8)	0.009
Ranolazine	388	26 (6.7)	20441	311 (1.5)	0.0001
Diuretics	388	94 (24.2)	20434	6264 (30.7)	0.004
Other antihypertensive agents	388	39 (10.1)	20436	1519 (7.4)	0.03
Digoxin and derivatives	388	11 (2.8)	20436	468 (2.3)	0.30
Amiodarone/Dronedarone	388	9 (2.3)	20436	625 (3.1)	0.25
Other antiarrhythmic	388	2 (0.5)	20435	218 (1.1)	0.21

Values represent n (%).
N represents patients with data available.
ACE, angiotensin converting enzyme.

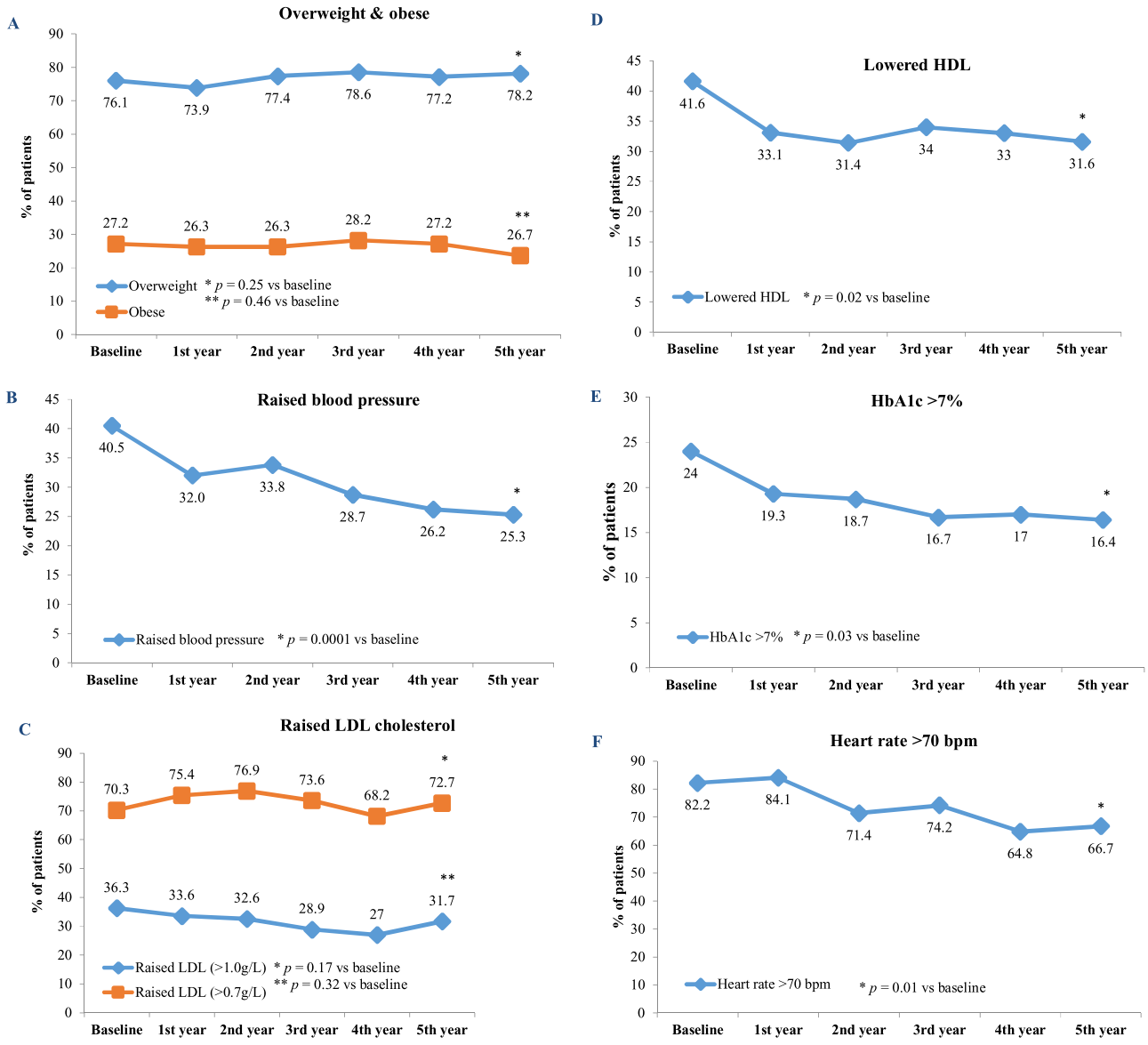

Fig. 1. Trends in risk factor distribution in Indian patients over 5 year period. A) Overweight & obesity: A) Overweight was defined as body mass index (BMI) ≥23 kg/m^2 and obesity ≥27.5 kg/m^2; B) Raised blood pressure: Defined as systolic blood pressure (SBP) ≥140 mmHg and/or diastolic blood pressure (DBP) ≥90 mmHg; C) Raised LDL cholesterol: Defined as (≥0.7 g/L, 1.8 mmol/L) and ≥1 g/l (2.6 mmol/L); D) Lowered HDL: Defined as ≤40 mg/dL, 1.0 mmol/L E) HbA1c >7% and F) Heart Rate >70bpm. BMI, Body Mass Index; HbA1c, glycated haemoglobin; HDL, high-density lipoprotein; LDL, low-density lipoprotein;

ROW. Both the Indian and ROW cohort had a similar percentage of patients achieving LDL and HDL control at 5-year. Significant proportion of Indian patients as compared to ROW exhibited elevated HR (66.7% vs 34.7, $p < 0.0001$), with only few patients achieving HR control in India (2.1% vs 23.6%, $p < 0.0004$) at 5-year. Similarly, glycaemic control was demonstrated to be poor at 5-year in India (6.4% vs 12.7%, $p = 0.01$) as compared to ROW.

