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A Case Control Study On The Risk Factors Of Coronary Artery Disease Among Patients Attending Tertiary Care Hospital

Dr Raja Bhattacharya,
Associate Professor,Medical College,Kolkata
Dr. Angshuman Roy,
Senior Resident,Medical College,Kolkata
DrBodhibrata Banerjee,
Senior Resident,General Medicine,Medical College,Kolkata
DrBhuranjanaBaghel,
Senior Resident,General Medicine,Medical College,Kolkata
DrKajal Kora
MD, General Medicine, Medical College, Kolkata

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I.Introduction:

Coronary artery disease(CAD) occurs due to an impairment in cardiac function because of inadequate blood flow to the heart compared to its needs.It is caused by obstructive changes in the coronary circulation.It presents with angina pectoris,myocardialinfarction,arrthythmias,heart failure and sudden death**[1,12].**

CAD should be considered an important public health problem due to changing lifestyles and an interplay of factors with regards to their existence,casualty and attributes[2,8,10].It is a leading cause of death in India.The number of deaths due to CAD in 1985 was expected to have doubled by 2015[3,9].As per reports of National Commission on Macroeconomics and Health,around 62 million people in India would have CAD by 2015 and around 23 million of them were below 40 years of age[4,11,13].The conventional risk factors for CAD includes modifiable and nonmodifiable risk factors.The former includes diabetes mellitus,smoking,dyslipidemia,hypertension and obesity.The latter includes age,sex and family history.Recently a number of newer risk factors have been identified.Comparative studies on these newer risk factors show that Indiand have higher C-reactive proteins,plasminogen activator inhibitors and serum homocysteine levels[5].Rapid urbanization and its accompanying lifestyle changes inckuding dietary habits,physicalinactivity,drugs and alcohol intake as well as increased prevalence of DM all contribute to increased incidence of CAD[6,7,14].

Controlling the modifiable risk factors can significantly decrease premature morbidity and mortality due to CAD.

II.Materials and Methods:

Study area: General Medicine ward and Cardiology ward of Medical College,Kolkata
Study period: April 2018 – July 2019
Study Population: Case and control subjects as per inclusion and exclusion criteria
Definition of the case:
Definite CAD is based on any of the following:

1) Documented evidence of prior Acute Coronary Syndrome(ACS) or treatment for CAD
2) Documented history of undergoing coronary angioplasty or CABG
3) More than 50% of epicardial coronary stenosis by coronary angiography
4) ECG showing pathological Q wave
5) Imaging evidence of a loss of viable myocardium that is thinned and has a motion abnormality in absence of a non-ischemic cause
6) Angina plus ECG changes

7) Angina plus positive treadmill ECG Probable CAD is based on any of the following:
1) Angina without significant ECG changes
2) ECG changes without angina
3) Positive treadmeal ECG without angina
4) Absence of any of the other definite criteria

Definition of control:
A control is an individual who is admitted in the hospital or attends OPD for minor illness and not having any history of angina pectoris and myocardial infarction The total sample size of the study was 270(135 cases and 135 controls).

Inclusion criteria:
1) All newly diagnosed CAD patients irrespective of co-morbidities
2) Previously diagnosed CAD patients who are on follow up treatment
3) Patients who had prior PTCA or CABG will also be included in the study
4) Patients must be fully alert, conscious, oriented regarding time, place and person

Exclusion criteria:
1) Patients who donot give consent for the study
2) Patients who are unconscious, disoriented or unable to give proper history

Study design:
It is a paired matched case-control study in which patients were selected according to inclusion and exclusion criteria and grouped into cases and controls. Then they were assessed regarding the presence or absence of various risk factors of CAD.

Study variables:
These include different risk factors of CAD like:
- Demographic-

Age, sex, religion, residence, education, occupation, socioeconomic status, marital status
- Addiction history- Smoking, alcohol
- Dietary habits-

Vegetarian, non-vegetarian, mixed diet
- History of added salt intake-

Less than OR more than/equal to 5 g/day
- History of intake of oil/ghee
- Family history of CAD
- Physical inactivity
- Clinical parameters-

Height, weight, BMI, BP, Pulse
- Laboratory parameters-

CBC, FBS, PPBS, Urea, creatinine, LFT, Lipid profile,ECG-12 leads, Echocardiography

Study tool:
1. History taking and clinical examination
2. Assessment of subjects regarding associated risk factors as stated above
3. ECG-12 leads with long lead II
4. 2D Echocardiography
5. Estimation of CBC, FBS, PPBS, Urea, creatinine, LFT, Lipid profile

III.Result & Analysis :

A total of 135 cases & 135 controls were analyzed, mean age of cases & controls were 58.57 & 53.8 respectively.

