SMOKING, SMOKELESS TOBACCO CONSUMPTION & CORONARY ARTERY DISEASE – A CASE CONTROL STUDY

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ABSTRACT

Background: Coronary artery disease (CAD) is a major cause of premature death and disability throughout the world. Tobacco use is an important and avertable cause of CAD. The use of tobacco is on the rise worldwide. Present study was carried out to study the role of tobacco consumption in the occurrence of Coronary artery disease.

Materials and Methods: Present study was a hospital based paired matched case-control study, carried out at civil hospital, Ahmedabad. 135 newly diagnosed cases of coronary artery disease and 135 controls were studied after taking informed written consent. Data was analyzed by using Epi-info version 3.5.1 computer package, Chi -square test, Z test and Odds ratio was calculated.

Results: Among the total 135 cases 70.4% were male and 29.6% were female, most of the cases (40%) were belongs to the age group of 51-60 years. Smokers and smokeless tobacco users were significantly higher among the cases as compared to controls. Significant association was also observed between current smokers, smokeless tobacco users and Coronary artery disease. Strong associations were also observed between frequency and duration of smoking with CAD.

Conclusion: Tobacco consumption in any form is major aetiology behind the occurrence of CAD.

Key words: Case Control study, Coronary artery disease, Smoking, Smokeless tobacco

INTRODUCTION

Coronary heart disease is a leading cause of morbidity & mortality in developed countries & is emerging as an epidemic in developing countries. A substantial proportion of population in India is exhibiting increasing prevalence of cardio-vascular disease and associated risk factors.[1] Precious life is snatched away when person is in the most productive stage of life, when the social and family responsibilities are the greatest. Overall prevalence has increased from 2.06% in 1970 to 5% in 2002 in rural area and 1.04% in early 1960 to 13.02% in 2004 in urban area.[2]

Most common presentation of Coronary artery disease (CAD) is myocardial infarction and angina pectoralis.[3] Coronary artery disease is a multifactorial disease. Tobacco consumption in any form either smoking or chewing is independent risk factor for CAD. It increases the risk of cardiovascular disease by damaging the endothelium lining of blood vessels, enhancing coagulability and atherogenesis, increasing cholesterol plaques and LDL-cholesterol and lowers the HDL-cholesterol. On an average, 50-150 mcg of nicotine is absorbed through lungs and oral mucosa with each puff of tobacco or about 1 to 2 mg per cigarette. Those who stop smoking show a prompt decline in risk and may reach the risk level of non-smoker as early as after one year of cessation, for those who have a myocardial infarction, the risk of fatal recurrence may be halved after cessation of smoking.[4]

In India according to NFHS III, prevalence of tobacco use by any form is 50% in men and 7% in female in urban area and 61% in men and 13% in female in rural area in age group of 15-49 while, in Gujarat; prevalence of tobacco use by

any form is 60.2% in men and 8.4% in women.[5] It is very high proportion but potentially modifiable one. Taking into consideration of these facts the present case control study was carried out at Civil Hospital Ahmedabad to study the role of tobacco consumption in any form in the occurrence of CAD.

MATERIALS AND METHODS

The present study was paired matched case-control study, carried out at Civil hospital Ahmedabad, a tertiary care teaching hospital, for one year from March 2009 to April 2010. Permission was taken from the Ethical Committee, of the institute before carrying out the study. Informed written consent was taken from all the enrolled subjects after a full explanation of the purpose of study and liberty to drop out. This was done in Gujarati, Hindi and English languages for easy comprehension. All the patients were interviewed and examined while in hospital, all the information was filled up in a specially designed pretested questioner.

Sample size:

The sample size of the study was calculated after conducting the pilot study by using the following formula. [6]

$$N = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 \, \overline{p} \, \overline{q} \, (r+1)}{(P_1 - P_2)^2 \, r}$$

Where,
$\alpha = 0.05$ (allowed type I error), $\beta = 0.02$ (allowed type II error)
So for these value of type I & type II errors the values of power of detecting these errors are as under;
$Z_{1-\alpha/2} = 1.96$ and $Z_{1-\beta} = 0.84$
$P_1 = 0.55$ proportion of smokers among the cases in pilot study
$P_2 = 0.38$ proportion of smokers among the controls in pilot study
$\overline{p} = (P_1 + P_2)/2 = 0.465, \overline{q} = 1 - p = 0.535$
r = ratio of number of controls to cases, here it was 1.