3.4. Clinical outcomes

At 5-years, the number of deaths in both the groups due to CV and non-CV causes, were comparable (Table 4). Unstable angina, stroke (fatal or non-fatal), non-fatal MI, non-fatal stroke and major bleeding were significantly higher in ROW than in India. The proportion of patients who underwent coronary angiography, PCI, and any revascularisation were significantly higher in ROW than in India. Hospitalization for CV diseases and coronary heart failure were also significantly higher in ROW patients than in India.

4. Discussion

Five year results of CLARIFY India show varying trends in the prevalence of CV risk factors. The incidence rates of HR >70 bpm, HbA1c >7%, and raised blood pressure decreased significantly while overweight and obesity remained same and raised LDL cholesterol (>1.0 g/L) showed statistically non-significant reduction. Moreover, no improvement in the control of CV risk factors was observed. The majority of patients received evidence-based therapies with some differences. Overall, the results indicate that irrespective of the status of risk factors prevalence and control, and medication use, the long-term prognosis seems to be satisfactory in the CLARIFY Indian population.

The incidence and prevalence of CAD have increased tremendously in India during the last two decades and this change is largely attributable to rapid urbanisation and alterations in lifestyle.[15] The pattern of risk factors observed in CLARIFY Indian cohort is consistent with that previously observed