AGE

Table 1: Age-wise distribution of cases and controls

	CASE	CONTROL	P-

AGE	FREQUENCY	PERCENT	FREQUENCY	PERCENT	VALUE
31-40	5	3.7%	28	20.7	0.00046
41-50	33	24.4%	35	25.9	
51-60	45	33.3%	32	23.7	
61-70	33	24.4%	23	17.0	
>70	19	14.1%	17	12.6	

Chi-Square =20.1808

28 patients out of 135patients in control group and 5 patients in the case group were in the age group of 31-40 years comprising 20.7% & 3.7 % of total controls and cases respectively.

SEX

Table 2: Sex wise distribution of cases and controls

	CASE		CONTROL		P-VALUE	
SEX	FREQUENCY	PERCENT	FREQUENCY	PERCENT		
F	42	31.1	67	49.6	0.001929	
M	93	68.9	68	50.3		

Chi-Square=9.6159

67 patients out of 135patients in control group and 42 patients in the case group were female, comprising 49.6% & 31.1 % of total controls and cases respectively.

RELIGION

Table 3: Religion wise distribution of cases and controls

RELIGION	CASE		CONTROL		P-VALUE
	FREQUENCY	PERCENT		PERCENT	
HINDU	101	74.8	100	74.1	0.889033
MUSLIM	34	25.2	35	25.9	

Chi-Square =0.0195

100 patients out of 135patients in control group and 101 patients in the case group were Hindu, comprising 74.1% & 74.8 % of total controls and cases respectively.

MARITAL STATUS

Table 4: Marital status wise distribution of cases and controls

MARITAL STATUS	CASE		CONTROL		P-VALUE
	FREQUENCY	PERCENT	FREQUENCY	PERCENT	
MARRIED	127	94.1	131	97.0	0.237504
UNMARRIED	8	5.9	4	3.0	

Chi-Square=1.3953

131 patients out of 135patients in control group and 127 patients in the case group were married, comprising 97% & 94.1 % of total controls and cases respectively.

RESIDENCE

Table 5: Residence wise distribution of cases and controls

	CASE		CONTROL		P-VALUE	ODDS RATIO
RESIDENCE	FREQUENCY	PERCENT	FREQUENCY	PERCENT		
RURAL	50	37.04	41	30.37	0.246572	1.22
URBAN	85	62.96	94	69.63		

Chi-Square =1.3426

41 patients out of 135patients in control group and 50 patients in the case group were rural residents, comprising

30.37% & 37.04 % of total controls and cases respectively .

EDUCATION LEVEL

Table 6: Education Level wise distribution of cases and controls

	CASE		CONTROL		P-VALUE
EDUCATION LEVEL	FREQUENCY	PERCENT	FREQUENCY	PERCENT	
ILLITERATE	24	17.78	21	15.56	0.95696
PRIMARY (UPTO TO 5^{TH} STD)	33	24.44	35	25.93	
SECONDARY (6^{TH} TO 10^{TH})	52	38.51	54	37.78	
HS AND ONWARDS	26	19.26	25	18.52	

Chi-Square = 0.3162

Majority of the patients from case gr(52,38.51%) & control gr(54,37.78%) were educated upto secondary level($6^{th}10^{th}$standard).

EMPLOYMENT STATUS

Table 7 : Employment status wise distribution of cases and controls

	CASE		CONTROL		P-VALUE	Odds Ratio
OCCUPATION	FREQUENCY	PERCENT	FREQUENCY	PERCENT		
EMPLOYED	78	57.8 %	56	41.5 %	0.00741	1.83
UNEMPLOYED	57	42.2%	79	58.5 %		

Chi-Square =7.1708

57.8% of the patients from case gr.& 41.5% of patients from control groups were employed.

OCCUPATION

Table 8: Occupation wise distribution of cases and controls

OCCUPATION	CASE		CONTROL	
	FREQUENCY	PERCENT	FREQUENCY	PERCENT
BUSINESSMAN	24	17.78	23	17.03
LABOUR	10	7.41	8	5.92
OTHERS(housewives, retired,nil etc.)	98	72.59	97	71.85
SERVICE	3	2.22	7	5.18

Chi-Square =1.8486

8 patients out of 135patients in control group and 10 patients in the case group were labours, comprising 5.92% & 7.41 % of total controls and cases respectively.

