Original Article

Coronary Artery Disease Pattern Using Gensini Score in City, Urban and Rural Populations

Rajith K.S., MBBS, MD (General Medicine), DNB Cardiology[1]; Harsha Basappa, MBBS, MD (General Medicine), DNB Cardiology[1]; S. S. Ramesh, MBBS, MD (General Medicine), DM Cardiology[2]

[1]Associate Professor in Cardiology, Sri Jayadeva Institute of Cardiovascular Sciences and Research, Bangalore, Mysore Branch, Karnataka, India [2]Consultant Interventional Cardiologist, Vagus Superspeciality Hospital, Bangalore Karnataka, India

Abstract

Objective

To study the coronary artery disease (CAD) pattern by angiogram using Gensini score in cities, urban and rural populations.

Methodology

A cross-sectional study of all patients with CAD coming to Bhagawan Mahaveer Jain Heart Centre, Bangalore, or its peripheral centres from city, urban and rural areas presenting with known or suspected CAD with chest pain suggestive of CAD and various investigations suggestive of CAD were screened. Patients with evidence of CAD on coronary angiogram were included in the study.

Results

In total, there were 400 patients with evidence of CAD on coronary angiogram. Among them, the number of patients from city areas was 197, from urban areas was 102 and from rural areas was 101. Patients were divided into three groups as per their Gensini score: those with 50 score, 51–150 score and > 150 score. Majority of the patients belonged to the 50 score group, with 129 (65.5%) from city, 67 (65.7%) from urban and 81 (80.2%) from rural areas. In the 51–150 Gensini-score group, 67 (34.0%) were from city, 33 (32.4%) from urban and 20 (19.8%) from rural areas. In the > 150 Gensini-score group, 1 (0.5%) was from city, 2 (2.0%) from urban and none from rural areas, with significant difference between the groups (p = 0.041).

Conclusions

Gensini score was higher in city population than in rural population, indicating increased burden of coronary lesions in the former.

Keywords

- Coronary artery disease
- Gensini score
- City
- Urban
- Rural

Introduction

Cardiovascular disease is the leading cause of death worldwide, accounting for 17.7 million deaths annually; of them, 6.2 million (35%) occur in middle age (30–69 years).[1] India accounts for more than one-fifth of these deaths, according to a WHO study,[1] and therefore, reduction of global cardiovascular mortality greatly depends on India, where cardiovascular disease develops a decade earlier in life than it does in high-income countries.[2]

According to a population-based cross-sectional survey, the prevalence of coronary artery disease (CAD) in India

Received: 04-04-2019; Revised: 11-07-2019; Accepted: 13-07-2019
Disclosures: This article has not received any funding and has no vested commercial interest.
Acknowledgments: None.

was estimated to be 3%–4% in rural areas and 8%–10% in urban areas, with a total of 29.8 million affected.[3]

The Gensini scoring system is an objective method to determine the severity of CAD according to angiographic findings.[4] However, little is known about the association between the severity of CAD assessed by the Gensini score and risk factors in city, urban and rural patients with CAD.

Aim of the study

To study the CAD pattern by angiogram using Gensini score in the setting of city, urban and rural populations.

Material and methods

Study period

April 2009–March 2010

Study design

A cross-sectional study of patients with CAD

Study population

All patients coming to Bhagawan Mahaveer Jain Heart Centre, Bangalore, or its peripheral centres from city, urban and rural areas presenting with known or suspected CAD with chest pain suggestive of CAD and various investigations suggestive of CAD were taken up for coronary angiogram, and patients with evidence of CAD on angiogram were included in the study. Ethical clearance was obtained as per the institutional ethical review board. City, urban and rural populations[5] were defined according to the census of India 2001 data.

Inclusion criteria

All patients with coronary angiogram confirmative of CAD were included.

Exclusion criteria

Patients with coronary angiogram not confirmative of CAD were excluded.