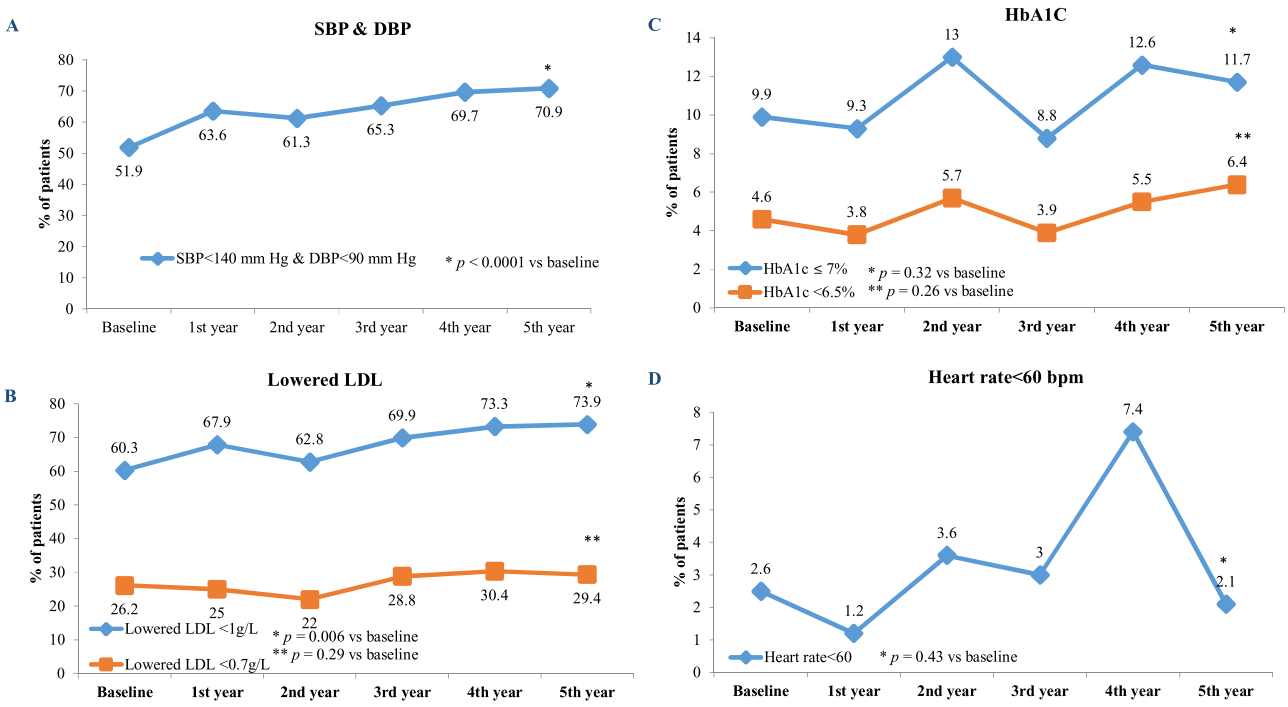

Fig. 2. Trends in target achievement in Indian patients over 5-year period A) mean SBP & DBP B) lowered LDL-C) HbA1c D) Heart rate <60 bpm.
bpm, beats per minute; HbA1c, glycated haemoglobin; LDL, low-density lipoprotein; SBP, systolic blood pressure; DBP, diastolic blood pressure

Table 3
Risk factor prevalence and control at 5-year.

	India (n = 450)		ROW (n = 21982)		*p*-Value
	N	n (%)	N	n (%)	
Distribution of risk factors					
Overweight, as defined by BMI (kg/m^2) ≥23,	371	290 (78.2)	19904	17736 (89.1)	0.0001
Obese, as defined by BMI (kg/m^2) ≥27.5,	371	99 (26.7)	19904	9979 (50.1)	<0.0001
Smoking initiation for former/never smokers at baseline	397	5 (1.3)	18724	476 (2.5)	NA
Raised blood pressure, as defined by SBP ≥ 140 and/or DBP ≥ 90 mmHg	371	94 (25.3)	20007	5831 (29.1)	0.06
Raised LDL (≥1 g/L, 2.6 mmol/L)	161	51 (31.7)	11164	3456 (31)	0.46
Raised LDL (≥0.7 g/L, 1.8 mmol/L),	161	117 (72.7)	11164	8467 (75.8)	0.20
Lowered HDL (≤40 mg/dL, 1.0 mmol/L)	155	49 (31.6)	11732	3160 (26.9)	0.11
HbA1c ≥ 7%	171	28 (16.4)	6083	1448 (23.8)	0.02
HR on palpation ≥70 bpm	48	32 (66.7)	3109	1078 (34.7)	<0.0001
Targets Achieved					
SBP <140 mmHg and DBP <90 mmHg in treated hypertensive defined at baseline	258	183 (70.9)	14393	9731 (67.6)	0.14
Lowered LDL (<1 g/L, 2.6 mmol/L),	119	88 (73.9)	8633	5960 (69)	0.15
Lowered LDL (<0.7 g/L, 1.8 mmol/L)	119	35 (29.4)	8633	2055 (23.8)	0.09
HbA$_1$c <7%	171	20 (11.7)	6083	1283 (21.1)	0.002
HbA$_1$c <6.5%	171	11(6.4)	6083	770 (12.7)	0.01
HR on palpation ≤60 bpm in angina patients	48	1 (2.1)	3109	734 (23.6)	0.0004