H/O SMOKING

Table 9: H/O Smoking wise distribution of cases and controls

	CASE		CONTROL		P-VALUE	ODDS RATIO
H/O SMOKING	FREQUENCY	PERCENT	FREQUENCY	PERCENT		
YES	85	62.96	61	45.18		2.06

NO	50	37.04	74	54.81	0.004	

Chi-Square =8.5904

61 patients out of 135patients in control group and 85 patients in the case group were smokers, comprising 45.18%
& 62.96% of total controls and cases respectively.

FREQUENCY OF SMOKING

Table 10: Frequency of smoking wise distribution of cases and controls

FREQUENCY OF SMOKING	CASE		CONTROL		P-VALUE	ODDS RATIO
	FREQUENCY	PERCENT	FREQUENCY	PERCENT		
≥ 10/day	55	64.70	19	31.14	0.000063	4.05
<10/day	30	35.29	42	68.85		

Chi-Square=16.0007

64.70% of total smokers in case gr & 31.14% of total smokers in control gr. smoked >10/day.

F/H CHD

Table 11: F/H CHD wise distribution of cases and controls

F/H CHD	CASE		CONTROL		P-VALUE	ODDS RATIO
	FREQUENCY	PERCENT	FREQUENCY	PERCENT		
YES	43	31.85	3	2.22	0.00001	20.56
NO	92	68.15	132	97.78		

Chi-Square=41.9255

31.85% of total cases & 2.22% of total control gr patients had a positive family history of CHD.

ALCOHOL INTAKE

Table 12:H/O alcohol intake wise distribution of cases and controls

H/O ALCOHOL INTAKE	CASE		CONTROL		P-VALUE	ODDS RATIO
	FREQUENCY	PERCENT	FREQUENCY	PERCENT		
YES	26	19.26	9	6.67	0.002069	3.34
NO	109	80.74	126	93.33		

Chi-Square =9.4869

9 patients out of 135 in the control group and 26patients in the case group had history of alcohol intake, comprising
6.67% & 19.26% of total controls and cases respectively.

H/O HTN

Table 13: H/O HTN wise distribution of cases and controls

H/O HTN	CASE		CONTROL		P-VALUE	ODDS RATIO
	FREQUENCY	PERCENT	FREQUENCY	PERCENT	0.00001	3.43
YES	71	52.59	34	25.18		
NO	64	47.40	101	74.81		

Chi-Square =41.9255

34 patients out of 135patients in control group and 71patients in the case group had history of hypertension, comprising 25.18% & 52.59 % of total controls and cases respectively.

H/O DM

Table 14: H/O DM wise distribution of cases and controls

	CASE		CONTROL		P-VALUE	ODDS RATIO
H/O DM	FREQUENCY	PERCENT	FREQUENCY	PERCENT		
YES	45	33.33	13	9.63	0.00001	4.69
NO	90	66.67	122	90.37		

Chi-Square =22.4854

13 patients out of 135 in control group and 45 patients in the case group had history of DM, comprising 9.63% &
33.33 % of total controls and cases respectively.

PHY. ACT.

Table 15: Physical activity wise distribution of cases and controls

	CASE		CONTROL		P-VALUE
PHY. ACT.	FREQUENCY	PERCENT	FREQUENCY	PERCENT	
SEDENTARY	80	59.26	56	41.48	0.003486
NON SEDENTARY	55	40.74	79	58.52	
TOTAL	135	100	135	100	

Chi-Square =8.5338

80 patients out of 135patients in case group and 56 patients in the control group performed sedentary activity, comprising 59.26% & 41.48% of total cases and controls respectively .

DIETARY HABITS

Table 16: Dietary habits wise distribution of cases and controls

	CASE		CONTROL		P-VALUE	ODDS RATIO
DIETARY HABITS	FREQUENCY	PERCENT	FREQUENCY	PERCENT		
MIX	123	91.11	120	88.89	0.542802	1.28
VEG	12	8.89	15	11.11		

Chi-Square =0.3704

120 patients out of 135 in control group and 123 patients in the case group had h/o intake of mix diets, comprising 88.89% & 91.11% of total controls and cases respectively .

