

## Original Research Article

# A study of risk factors for ischemic heart disease in a village of Davanagere district: a case control study

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## ABSTRACT

**Background:** Ischemic heart disease is a multifactorial disease. Various behavioural risk factors like smoking, physical inactivity, unhealthy diet and alcohol are known to be important risk factors for IHD.

**Methods:** A case control study was conducted at Kerebilachi village, Davanagere. 40 known cases of Ischemic heart diseases and 80 controls were studied. The association of various risk factors with IHD was assessed. Data was entered in the Microsoft excel and analysed using SPSS v20.

**Results:** Smoking, diabetes, hypertension, physical inactivity and obesity were important risk factors considered in this study. Significant association was observed with smoking (OR 6.15, CI: 2.646 -14.289.), diabetes (OR 5.28, CI: 1.80-18.54), hypertension (OR.35, CI: 0.12-1.01) and obesity (OR 0.74, CI: 1.06—8.23).

**Conclusions:** This study reinforces the importance of risk factors which are modifiable and preventable.

**Keywords:** Risk factors, IHD, Case-control study

## INTRODUCTION

Ischemic heart disease (IHD) has been defined as “impairment of heart function due to inadequate blood flow to the heart compared to its needs which is caused by obstructive changes in the coronary circulation to the heart.<sup>1</sup> Cardiovascular diseases (CVD) comprising coronary heart and cerebrovascular diseases are currently the leading cause of death globally, accounting for 21.9% of total deaths and are projected to increase to 26.3% by 2030.<sup>2</sup>

Ischemic heart disease is a multifactorial disease. Various behavioral risk factors like smoking, smokeless tobacco consumption, physical inactivity, unhealthy diet and alcohol consumption are known to be the important risk factors for IHD. Most of the behavioral risk factors are potentially modifiable one.<sup>3</sup> This is due to rapid epidemiological transition, increased life expectancy,

lifestyle changes and genetic predisposition of Indians to atherosclerotic Ischemic heart disease (IHD).<sup>4</sup> Seventy percent of the Indian population lives in rural areas<sup>5</sup>. The rural population of Karnataka is 61.32%.<sup>6</sup> Most of the studies conducted on IHD in India are in urban population. Few studies were conducted in rural areas suggested that IHD was not a major problem in rural communities.<sup>7</sup> This study was conducted to assess the risk factors associated with Ischemic Heart Disease and to determine the strength of association between the risk factor and Ischemic Heart Disease among people with IHD in Kerebilachi village of Davanagere district.

## METHODS

**Study design:** Case control study.

**Study population:** People who are the residents of Kerebilachi village.

### **Inclusion criteria**

Inclusion criteria were individuals whose age >18 years; people who are resident for more than 6 months in that village; Cases: Already diagnosed cases of IHD. Diseases which comes under IHD are angina pectoris, myocardial infarction, cerebrovascular disease (stroke), and congestive heart failure. Patients with known CAD included those who had documented evidence of acute coronary syndrome, treatment for CAD including history of angioplasty/Coronary Artery Bypass Graft Surgery (CABG) or documentation of CAD by coronary angiography; Controls: person not a known case of Ischemic heart disease in Kerebilachi village.

### **Exclusion criteria**

Exclusion criteria were people with the organic and congenital heart disease.

**Study period:** 6 months (1<sup>st</sup> March to 31<sup>st</sup> August 2018).

**Sampling technique:** Convenient.

### **Sample size**

Sample size was 40 cases, 80 controls.

List of patients with IHD was obtained from NCD register maintained at Community Health Centre, Kerebilachi. House to house visit was done with the help of health care workers.

For each case, 2 age- and sex-matched controls were selected and the neighbour was the source of control.