Values represent n (%) unless specified.
BMI, body mass index; DBP, diastolic blood pressure; HbA$_1$c, glycosylated haemoglobin; HDL, high-density lipoprotein; HR, heart rate; LDL, low-density lipoprotein.

in earlier studies including INTERHEART study.[16–19] The CLARIFY India results demonstrated no change in the prevalence of overweight and obesity in India over 5 years; however, the prevalence was lower than ROW at both baseline and at 5-year. These results are consistent with findings from the systematic analysis describing global trends in body-mass index since 1980 by the Global Burden of Metabolic Risk Factor of Chronic Diseases Collaborating Group.[20] On the contrary, an epidemiological study from India reported increase in obesity and truncal obesity.[11,21] Beyond everything, this study primarily highlights the need for better patient and physician education regarding lifestyle improvements and the essential primary and secondary prevention medications.

Despite a slight decrease in mean HR observed at 5-year, a persistently elevated HR (≥70 bpm) from baseline at 5-year has been observed in CLARIFY India population. In patients with suspected and established CAD, an elevated HR is an independent predictor of CV events.[22,23] In view of increasing prognostic value of elevated HR, several guidelines recommend pharmacological HR reduction as an important part of disease management including the recent Indian SCAD guidelines.[11] Besides β-blockers and non-dihydropyridine calcium channel inhibitors, I*f* inhibitors that block the I*f* current in a sinoatrial node may have a role in therapeutic HR management and angina control. At 5-year, although more than half of patients with SCAD were treated with β-blockers (65.2%), almost 66.7% had resting HR ≥ 70 bpm. These findings imply that

Table 4
– Clinical outcomes at 5-year for India compared with ROW.

Variable	India (n = 706)	ROW (n = 31672)	HR (95% CI)	*p*-Value
All cause death	56 (7.9)	2488 (7.9)	1.06 (0.81, 1.38)	0.69
Cardiovascular death	39 (5.5)	1580 (5.0)	1.16 (0.84, 1.59)	0.37
Non-Cardiovascular death	17 (2.4)	908 (2.9)	0.88 (0.54, 1.42)	0.60
MI (fatal or non-fatal)	20 (2.8)	1086 (3.4)	0.85 (0.55, 1.33)	0.48
Stroke (fatal or non-fatal)	6 (0.8)	680 (2.1)	0.41 (0.18, 0.91)	0.03
Cardiovascular death or non-fatal MI	46 (6.5)	2307 (7.3)	0.93 (0.69, 1.24)	0.61
Cardiovascular death, non-fatal MI/non-fatal stroke	49 (6.9)	2758 (8.7)	0.82 (0.62, 1.09)	0.17
Non-fatal MI	7 (1.0)	788 (2.5)	0.41 (0.20, 0.87)	0.02
Non-fatal stroke	4 (0.6)	527 (1.7)	0.35 (0.13, 0.94)	0.04
Unstable angina	54 (7.6)	3385 (10.7)	0.73 (0.56, 0.95)	0.02
Major bleeding	2 (0.3)	444 (1.4)	0.21 (0.05, 0.84)	0.03
Coronary angiography	63 (8.9)	4566 (14.4)	0.63 (0.49, 0.81)	0.0003
PCI	20 (2.8)	2120 (6.7)	0.43 (0.28, 0.66)	0.0002
CABG	11 (1.6)	424 (1.3)	1.21 (0.67, 2.20)	0.53
Revascularisation (PCI or CABG)	31 (4.4)	2495 (7.9)	0.56 (0.40, 0.80)	0.006
Transient Ischemic Attack	18 (2.5)	810 (2.6)	1.05 (0.66, 1.67)	0.84
Hospitalization for CHF	22 (3.1)	1625 (5.1)	0.63 (0.41, 0.95)	0.03
Cardiovascular death, non-fatal MI, non-fatal stroke/revascularisation (PCI/CABG)	49 (6.9)	2758 (8.7)	0.81 (0.61, 1.07)	0.13
MI (fatal or non-fatal)/revascularisation (PCI/CABG)	48 (6.8)	3062 (9.7)	0.71 (0.54, 0.95)	0.02
All coronary events: MI (fatal or non-fatal) or revascularisation (PCI/CABG)/unstable angina	74 (10.5)	5079 (16.0)	0.65 (0.52, 0.82)	0.0003
Cardiovascular hospitalization	129 (18.3)	9708 (30.7)	0.58 (0.49, 0.69)	<0.0001