Methodology

Patients coming to our centre with typical angina were evaluated using clinical and biochemical testing, ECG and echocardiogram. Treadmill test was conducted in indicated patients. Risk factors of each patient were recorded. With due consent, indicated patients underwent coronary angiogram. Those with evidence of CAD on coronary angiogram were included in the study.

Judkins approach was used for the catheterisation of coronary arteries. GE Advantx LC Plus and GE OEC machines were used to acquire cine fluorographic images. Selective left and right coronary arteriograms with multiple views were taken to define the severity of the arteriographic disease. Number of diseased vessels and Gensini score were calculated for each lesion.

1. Number of diseased vessels: The number of diseased vessels was measured according to coronary artery surgery study criteria.[6]

2. Gensini Score: This index assigns a heavier weight to more severe luminal narrowing. Weights are also assigned to each segment depending on vessel size and importance: segments serving larger regions of myocardium are more heavily weighted. For each segment, the two weights are multiplied. The sum of the products is the Gensini score. The Gensini score was calculated for each patient from the coronary arteriogram. It was computed by assigning a severity score to each coronary stenosis according to the degree of luminal narrowing and its geographic importance. Reduction in the lumen diameter and the roentgenographic appearance of concentric lesions and eccentric plaques were evaluated (reductions of 25%, 50%, 75%, 90%, 99% and complete occlusion were assigned the Gensini scores of 1, 2, 4, 8, 16 and 32, respectively). Each principal vascular segment was assigned a multiplier in accordance with the functional significance of the myocardial area supplied by that segment: the left main coronary artery, ×5; the proximal segment of left anterior descending coronary artery (LAD), ×2.5; the proximal segment of the circumflex artery, ×2.5; the mid segment of the LAD, ×1.5; the right coronary artery, the distal segment of the LAD, the posterolateral artery and the obtuse marginal artery, ×1 and others, ×0.5.[4,7]

Statistical analysis

Data were analysed using chi-squared test, t-test and analysis of variance (ANOVA), wherein p values < 0.05 were considered statistically significant. The data were analysed using SPSS package.

Results

In total, there were 400 patients with evidence of CAD on coronary angiogram. Among them, the number of patients from city areas was 197, from urban areas was 102 and from rural areas was 101.

Age and sex distribution

Age of the patients in this study ranged from 28 years to 85 years, mean age of patients in city areas was 58.08 ± 11.25 years, in urban areas was 57.81 ± 9.97 years and in rural areas was 58.89 ± 9.85years ($p = 0.744$).

Of the 197 patients in the city group, 145 (73.6%) were men and 52 (26.4%) were women; of the 102 patients in the urban group, 77 (75.5%) were men and 25 (24.5%) were women; of the 101 patients in the rural group, 79 (78.2%) were men and 22 (21.8%) were women. There was no significant difference between the groups ($p = 0.681$). Coronary angiogram pattern in city, urban and rural populations are shown in Table 1.

Table 1: Coronary angiogram and Gensini score pattern in the study population

		City population (N = 197)	Urban population (N = 102)	Rural population (N = 101)	p Value
Number of diseased vessels		1.70 ± 0.886	1.63 ± 1.004	1.47 ± 0.996	0.139
Gensini score		47.62 ± 35.599 (b)	42.44 ± 36.458	33.60 ± 26.877	0.004
Number of diseased vessels and Gensini score	0 (n = 45)	5.65 ± 4.679	4.50 ± 2.955	3.64 ± 2.661	0.284
	1 (n = 149)	33.49 ± 20.278 (a)	24.94 ± 18.832	26.31 ± 19.685	0.055
	2 (n = 119)	50.23 ± 29.346	47.64 ± 26.554	43.50 ± 15.747	0.534
	3 (n = 87)	81.72 ± 41.947 (b)	82.52 ± 35.895 (c)	62.11 ± 29.356	0.002
	p value	0.001	0.001	0.001	

a = significant p value between city and urban, b = significant p value between city and rural, c = significant p value between urban and rural