Putting all these values to the above mentioned equation the desired sample size was found to be 134.97 ≅ 135. As the case: control ratio was kept 1: 1, the final total sample size of study was 270 (135 cases and 135 controls).

Selection of Cases:

Definition of Case: Present study includes newly diagnosed cases of CAD. CAD patients were diagnosed as per the Monica criteria: (1) two or more ECG showing specific changes; (2) an ECG showing probable changes plus abnormal cardiac injury enzymes; or (3) typical symptoms such as a retrosternal pain plus abnormal enzymes.[7]

Eligibility criteria for cases: The patient who was diagnosed first time as a suffering from CAD to avoid bias arising from recall memory; and Well conscious, co-operative, and well oriented with time, place and person, to avoid bias from respondent's answers.

Selection of Control:

Definition of control: A control was defined as an individual who was admitted in civil hospital Ahmedabad on the same day or within seven days for conditions other than angina pectoris and myocardial infarction. For the selection of proper control person's prior history regarding CAD was asked and it was assured that the control had never been admitted to hospital or taken treatment for acute myocardial infarction and angina pectoris.

Eligibility criteria for control: Well conscious, co-operative, and well oriented with time, place and person, who voluntary agree to participate in the study to avoid bias from respondent's answers.

Matching: For each case one age and sex matched control was selected, age matching was done with the liability of ±2 years of age.

Association of the risk factors under study was assessed by applying Chi Square test, Z test and to assess the strength of association the odds ratio was calculated. For all these statistical analysis Epi- info version 3.5.1 computer package was used.

RESULTS

A total of 135 cases of Coronary Artery Disease and 135 matched controls were analysed. Among the cases 70.4% were males and 29.6% were females.

The Largest numbers of cases were in the age group of 51-60 years (40%). The mean age of cases and controls were 54 ± 10.50 years and

53.83 ± 10.66 years respectively and this difference was not statistically significant (Z = 0.13, P > 0.05) [Table 1]. Study of Socio-demographic characteristics did not reveal any significant difference between cases and controls.

Table 1: Age and Sex wise distribution of Cases and Controls

Age group (in years)	Cases			Controls		
	Male (%)	Female (%)	Total (%)	Male (%)	Female (%)	Total (%)
31 – 40	11 (11.6)	4 (10.0)	15 (11.1)	9 (9.5)	5 (12.5)	14 (10.4)
41 – 50	28 (29.5)	9 (22.5)	37 (27.4)	30 (31.6)	9 (22.5)	39 (28.9)
51 – 60	39 (41.1)	15 (37.5)	54 (40.0)	38 (40.0)	14 (35.0)	52 (38.5)
61 – 70	12 (12.6)	10 (25)	22 (16.3)	13 (13.7)	8 (20.0)	21 (15.6)
71 – 80	4 (4.1)	2 (5)	6 (4.4)	3 (3.1)	4 (10.0)	7 (5.2)
>80	1 (1.1)	0 (0)	1 (0.7)	2 (2.1)	0 (0)	2 (1.5)
Total	95 (70.4)	40 (29.6)	135 (100)	95 (70.4)	40 (29.6)	135 (100)

Smokers and smokeless tobacco consumers were more among the cases (51.85% & 44.44%) as compared to controls (26.66% & 31.11%) and these differences were also statistically significant. It was seen that current smokers and smokeless tobacco consumers were significantly higher among the cases (71.42% and 76.66% respectively) as compared to controls (47.22% and 54.76% respectively) [Table 2]. Most of the smokers (92.85% & 91.67% from cases and controls respectively) were using bidi for smoking while most common form for smokeless tobacco consumption was chewing tobacco in both cases and controls [Table 3].

Table 2: Distribution of Cases and Controls by their habit of smoking and smokeless tobacco consumption

Habit	Cases (N=135) (%)	Controls (N=135) (%)	Odds Ratio	95% CI	P value
Smoking					
Yes	70 (51.85)	36 (26.66)	2.96	1.73-5.10	<0.001*
No	65 (48.15)	99 (73.34)			
Current Smoker	50 (71.42)	17 (47.22)	2.79	1.12-7.03	<0.05*
Past Smoker	20 (28.58)	19 (57.78)			
Smokeless tobacco consumption					
Yes	60 (44.44)	42 (31.11)	1.77	1.04-3.01	<0.05*
No	75 (55.56)	93 (68.89)			
Current User	46 (76.66)	23 (54.76)	2.71	1.07-6.98	<0.05*
Past User	14 (23.34)	19 (45.24)			

(* P values < 0.05 are significant)

The mean age of starting smoking among the cases was 23.7±5.7 years which was significantly lower than the mean age of starting smoking among the controls 27.97±8.82 years (Z=2.70, P<0.05), similarly the mean age of starting smokeless tobacco consumption among the cases was 26.89±7.4 years which was also significantly lower than the mean age of same among the controls 30.8±9.2 years (Z= 2.32, P<0.05).