Informed consent was obtained from each respondent prior to the interview and physical Examinations. The questionnaire containing demographic characteristics such as age, sex, religion, education, history of alcohol consumption, cigarette smoking, hypertension, type 2 diabetes mellitus, sedentary lifestyle, dietary pattern and family history of IHD will be administered by interview technique. Time spend for moderate physical activity like brisk walking, cycling was calculated for each subject and they were classified as physically inactive if physical activity was <30 minutes/day.<sup>9</sup> Body mass index (BMI) was used to classify the weight status of subjects. Classification of overweight and obesity was done according to Asian classification.<sup>10</sup>

### **Analysis**

Data was entered in the Microsoft excel and analysed using SPSS v20, presented in the form of frequencies, Chi square test was applied. Strength of association was used by odds ratio.

## **RESULTS**

In this study 40 cases and 80 controls were included. Majority of the cases and controls were >60 years of age groups, 90% of the participants were males and predominant religion was Islam (96%). Majority of cases (27.5%) and controls (37.5%) studied only up to high school and belonged to class 2 socioeconomic status. Most of the cases (52.5%) were residing in joint families and controls (55%) in nuclear families. The association of Ischemic heart disease with socio-demographic factors are explained in the Table 1.

In this study 43.7% were smokers. It was also found that (72.5%) of the cases and (30%) of controls had history of smoking. Diabetes was found to be present in (30%) of the cases and (7.5%) in controls. Hypertension was found to be present in (12.6%) of cases and (28.7%) in controls. It was observed that (62.5%) of cases and (55%) of controls had sedentary lifestyle. Majority of the cases as well as controls had normal body mass index. Association of Ischemic heart disease with these risk factors is explained in Table 2.

In this study significant association was found between smoking, diabetes, hypertension and body mass index with Ischemic Heart Disease but no significant association was found between exercise with Ischemic Heart Disease.

In this study risk of IHD was 1.9 times more among 51-60 age group compare to > 60 years

(OR: 1.9, CI: 0.38-8.432). The risk of IHD was 8.4 times among Muslims compared to Hindus( OR:8.4,CI: 0.827-8.56).The risk of IHD was 1.1 times more among illiterates compared to graduates(OR:1.1, CI:0.36-7.14) and 1.5 times more among class 1 socioeconomic group compared to class V( OR: 1.5, CI: 0.59-5.95) and risk of IHD was 2.9 times more among people residing in joint family compared to nuclear family(OR: 2.9, CI:0.458-18.37).

In this study the risk of Ischemic Heart Diseases was 6.15 times more among smokers compared to non- smokers and association was statistically significant with (OR: 6.15, CI: 2.648-14.298 and p<0.001). The risk of Ischemic Heart Disease was 5 times more among those with diabetes compare to non-diabetics (OR:5.28, CI:1.80-15.4 and p<0.001). The risk of Ischemic Heart Disease was 2.8 times was more among hypertensives compare to

Normotensives with (OR: 2.81, CI 0.98-8.11 and p<0.02). The risk of Ischemic heart disease was more among type II compare to obese but no statistically significant association was found (OR :0.74, CI 0.067-8.237, p<0.809) which is explained below the Table 3.

**Table 1: Sociodemographic features of study participants.**

Variables		Ischemic Heart disease		Total
		Cases	Controls	
		N (%)	N (%)	N (%)
Age wise distribution (in years)	≤40	4 (10)	8 (10)	12 (10.0)
	41-50	5 (12.5)	10 (12.5)	15 (12.5)
	51-60	8 (20.0)	16 (20.0)	24 (20.0)
	>60	23 (57.5)	46 (57.5)	69 (57.5)
Sex wise distribution	Female	4 (10)	8 (10)	12 (10.0)
	Male	36 (90)	72 (90)	108 (90.0)
Religion	Hindu	3 (7.5)	2 (2.5)	5 (4.0)
	Islam	37 (92.5)	78 (80)	115 (96.0)
Education	Illiterate	7 (17.5)	9 (11.2)	16 (13.3)
	Primary	9 (22.5)	10 (12.5)	19 (15.8)
	Middle	4 (10.0)	11 (13.8)	15 (12.5)
	High school	11 (27.5)	30 (37.5)	41 (34.1)
	PUC/Diploma	1 (2.5)	6 (7.5)	7 (5.8)
	Undergraduate/ Postgraduate	8 (20.0)	14 (17.5)	22 (18.3)
Socioeconomic status	Class 1	10 (25.0)	17 (21.2)	27 (22.5)
	Class 2	11 (27.5)	30 (37.5)	41 (34.1)
	Class 3	9 (22.5)	19 (23.8)	28 (23.3)
	Class 4	7 (17.5)	12 (15.0)	19 (15.8)
	Class 5	3 (7.5)	2 (2.5)	5 (4.1)
Type of family	Joint	21 (52.5)	31 (38.7)	52 (43.4)
	Nuclear	17 (42.5)	44 (55.0)	61 (50.8)
	Three generation	2 (5.0)	5 (2.5)	7 (5.8)
Total		40 (100)	80 (100)	120 (100)