Gensini score distribution

Patients were divided into three groups as per their Gensini score: those with 50 score, those with 51–150 score and those with >150 score. Majority of the patients belonged to the 50 score group, with 129 (65.5%) from city, 67 (65.7%) from urban and 81 (80.2%) from rural areas. In the 51–150 Gensini-score group, 67 (34.0%) were from city, 33 (32.4%) from urban and 20 (19.8%) from rural areas. In the > 150 Gensini-score group, 1 (0.5%) was from city, 2 (2.0%) from urban and none from rural areas, with significant difference between the groups (p = 0.041).

As shown in Table 2, the Gensini score was compared with each CAD risk factor and its significance between city, urban and rural populations. The Gensini score was also compared with and without risk factors within each population, which is demonstrated in the Table 2.

Table 2: Risk factors and Gensini score

		City areas (N = 197)	Urban areas (N = 102)	Rural areas (N = 101)	p Value
Age	40 years	41.58 ± 23.25 (n = 13)	42.20 ± 23.94 (n = 5)	8.00 ± 10.39 (n = 3)	0.317
	41–55 years	45.70 ± 41.54 (n = 67)	37.28 ± 33.04 (n = 40)	34.00 ± 27.65 (n = 36)	0.283
	56–70 years	48.94 ± 32.37 (n = 91)[b]	44.05 ± 34.57 (n = 44)	34.04 ± 26.99 (n = 53)	0.004
	>70 years	50.94 ± 36.04 (n = 26)	53.31 ± 34.57 (n = 13)	37.94 ± 25.54 (n = 9)	0.352
	p value	0.823	0.568	0.400	
Sex	Male	48.70 ± 36.88 (n = 145)[b]	41.41 ± 36.08 (n = 77)	33.78 ± 27.46 (n = 79)	0.009
	Female	44.60 ± 31.88 (n = 52)	45.78 ± 37.95 (n = 25)	32.95 ± 25.25 (n = 22)	0.074
	p value	0.477	0.605	0.900	
BMI	25kg/m^2	47.80 ± 34.57 (n = 110)[b]	41.25 ± 33.67 (n = 38)[c]	29.90 ± 21.34 (n = 35)	0.002
	< 25 kg/m^2	47.47 ± 36.54 (n = 87)	44.55 ± 41.00 (n = 64)	40.57 ± 34.31 (n = 66)	0.622
	p value	0.949	0.660	0.057	