Classification of study subjects into three categories according to frequency of smoking, it was observed that 23.70% of cases and 17.78% of controls had smoked up to 10 biddies per day

giving Odds ratio of 2.03, while 28.15% cases and only 8.88% controls had smoked more than 10 biddies per day, giving Odds ratio of 4.82 as compared to non smokers (X^2=21.71, df=2, P<0.001).

Odds ratio of 2.01 and 5.12 was observed when comparing cases and controls that smoked for the duration of less than 10 years and more than or equal 10 years respectively as compared to non smokers and these difference was also statistically significant (X^2=22.24, df=2, P<0.001) [Table 4].

DISCUSSION

The present study was designed as Hospital based Case control study to study the role of tobacco consumption in any form in the occurrence of CAD. A total of 270 subjects (135 cases and 135 controls) were studied. Among the total 135 cases 70.4% were males and 29.6% were females, male predominance has been also reported by Zodpay et al.[8]

The mean age of cases was 54 ± 10.50 years, largest number of cases were present in the age group of 51-60 years (40%), followed by 41-50 years (27.4%), whereas 11.1% of the cases had faced their first attack of CAD before crossing the forty of their life, which is well correlated with the findings of Zodpay et al.[8]

Table 3: Distribution of Cases and Controls according to the form of smoking and smokeless tobacco consumption

Habit	Form of consumption	Cases (%)	Controls (%)
Smoking	Bidi	65 (92.85)	33 (91.67)
	Cigarette	4 (5.72)	1 (2.78)
	Hukka	1 (1.43)	2 (5.55)
	Total	**70 (100)**	**36 (100)**
Smokeless tobacco	Chewing	34 (56.67)	13 (30.95)
	Snuffing	11 (18.33)	12 (28.58)
	Gutkha	9 (15.00)	11 (26.19)
	Mava	3 (5.00)	4 (9.52)
	Pan	3 (5.00)	2 (4.76)
	Total	**60 (100)**	**42 (100)**

Table 4: Distribution of Cases and Controls by frequency and duration of smoking

Smoking	Cases (N=70) (%)	Controls (n=36) (%)	Odds Ratio	95% CI	P value
Frequency of smoking / day					
None	65 (48.15)	99 (73.34)	1	-	
<10/day	32 (23.70)	24 (17.78)	2.03	1.05-3.93	<0.001*
≥10/day	38 (28.15)	12 (8.88)	4.82	2.23-10.59	
Duration of smoking in years					
None	65 (48.15)	99 (73.34)	1	-	
≤10 years	33 (24.44)	25 (18.51)	2.01	1.05-3.86	<0.001*
>10 years	37 (27.41)	11 (8.15)	5.12	2.31-11.55	

($*$ P values < 0.05 are significant)

There is incontrovertible evidence that tobacco, in any form (smoked or chewed) is a major risk factor of CAD.[9] In present study a strong statistical association of smoking and CAD was found (P<0.001). The odds ration of smoking is 2.96 it means that the risk of CAD is 2.96 times higher in smokers as compared to non smokers, Yathish TR et al[10] also found a strong association of smoking with CAD. Compared to non-smokers, odds ratio of occurrences of CAD was 2.03 among the cases who smoked up to 10 biddies per day and 4.82 among those who smoked more than 10 biddies per day, indicating a dose response relationship, which is well correlated with the observations of Prem Pais et al[11] in their study. Subrata Bagchi et al[12] also observed the dose response relationship between smoking and CAD in their study. In present study statistical association was also observed between duration of smoking and occurrence of CAD, which is correlate with the findings of Subrata Bagchi et al.[12]

To conclude findings of our study suggest that tobacco consumption in any form is major aetiology behind the occurrence of CAD. People know much about the health hazards of tobacco and that merely is not sufficient to stop them from taking up or from continuing the habit. There is a need to develop multifactorial tobacco quitting strategies focusing on early age intervention and covering the addict along with his surrounding environment.

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