**Table 2: Association of Ischemic heart diseases with risk factors.**

Variable		Ischemic heart disease		Total	χ2 value	P value
		Cases	Controls			
		N (%)	N (%)	N (%)		
Smoking history	Smokers	29 (72.5)	24 (30)	53 (43.7)	19.5	0.000
	Non smokers	11 (27.5)	56 (70)	76 (63.3)		
Diabetes	Present	12 (30.0)	6 (7.5)	18 (15.0)	14.516	0.002
	Absent	28 (70.0)	74 (92.5)	102 (85.0)		
Hypertension	Present	5 (12.6)	23 (28.7)	28 (23.3)	3.96	0.04
	Absent	35 (87.5)	57 (71.2)	92 (76.7)		
Both diabetes and hypertension	Present	5 (12.6)	23 (28.75)	28 (15.0)	1.46	0.364
	Absent	35 (87.5)	57 (71.25)	92 (76.7)		
Exercise	Practiced	15 (37.5)	39 (45.5)	54 (45.0)	1.364	0.24
	Not practiced	25 (62.5)	41 (51.2)	66 (55.0)		
BMI	<18.50 (underweight)	4 (10)	2 (2.5)	6 (5.0)	13.43	0.009
	18.5-22.9 (normal)	12 (35.0)	32 (36.2)	44 (36.7)		
	23.0-24.9(At risk)	5 (12.5)	17 (21.2)	22 (18.3)		
	25-29.99 (obese I)	13 (32.5)	27 (33.5)	40 (33.3)		
	>30 (obese II)	6 (15.0)	2 (2.5)	8 (6.7)		
	Total	40 (100.0)	80 (100.0)	120 (100.0)		

**Table 3: Strength of association of Ischemic heart disease with risk factors.**

Risk factors		OR	95% CI	P value
Age (in years)	≤ 40	1.17	0.393-3.943	0.880
	41-50	1.245	0.238-5.238	0.456
	51-60	1.803	0.38-8.432	0.506
	>60	1		
Sex	Female	1.958	0.462-9.29	0.362
	Male	1		
Religion	Islam	8.415	0.827-8.56	0.072
	Hindu	1		
Education	Illiterate	1.16	0.36-7.14	0.881
	Primary	1.12	0.85-4.10	0.908
	Middle	0.47	0.25-2.94	0.387
	High school	0.49	0.14-2.60	0.277
	PUC/Diploma	0.25	0.02-1.75	0.274
	Undergraduate/Postgraduate	1		
Socioeconomic classification	Class 1	1.594	0.59-5.95	0.658
	Class 2	0.514	0.49-5.39	0.347
	Class 3	0.355	0.34-3.5	0.368
	Class 4	0.344	0.40-3.1	0.579
	Class 5	1		
Type of family	Joint	2.901	0.458-18.37	0.258
	Three generation	1.479	0.231-9.45	0.679
	Nuclear	1		
Smoking	Smokers	6.15	2.64- 14.28	0.000
	Non smokers	1		
Diabetes	Diabetes	5.28	1.80-15.4	0.000
	Non diabetics	1		
Hypertension	Hypertensives	2.82	0.98- 8.11	0.02
	Normotensives	1		
Body mass index (Kg/mt <sup>2</sup> )	<18.50(Underweight)	0.081	0.01-0.53	0.09
	18.5-23(Normal)	0.064	0.00-0.50	0.07
	23.0-24.9(At risk)	0.10	0.01-0.62	0.014
	25-29.99(Obese I)	0.74	0.06-8.237	0.809
	>30(Obese II)	1		