....Table continued on next page

DM	YES	49.17 ± 35.11 (n = 110)[b]	45.29 ± 37.06 (n = 56)	35.69 ± 23.87 (n = 51)	0.060
	NO	45.65 ± 36.30 (n = 87)[b]	39.07 ± 35.71 (n = 44)	31.47 ± 29.72 (n = 50)	0.069
	p value	0.492	0.393	0.433	
HTN	YES	49.65 ± 34.99 (n = 127)[b]	43.29 ± 39.77 (n = 59)	35.63 ± 27.77 (n = 54)	0.044
	NO	43.93 ± 36.63 (n = 77)[b]	41.37 ± 31.64 (n = 43)	31.27 ± 25.90 (n = 47)	0.111
	p value	0.281	0.794	0.418	
Tobacco Smoking	YES	49.16 ± 34.27 (n = 67)[b]	44.93 ± 36.34 (n = 37)[c]	31.84 ± 26.37 (n = 57)	0.014
	NO	44.63 ± 38.12 (n = 130)	38.18 ± 36.62 (n = 65)	34.96 ± 27.41 (n = 44)	0.284
	p value	0.399	0.370	0.566	
Alcohol consumption	YES	49.06 ± 47.69 (n = 31)	50.95 ± 47.39 (n = 29)	32.95 ± 23.19 (n = 39)	0.118
	NO	47.35 ± 33.03 (n = 166)[b]	39.12 ± 30.75 (n = 73)	34.01 ± 29.13 (n = 62)	0.011
	p value	0.806	0.140	0.848	
F/H/O CAD	YES	49.31 ± 36.98 (n = 32)[b]	42.83 ± 36.84 (n = 19)	33.02 ± 27.17 (n = 17)	0.002
	NO	38.89 ± 26.11 (n = 165)	40.95 ± 35.37 (n = 83)	36.47 ± 25.96 (n =84)	0.898
	p value	0.130	0.840	0.631	
Sedentary lifestyle	YES	54.73 ± 42.21 (n = 141)[a,b]	38.43 ± 29.00 (n = 44)	32.22 ± 27.18 (n = 37)	0.001
	NO	44.79 ± 32.33 (n = 156)	47.82 ± 44.13 (n = 58)	35.99 ± 26.53 (n = 64)	0.267
	p value	0.077	0.199	0.500	
		City areas (N = 197)	**Urban areas (N = 102)**	**Rural areas (N = 101)**	**p Value**
Serum. Cholesterol	200 mg/dL	60.58 ± 44.56 (n = 65)	55.35 ± 26.75 (n = 26)	49.52 ± 21.76 (n = 21)	0.485
	<200 mg/dL	41.23 ± 28.31 (n = 132)[b]	38.08 ± 38.34 (n = 76)	29.42 ± 26.63 (n = 80)	0.026
	p value	0.001	0.036	0.032	
Serum.LDL-C	130 mg/dL	57.82 ± 43.63 (n = 71)	48.91 ± 28.91 (n = 37)	45.14 ± 29.41 (n= 32)	0.222
	<130 mg/dL	41.87 ± 28.78 (n = 126)[b]	38.82 ± 39.80 (n = 65)[c]	28.25 ± 24.00 (n = 69)	0.013
	p value	0.002	0.180	0.003	
Serum.HDL-C	<40 mg/dL	49.79 ± 37.23 (n = 123)[b]	50.65 ± 39.10 (n = 62)[c]	36.78 ± 26.63 (n = 60)	0.043
	40 mg/dL	44.01 ± 32.61 (n = 84)[a,b]	29.83 ± 27.77 (n = 40)	28.95 ± 26.87 (n = 41)	0.011
	p value	0.271	0.004	0.152	
Serum.TGL	150 mg/dL	49.86 ± 40.34 (n = 69)	52.36 ± 45.80 (n = 35)	43.47 ± 31.20 (n = 37)	0.608
	<150 mg/dL	46.41 ± 32.86 (n = 128)[a,b]	37.32 ± 29.49 (n = 57)	27.89 ± 22.35 (n = 54)	0.001
	p value	0.517	0.047	0.004	

BMI, body mass index; DM, type 2 diabetes mellitus; HTN, systemic hypertension; F/H/O CAD, family history of coronary artery disease; LDL-C, low density lipoprotein cholesterol; HDL-C, high density lipoprotein cholesterol; TGL, triglycerides

In patients aged 40 years, the Gensini score was 41.58 ± 23.250, 42.20 ± 23.942 and 8.00 ± 10.392 in the populations from city, urban and rural areas, respectively, with no significant difference between the groups (p = 0.317). In patients aged 41–55 years, the Gensini score was 45.70 ± 41.540, 37.28 ± 33.046 and 34.00 ± 27.656 in the populations from city, urban and rural areas, respectively, with no significant difference between the groups (p = 0.283). In patients aged 56–70 years, the Gensini score was 48.94 ± 32.379, 44.05 ± 34.579 and 34.04 ± 26.990 in the populations from city, urban and rural areas, respectively, with significant difference between the groups (p = 0.004). In patients aged >70 years, the Gensini score was 50.94 ± 36.047, 53.31 ± 34.579 and 37.94 ± 25.547 in the populations from city, urban and rural areas, respectively, with no significant difference between the groups (p = 0.352). When the Gensini score was compared between different age groups within each population, there was no significant difference (city, p = 0.823; urban, p = 0.568; rural, p = 0.400).