ADDED SALT

Table 17: Added salt wise distribution of cases and controls

	CASE		CONTROL		P-	ODDS
ADDED						

SALT	FREQUENCY	PERCENT	FREQUENCY	PERCENT	VALUE	RATIO
YES	90	66.67	91	67.41	0.896991	0.97
NO	45	33.33	44	32.59		

CHI-SQUARE=0.0168

90 patients out of 135 in the case gr & 91 patients in control group had h/o added salt intake ,comprising 66.67% & 67.41% respectively.

AMOUNT OF ADDED SALT

Table 18:Amount of added salt wise distribution of cases and controls

	CASE		CONTROL		
ADDED SALT	FREQUENCY	PERCENT	FREQUENCY	PERCENT	P-VALUE
>= 5 gm/day	46	34.07	27	20	0.003282
< 5 gm/day	44	32.59	64	47.41	
NO	45	33.33	44	32.59	

Chi-Square =8.6436.

27 patients out of 135patients in control group and 46 patients in the case group took added salt greater than or equal to 5gm/day, comprising 20% & 34.07 % of total controls and cases respectively.

EXCESS SATURATED FAT / OIL INTAKE

Table 19:H/O excess saturated fat/oil intake wise distribution of cases and controls

	CASE		CONTROL			
H/O EXCESS SATURATED FAT / OIL INTAKE	FREQUENCY	PERCENT	FREQUENCY	PERCENT	P-VALUE	ODDS RATIO
YES	39	28.89	4	2.96	0.00001	13.30
NO	96	71.11	131	97.04		

Chi-Square =33.8848

4 patients out of 135patients in control group and 39 patients in the case group had h/o excess saturated fat/oil intake in their diets, comprising 2.96% & 28.89 % of total controls and cases respectively.

SOCIO ECONOMIC CLASS

Table 20: Socio economic class wise distribution of cases and controls

SOCIO-ECONOMIC CLASS	CASE		CONTROL		P-VALUE
	FREQUENCY	PERCENT	FREQUENCY	PERCENT	
Class I	11	8.15	16	11.85	0.43313
Class II	46	34.07	47	34.81	
Class III	31	22.96	38	28.15	
Class IV	42	31.11	31	22.96	
Class V	5	3.70	3	2.22	

Chi-Square=3.8044

Majority of patients in the case gr(46,34.07%) & control gr(47,34.81%) belonged to socio-economic class –II.

DYSLIPIDEMIA

Table 21: Dyslipidemia wise distribution of cases and controls

DYSLIPIDEMIA	CASE		CONTROL		P-VALUE	ODDS RATIO
	FREQUENCY	PERCENT	FREQUENCY	PERCENT		
PRESENT	93	68.89 %	57	42.22 %	0.00001	3.03
ABSENT	42	31.11 %	78	57.78 %		

Chi-Square=19.44

93 patients out of 135 in the case gr.& 57 patients in the control gr had h/o dyslipidemia comprising 68.89% of total cases & 42.22% of total controls respectively.

OBESITY

Table 22: Obesity wise distribution of cases and controls

OBESITY (BMI>25kg/ m^2)	CASE		CONTROL		P-VALUE	ODDS RATIO
	FREQUENCY	PERCENT	FREQUENCY	PERCENT		
YES(>25)	28	20.74	12	8.89	0.006125	2.68
NO(<25)	107	79.26	123	91.11		

Chi-square=7.513

28 patients out of 135 in case gr. & 12 patients in control gr. were obese,comprising 20.74% & 8.89% of toal cases & controls respectively.

Table 23: Age and sex-wise distribution of cases and controls

Age group (in years)	CASE			CONTROL		
	Male No. (%)	Female No. (%)	TOTAL No. (%)	Male No. (%)	Female No. (%)	TOTAL No. (%)
≤40	3 (2.2%)	2 (1.5%)	5 (0.0%)	13 (9.6%)	15 (11.1%)	28 (20.7%)
41-50	26 (19.3 %)	7 (5.2 %)	33 (3.7%)	22 (16.3%)	13 (9.6%)	35 (25.9%)
51-60	28 (20.7 %)	17 (12.6 %)	45 (24.4%)	14 (10.4%)	18 (13.3%)	32 (23.7%)
61-70	26 (19.3 %)	7 (5.2 %)	33 33.3%)	7 (5.2%)	16 (11.6%)	23 (16.8%)
>70	9 (7.4 %)	10 (6.7 %)	19 (38.5%)	12 (8.8%)	5 (3.6%)	17 (12.45)
TOTAL	92 (68.1 %)	43 (31.9 %)	135 (100%)	68 (50.3%)	67 (49.7%)	135 (100 %)