## DISCUSSION

The present study was designed as case-control study to assess risk factors among IHD patients in rural area of Davanagere district. It was found that smoking, type 2 diabetes, hypertension, sedentary life style, obesity were the important risk factors which were associated with IHD.

A total of 120 subjects (40 cases and 80 controls) were studied, 90% were males and 10% were females. Majority of the cases and controls belongs to age group >60 years. This is similar to other studies. In this study majority were belongs to Islam religion. Majority of the cases 11 (27.50%) and controls 30 (37.50%) studied up to high school and similar difference was also observed by Singh et al.<sup>17</sup> In this study majority of the cases (27.5%) and controls (37.5%) belongs to class 2 socio economic state which is similar with the findings of Singh et al.<sup>17</sup>

Majority of cases residing at joint families 21 (52.50%) and controls 44 (55.0%) residing at nuclear families.

In this study majority of the cases were smokers and controls were non-smokers. Significant association was found between smoking and IHD ( $p=0.000$ ) and similar results were found by the other studies<sup>4,7</sup> but in contrast, a study done By Hussain M et al<sup>14</sup> showed that majority of the study participants were non - smokers. In our study smokers were 6.15 times increased the risk of developing IHD compared to non-smokers with (OR: 6.15, CI: 2.64-14.289,  $p<0.000$ ).

In present study significant association was found between diabetes and hypertension with Ischemic heart disease ( $p=0.002$ ) which is similar to study done by others.<sup>11,15</sup> In this study risk of IHD was 5 times more among Diabetics compare to those with non diabetics. In contrast, other studies showed that majority of the study participants were hypertensives.<sup>4,7,15,18</sup>

In this study, majority of the cases and controls do not practice exercise regularly but no significant association was found with development of IHD. This is similar to study conducted by Mendagudali et al, Oommen et al at rural block of Vellore, Krishnan et al at rural block of Kerala and Dhungana et al at Sitapaila Village in Nepal.<sup>7,11,13,18</sup> In contrast, study done by Hussain et al and Sinha et al showed that majority of workers practiced exercise regularly and significant association was found between physical activity and IHD.<sup>14,16</sup>

In this study majority of the cases and controls had normal body mass index. Significant association was found between Obesity and IHD (chi square p value 0.009), similar to the previous literature.<sup>7,11</sup> In contrast, studies done by others showed that majority of study participants had BMI >25 Kg/m<sup>2</sup> and study done by Dhungana et al showed that majority of the study participants had BMI in the range of 25-30.<sup>4,14,18</sup>

The limitations of the present study were the sample size was small. Cases who have died are generally not taken and these may be systematically very different from living case as regards the exposure status and leads to survivorship bias.

Chance of social desirability bias because many participants may under report the answers. Salt intake and oil intake was not assessed because of chance of recall bias.

## CONCLUSION

Present study was a case-control study conducted in rural area of Davanagere district. Study showed that smoking, diabetes, hypertension, sedentary life style and obesity were the important risk factors of Ischemic heart disease. The risk factors are modifiable and preventable. Creating awareness about the non-communicable diseases among villagers, early diagnosis, treatment and proper glycemic control along with reduction of blood pressure, central obesity, regular physical exercise, reduction of excess salt, oil and fat consumption and cessation of smoking may be important in controlling coronary artery disease in the rural population. Life style interventions along with adherence to medicine for other co-morbidities will reduce the risk of Ischemic heart disease.

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