The Gensini score among men was 48.70 ± 36.882, 41.41 ± 36.089 and 33.78 ± 27.464 in the populations from city, urban and rural areas, respectively, with significant difference between the groups (p = 0.009). The Gensini score among women was 44.60 ± 31.888, 45.78 ± 37.953 and 32.95 ± 25.256 in the populations from city, urban and rural areas, respectively, with no significant difference between the groups (p = 0.074). When the Gensini score was compared between male and female sex within each population, there was no significant difference (city, p = 0.477; urban, p = 0.605; rural, p = 0.900).

In patients with BMI 25, the Gensini score was 47.80 ± 34.572, 41.25 ± 33.676 and 29.90 ± 21.341 in the populations from city, urban and rural areas, respectively, with significant difference between the groups (p = 0.002). When the Gensini score was compared between patients with BMI 25 and those with BMI < 25 within each population, there was no significant difference (city, p = 0.949; urban, p = 0.660; rural, p = 0.057).

In patients with diabetes mellitus, the Gensini score was 49.17 ± 35.116, 45.29 ± 37.060 and 35.69 ± 23.878 in the populations from city, urban and rural areas, respectively, with no significant difference between the groups (p = 0.060). When the Gensini score was compared between patients with diabetes and those without diabetes within each population, there was no significant difference (city, p = 0.492; urban, p = 0.393; rural, p = 0.433).

In patients with hypertension, the Gensini score was 49.65 ± 34.994, 43.29 ± 39.776 and 35.63 ± 27.775 in the populations from city, urban and rural areas, respectively, with significant difference between the groups (p = 0.044). When the Gensini score was compared between patients with hypertension and those without hypertension within each population, there was no significant difference (city, p = 0.281; urban, p = 0.794; rural, p = 0.418).

In patients with a history of tobacco smoking, the Gensini score was 49.16 ± 34.273, 44.93 ± 36.348 and 31.84 ± 26.371 in the populations from city, urban and rural areas, respectively, with significant difference between the groups (p = 0.014). When the Gensini score was compared between patients with a history of tobacco smoking and those without a history of tobacco smoking within each population, there was no significant difference (city, p = 0.399; urban, p = 0.370; rural, p = 0.566).

In patients with the habit of drinking alcohol, the Gensini score was 49.06 ± 47.695, 50.95 ± 47.395 and 32.95 ± 23.193 in the populations from city, urban and rural areas, respectively, with no significant difference between the groups (p = 0.014). When the Gensini score was compared between patients with and those without the habit of drinking alcohol within each population, there was no significant difference (city, p = 0.806; urban, p = 0.140; rural, p = 0.848).

In patients with a family history of CAD, the Gensini score was 49.31 ± 36.985, 42.83 ± 36.848 and 33.02 ± 27.172 in the populations from city, urban and rural areas, respectively, with significant difference between the groups (p = 0.002). When the Gensini score was compared between patients with and those without a family history of CAD within each population, there was no significant difference (city, p = 0.130; urban, p = 0.840; rural, p = 0.631).

In patients with a sedentary lifestyle, the Gensini score was 54.73 ± 42.213, 38.43 ± 29.005 and 32.22 ± 27.183 in the populations from city, urban and rural areas, respectively, with significant difference between the groups (p = 0.001). When the Gensini score was compared between patients with and those without a sedentary lifestyle within each population, there was no significant difference (city, p = 0.077; urban, p = 0.199; rural, p = 0.500).