Values represent n (%) unless specified.
CABG, coronary artery bypass surgery; CHF, congestive heart failure; MI, myocardial infraction; PCI, percutaneous coronary intervention.

patients on β-blockers are not adequately controlled to achieve a target HR ≤ 60 bpm. The results are in line with the baseline results of CLARIFY; wherein 69% patients received β-blocker and about 82% patients had resting HR ≥ 70 bpm.[14] The observed reduction in the percentage of patients with resting HR ≥ 70 bpm at 5-year (66.7%) from baseline (82%) may be attributed to increasing use of HR-lowering medication like ivabradine (5.4% to 17.8%, $p < 0.0001$). However, exploratory statistical analysis with adequate power to detect such impact is required to make a definitive conclusion.

The analysis of the medications at 5-year revealed slightly lower use of aspirin and β-blockers in India than ROW, however, this is accompanied by the higher use of thienopyridines and dual antiplatelet agents. Moreover, the 5-year trend in India showed a decrease in some guideline-recommended agents, such as β-blockers (<5% decrease), aspirin, and lipid lowering agents. Low use of β-blockers may be attributed to intolerance to them[24] and low aspirin use could be due to increased usage of other antiplatelet agents. In patients intolerant to β-blockers, ivabradine may be prescribed, which has been recently recommended by clinical practice guidelines as well.[25] Moreover, use of ivabradine is also supported by evidence that the addition of ivabradine to optimal preventive therapy further reduces the risk of coronary events such as hospitalization for MI by 36% and revascularisation by 30%, particularly in a subgroup of patients with elevated resting HR.[26]

The clinical outcomes in this study are in line with the findings from the Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluation (COURAGE) trial that shows optimal medical therapy alone to be effective in reducing the cardiac events. However, the risk factors reduction has remained lower than expected in the present study.[27] The study exhibits inherent selection bias owing to the voluntary enrolment of patients by physicians. Patients' enrolment only at urban centres also contributed so-called urban bias. Despite these limitations, a large number of participating countries is the major strength of the registry, which facilitates generalisation of results.

5. Conclusion

The 5-year trend of CLARIFY India registry indicates varying trends in the prevalence of CV risk factors like HR >70 bpm, HbA1c >7%, and raised blood pressure and raised LDL cholesterol. The results also suggest that the risk factors are inadequately controlled. Though, there are few favorable changes in the pattern of receiving guideline-recommended therapy, systematic approaches to improve control of all modifiable risk factors and increase the long-term use of essential primary and secondary prevention medications are required in current clinical practice. The same has been emphasized in the latest Indian guidelines for the management of SCAD.

Disclosure

The authors have no conflict of interest.

Conflict of interests

All the authors declare that they have no conflict of interest.

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Appendix A.

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Appendix B. Supplementary data

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.ihj.2018.04.003.

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