Table 24: Comparison of various risk factors among cases & controls

RISK FACTORS	CASE		CONTROL	
SMOKING	85	62.96	61	45.18
ALOCHOL	26	19.26	9	6.67
H/O HTN	71	52.59	34	25.18
H/O DM	45	33.33	13	9.63
SENDENTARY ACTIVITY(LIGHT)	80	59.26	56	44.48
ADDED SALT	90	66.66	91	67.4
DYSLIPIDEMIA	93	68.84	57	42.22
F/ H CHD	43	31.85	3	2.22

Table 25:

RISK FACTORS	CASE				CONTROL			
	MALE		FEMALE		MALE		FEMALE	
	FREQUENCY	PERCENT	FREQUENCY	PERCENT	FREQUENCY	PERCENT	FREQUENCY	PERCENT
SMOKING	85	62.96	0	0	61	45.18	0	0
ALCOHOL	26	19.26	0	0	9	6.67	0	0
H/O HTN	47	34.81	23	17.04	14	10.37	20	14.81
H/O DM	30	22.22	15	11.11	5	3.70	8	5.92
ADDED SALT INTAKE	57	42.22	33	24.44	46	34.07	45	33.33
DYSLIPIDEMIA	64	47.40	29	21.48	29	21.48	28	20.74
F/H OF CHD	28	20.74	15	11.11	1	0.74	2	1.48

Different risk factors & their frequency in male & female subjects between case & control groups

Table 26: Distribution of various risk factors & their statistical significance in case & control subjects

RISK FACTORS	CASE				CONTROL				ODD'S RATIO	P-VALUE
	YES		NO		YES		NO			
	FREQUENCY	PERCENT	FREQUENCY	PERCENT	FREQUENCY	PERCENT	FREQUENCY	PERCENT (%)		

SMOKING	85	62.96	50	37.04	61	45.18	74	54.84	2.06	0.004
ALCOHOL	26	19.26	109	80.74	9	6.67	126	93.33	3.34	0.002069
H/O HTN	71	52.59	64	47.40	34	25.18	101	74.81	3.43	0.00001
H/O DM	45	33.33	90	66.67	13	9.63	122	90.37	4.69	0.00001
F/H OF CHD	43	31.85	92	68.15	3	2.22	132	97.78	20.56	0.00001
DYSLIPIDEMIA	93	68.89	42	31.11	57	42.22	78	57.78	3.03	0.00001
ADDED SALT	90	66.67	45	33.33	91	67.41	44	32.59	0.97	0.896991
SENDENTARY ACTVITY (LIGHT)	80	59.26	55	40.74	56	41.48	79	58.52	2.05	0.0035

IV. Discussion :

The present study is designed as hospital based Case-control study to asses the role of various behavioral risk factors in the occurrence of coronary artery disease.A total of 270 subjects(135 cases & 135 controls) were studied. Among the total 135 cases 68.89% were males & 31.11% were females,male predominance has also been reported by **Zodpay et.al.**[27]also observed that prevalence of CAD was significantly (P<0.001) higher in men as compared to women in both urban (11% vs 6.9%) and rural(3.9% vs 2.6%) respectively.

Demographic data of the study population revealed that mean age of the cases & controls were 58.57yrs & 53.8yrs respectively. Largest no of cases were present in the age group 51-60yrs(33.3%) followed by 41-50yrs(24.4%) & 61-70yrs(24.4%).

Significantly higher no of cases were belong to urban area(85,62.96%) as compared to rural area(50,37.04%), similar urban-rural difference was observed.The high prevalence of CAD among urban dwellers may be due to accumulation of various risk factors.

With regard to religion majority of cases were Hindu(101/135,74.8%) & Muslims were (34/135,25.18%). The controls comprise 100 no of Hindus(74.07%) & 35 no of Muslims(25.9%) &Out of 135no of cases 127 no of subjects (94.07%) were married.

Regarding the educational status majority(52,38.51%) were educated up to secondary level(6^{th}-10^{th} standard).