In patients with total serum cholesterol 200 mg/dL the Gensini score was 60.58 ± 44.562, 55.35 ± 26.755 and 49.52 ± 21.761 in the populations from city, urban and rural areas, respectively, with no significant

difference between the groups (p = 0.002). When the Gensini score was compared between patients with total serum cholesterol levels 200 mg/dL and those with total serum cholesterol levels < 200 mg/dL within each population, significant difference was found in city (p = 0.001), urban (p = 0.036) and rural (p = 0.032) populations.

In patients with LDL cholesterol 130 mg/dL, the Gensini score was 41.87 ± 28.781, 48.91 ± 28.913 and 45.14 ± 29.415 in the populations from city, urban and rural areas, respectively, with no significant difference between the groups (p = 0.222). When the Gensini score was compared between patients with LDL cholesterol levels 130 mg/dL and those with LDL cholesterol levels < 130 mg/dL within each population, significant difference was found in city and rural populations (city, p = 0.002; urban, p = 0.180; rural, p = 0.003).

In patients with HDL cholesterol levels < 40 mg/dL, the Gensini score was 49.79 ± 37.238, 50.65 ± 39.107 and 36.78 ± 26.634 in the populations from city, urban and rural areas, respectively, with significant difference between the groups (p = 0.043). When the Gensini score was compared between patients with HDL cholesterol levels < 40 mg/dL and those with HDL cholesterol levels 40 mg/dl within each population, significant difference was found in urban population (city, p = 0.271; urban, p = 0.004; rural, p = 0.152).

In patients with serum triglyceride levels 150 mg/dL, the Gensini score was 49.86 ± 40.347, 52.36 ± 45.800 and 43.47 ± 31.205 in the populations from city, urban and rural areas, respectively, with no significant difference between the groups (p = 0.608). When the Gensini score was compared between patients with serum triglyceride levels 150 mg/dL and those with serum triglyceride levels < 150 mg/dL within each population, significant difference was found in urban and rural populations (city, p = 0.517; urban, p = 0.047; rural, p = 0.004).

Discussion

Coronary angiography is useful in the diagnosis of coronary atherosclerosis in patients with ischemic heart disease. Various systems have been proposed for grading the severity of CAD. In this study, we used the number of diseased vessels and Gensini score to assess the severity of CAD because it reflects both the degree and the position of stenosis.

In our study population, the presence of right dominant system, left dominant system and co-dominant system and the mean number of diseased vessels was the same in city, urban and rural populations. The mean Gensini score was significantly higher in the city population than in the rural population. As the number of diseased vessels increased, the Gensini score increased in the city, urban and rural populations. In patients with three-vessel disease, the mean Gensini score was significantly higher in the city and urban populations than in the rural population. More patients in rural population were in the ≤ 50 Gensini-score group, whereas the 51–150 and > 150 Gensini-score groups had more of the city and urban populations. We have assessed the Gensini score with risk factors in our study population. In patients aged ≤ 40 years, 41–55 years and > 70 years, the Gensini scores were the same in city, urban and rural populations, whereas in patients aged 56–70 years, the Gensini score was higher in the city population.

The Gensini score in the city, urban and rural populations was higher among patients with total serum cholesterol levels 200 mg/dL than in those with total serum cholesterol levels < 200 mg/dL. The Gensini score was higher in city and rural populations, with no difference in urban population, among patients with LDL cholesterol levels 130 mg/dL, when compared to those with LDL cholesterol levels < 130 mg/dL. Gensini score showed negative correlation with HDL cholesterol; it was higher in urban population, with no difference in city and rural population, in patients with HDL cholesterol levels < 40 mg/dL compared to patients with HDL cholesterol 40 mg/dL. Gensini score was higher in urban and rural population, with no difference in city population, among patients with serum triglyceride levels 150 mg/dL when compared to patients with serum triglyceride levels < 150 mg/dL.