Socio-economic classes were defined according to Modified BG Prasad Socioeconomic classification, Update2019 & majority of cases were belong to socioeconomic class-II(46,34.07%). In the present study, higher socioeconomic status was significantly associated with CAD. **Singh et al(1997)**[15]**.**cited that higher socioeconomic status was significantly associated with CAD in both sexes.

In the present study, positive family h/o CHD was significantly associated with CAD. **Gillurkar et al. (1998)**[16]also reported similar findings with that of present study. In their case-control study history of CHD was present in 17.8% of patients(OR=3.06,x^2=9.03,P<0.01).In our study, positive family history of CHD was present in 31.85% of cases(OR=20.56,P<0.00001). family history of CHD is known to increase the risk of premature death. Genetic factors appear to play an important role along with conventional and emerging risk factors.

Regarding dietary habits 127 no of cases(91%) take mix diet as compared to 12(8.89%)no of cases take veg diet. **W.H.O** stated that salt is an independent risk factor for hypertension, and intake of salt should be up to or less than 5gm/day to prevent CAD[17]. In current study consumption of salt more than 5gm/day found to be more among cases(46,34.07%) as compared to controls(27,20%). **W.H.O** also stated that high fat intake (dietary fat representing 40% or over of the energy supply and a higher proportion of saturated fats is a major risk factor for

CAD[18]. In present study, significantly higher no of cases (28.89%) were consumed excess saturated fats per day than controls(2.96%).

Hypertension is a very important risk factor for developing cardiac diseases.

In the present study person with hypertension (71,52.59%) is at 3.43 times higher risk of CAD than normotensive subjects. **Yoshihiro Miyake et al(2000)[17]. W.H.O.international case-control study (1997)[19]**also observed that hypertension was significantly associated with AMI.

In our study, diabetes mellitus was associated with increased risk of CAD(OR=4.69, P-0.00001). Similar results were reported in the previous studies[20]. Both diabetic men and women are susceptible to coronary artery disease.

The most common cause of death in these patients are cardiovascular diseases.[21]

This study showed association between dyslipidemia and CAD.(OR=3.03, P-

0.00001). Similar findings also noted by **ToobaKazemi et al.[22]**

In the present study, significant association was observed between smoking and CAD(OR=2.06, P-0.004) and a dose-response relationship was also observed between the frequency of smoking per day and CAD(OR=4.05,P-

0.000063) which are well correlated with the observations of **PremPais et al .[23]**in their study.

Significant association was also observed between alcohol drinking and CAD which is similar with the findings of **SubrataBagchi et al.[24]**

In present study, unhealthy behavior like smoking(62.96%), alcohol(19.26%) consumption were more among the males as compared to females in both cases and controls, similar findings were also observed by **Waldron I[25]**in their study. Possible reason may be that these types of unhealthy behaviors are more socially acceptable for males than for females.

Obesity has been defined as **BMI>25Kg/m^2**as per **Consensus statement for diagnosis of obesity, abdominal obesity and the metabolic syndrome for asian Indians[26].** Obesity has been identified as a risk factor for CAD in study conducted by **Zopady et al.[27]**; in present study, significant association was also observed between obesity and CAD(OR=2.68,P-0.006125).

In the present study, sedentariness was significantly associated with the risk of CAD(OR=2.05, P-0.003486).

Gupta et al(1995)[28]. Also found higher prevalence of CHD and sedentary lifestyle in urban population. Sedentary lifestyle has been shown to be important in the genesis of caloric imbalance, resulting obesity and all consequences of obesity.

The present study has a number of limitations:-

Ideally, to identify association of risk factor to disease should be done through a prospective cohort study, but time constraint and limited resources bound us to choose a hospital-based case-control study.

1. Being a hospital-based case-control study the cases and controls may not be the representative of the general population.
2. To mitigate against confounding effects of multiple risk factors present in a patient, logistic regression analysis should have been done.
3. The study was confined to small no of subjects and period.

V. Conclusion:

The present study assessed the prevalence of various risk factors of CAD among cases & controls & their individual influence in the causation of CAD.

In conclusion, the present case-control study showed that CAD is associated with several common but mostly preventable risk factors.

Hence we recommend a national initiative to quit smoking, to have more physical activities, to improve lifestyles and to promote healthy diets. We also propose screening programs for earlier detection of elevated blood pressure, high blood glucose, dyslipidemia and control of these atherosclerotic risk factors to reduce CAD.

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