The Gensini score was higher in the city population among men; smokers and patients with hypertension, a family history of ischemic heart disease, a sedentary lifestyle, BMI 25 kg/m^2 and HDL cholesterol levels < 40 mg/dL. The Gensini score was the same in the city, urban and rural populations among women; alcoholic beverage consumers and patients with diabetes mellitus, total serum cholesterol level 200 mg/dL, LDL cholesterol levels 130 mg/dL and serum triglycerides levels 150 mg/dL.

To the best of our knowledge, there is no angiographic comparative study of CAD in the city urban and rural populations in India. Kasaoka S et al.[8] have showed that the Gensini score is significantly higher in the hypercholesterolemia group than in groups with normal cholesterol levels, diabetes mellitus and hypertension. These results suggest that hypercholesterolemia has a greater influence on the severity of coronary artery lesions than does hypertension or diabetes mellitus and that the progression of coronary atherosclerosis may differ among patients with these risk factors.

Yavuz B et al.[9] have showed that within the lipid parameters affecting the Gensini score, HDL-C was the most effective one. Other parameters had weak (triglyceride, LDL-C) or no (total cholesterol) effect. Our study also had similar findings. Horimoto et al.[10] stated that the independent predictors of the severity of CAD were age, diabetes mellitus, hypertension, smoking and male sex.

The present study showed that Gensini score is significantly higher in the city population than in the urban and rural populations. These variations may be explained partly by differences in lifestyle. Men and women in rural areas work in agriculture, which involves heavy physical activity, whereas men and women residing in urban areas have sedentary habits.

Clinical implications

Gensini score, which reflects both the degree and the position of stenosis, is a good tool to assess coronary artery lesions. Gensini score is higher in city population than in rural population, indicating increased burden of coronary lesions in city population, which can be reduced with lifestyle modification.

Conclusion

Gensini score is a good tool to assess coronary artery lesion severity. Gensini score is higher in city population than in rural population, indicating increased burden of coronary lesions in city population. Gensini score is higher in the city population among men; smokers and patients with hypertension, a family history of CAD, a sedentary lifestyle, BMI ≥ 25 kg/m^2 and HDL cholesterol levels < 40 mg/dL.

References

1. WHO. Global health estimates 2015: deaths by cause, age, sex, by country and by region, 2000–2015. Geneva: World Health Organization, 2016.

2. Prabhakaran D, Jeemon P, Roy A. Cardiovascular diseases in India. Circulation. 2016;133:1605–20.

3. 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 :807–10.

4. Gensini GG. A more meaningful scoring system for determining the severity of coronary heart disease. Am J Cardiol. 1983;51(3):606.

5. Census of India. Census Data Summary, Metadata. [Internet] Available from: www.censusindia.gov.in

6. Ringqvist I, Fisher LD, Mock M, Davis KB, Wedel HA, Chaitman BR, et al. Prognostic value of angiographic indices of CAD from the coronary artery surgery study (CASS). J Clin Invest. 1983;71:1854–66.

7. Sullivan RD, Marwick TH, Freedman BS. A new method of scoring coronary angiograms to reflect extent of coronary atherosclerosis and improve correlation with major risk factors. Am Heart J. 1990;119:1262–7.

8. Kasaoka S, Okuda F, Satho A, Miura T, Kohno M, Fujii T, et al. Effect of coronary risk factors on coronary angiographic morphology in patients with ischemic heart disease. Japanese Circulation Journal.1997;61;390–5.

9. Yavuz B, Kabakci G, Aksoy H, Tulumen E, Deveci OS, Aytemir K, et al. Determining the relationship between metabolic syndrome score and angiographic severity of CAD. Int J Clin Pract. 2008;62(5):717–22.

10. Horimoto M, Hasegawa A, Ozaki T, Takenaka T, Igarashi K, Inoue H. Independent predictors of the severity of angiographic coronary atherosclerosis: the lack of association between impaired glucose tolerance and stenosis severity. Atherosclerosis. 2005;182:113–9.

Address for correspondence:
Rajith K. S.
Email ID: drrajithks25@gmail.com