



A Case Control Study to Determine the Predisposing Factors for Myocardial Infarction among Young Adults

Nandini C¹, Kashavva B Andanigoudar², Dattatreya D Bant³

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Author's Affiliation:

¹Asst Prof, Dept. of Community Medicine, Subbaiah Institute of Medical Sciences, Shimoga; ²Postgraduate student; ³Professor and Head, Dept. of Community Medicine, Karnataka Institute of medical Sciences (KIMS), Hubballi

Correspondence

Dr. Kashavva B Andanigoudar
drkashavvaba@gmail.com

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ABSTRACT

Background: Coronary artery disease (CAD) is the leading cause of death and the main cause of mortality and morbidity in the world. CAD is a serious health problem in young adults, as it occurs in younger age, which is a productive age group.

Objectives: To determine the predisposing factors for myocardial infarction among young adults in a tertiary health care centre of Hubballi, Karnataka

Methods: A facility-based case control study was conducted among patients aged <40 years, including 30 cases (with CAD) and 30 controls (without CAD), admitted to KIMS hospital Hubballi. Information about sociodemographic data, myocardial infarction, stress, physical activity and dietary pattern was collected.

Results: The study included 19 males and 11 females in each group. The factors found to be significantly associated with premature myocardial infarction were inadequate physical activity, BMI > 23 kg/m², family history of diabetes, high perceived stress, type A personality, smoking, hypertension, parental consanguinity, family history of IHD and inadequate dietary fibre intake.

Conclusion: The study concluded that, both modifiable and non-modifiable risk factors play an important role in premature myocardial infarction. Addressing the modifiable risk factors can significantly reduce premature myocardial infarction.

Key Words: Premature Myocardial Infarction, Type A personality, perceived stress, Case control study, dietary fibre

INTRODUCTION

Coronary artery disease (CAD) is defined as "impairment of heart function due to inadequate blood flow to the heart compared to its needs" caused by obstructive changes in the coronary circulation to the heart.¹ Coronary artery disease is the leading cause of death and the main cause of mortality and morbidity in the world. India is going through an "epidemiological transition" where there is a decline in the communicable disease but that of non-communicable disease (NCD) has been raising rapidly.²

India has a high burden of coronary artery disease among the non-communicable diseases. Prevalence of CAD has progressively increased in India. It has

a prevalence rate of 6.4% in urban areas and 2.4% in rural areas.³ Prevalence of CAD in young adults ranges from 2% to 10% among all the cases of CAD, has a mortality rate of 50%.⁴ Coronary artery disease/acute coronary syndrome is a serious health problem particularly in young adults, it causes significant morbidity, psychological impact and financial burden for the patient and the family, when it occurs in younger age as the productive age group is affected.

This trend of CAD among young adults is increasing exponentially due to multifactorial reasons usually the CAD among the young adults are misdiagnosed as non-cardiac chest pain which is the most common cause of mortality and morbidity.

Most of the young adults are not aware of it and do not consult the physician, resulting in delayed diagnosis and treatment. As awareness and early detection can reduce the burden of the disease, this study was to explore the causes and the risk factors that are predisposing to CAD in young adults.

Hence this study was conducted with an objective to determine the predisposing factors for myocardial infarction among young adults in a tertiary health care centre of Hubballi, Karnataka.

METHODOLOGY

A facility-based case-control study was conducted in Karnataka Institute of Medical Sciences Hospital (KIMS), Hubballi by Department of Community Medicine, KIMS Hubballi, District Dharwad, Karnataka, for the duration of one month from May 8th to June 6th, 2019. Institutional ethical permission was taken, 30 cases and 30 controls, admitted during the study period were selected by convenience sampling.

Definitions for Cases and Controls:

Cases: women and men aged 18 to 40 years who were diagnosed as acute coronary syndrome (STEMI/NSTEMI/ unstable angina) either by clinical findings/ECG/Echo/cardiac enzymes.

Controls: men and women who were not diagnosed as acute coronary syndrome (STEMI/NSTEMI/ unstable angina) currently or in the past, admitted in KIMS hospital during study period.

Cases and controls were matched for age and sex.

A Semi structured, pretested questionnaire was administered to collect information about Socio demographic profile, status of MI and pre-existing diseases and habits. "OB360" analysis was used to assess the type of personality.⁵ "PSS" questionnaire was used to evaluate level of stress.⁶ "WHO steps" questionnaire was used to assess dietary fibre intake and physical activity.⁷⁻⁹

Once the patient was stabilized, after taking the informed verbal consent, the questionnaire was administered to each of the cases and controls in an understandable language. The data was collected in ICU, emergency wards and medicine wards. Investigations of each participant were retrieved from his/her respective medical records.

The data collected was entered in Microsoft Excel and analysed using SPSS software version 21. The data was expressed as means, frequencies and standard deviations. Appropriate statistical tests were used for analysis and Odds ratio was calculated for each risk factor. P value of <0.05 was considered significant.

RESULTS

The present study was conducted among 30 cases and 30 controls, which included 19 males and 11 females in each group with the mean age of 37.5years. The socio-demographic characteristics of the study are mentioned in Table 1.

On assessing various biochemical parameters related to cardiovascular diseases among the cases, it was found that the mean levels of Triglycerides (TGs), Low-density Lipoprotein cholesterol (LDL) and High-density Lipoprotein cholesterol (HDL) were 128.3mg/dl, 96.33mg/dl and 43.6mg/dl respectively, which were in the normal range.

In the present study, majority of the cases had suffered ST segment Elevation Myocardial Infarction (STEMI). 40% of the cases had multiple vessel disease, and 30% of the participants were found to have both the coronary arteries affected (Table 2).

Table 1: Sociodemographic characteristics of cases and controls

Study Variables	Cases (%)	Controls (%)
Mean Age (Min-Max)	37.47+/-4.2(19-40)	
Gender		
Males	19(63)	19(63)
Females	11(37)	11(37)
Occupation		
Homemaker	6(20)	7(23.3)
Student	1(3.3)	0(0)
Semiskilled and Skilled	14(46.7)	14(46.7)
Semi-professional	8(26.7)	6(20)
Others	1(3.3)	3(10)
Socioeconomic Status		
Upper Middle	1(3.3)	0(0)
Middle	9(30)	13(43.3)
Lower Middle	7(23.3)	17(56.7)
Lower	13(43.3)	0(0)
Education		
Illiterate	1(3.3)	5(16.7)
Literate	29(96.7)	25(83.3)
Locality		
Rural	15(50)	22(73.3)
Urban	15(50)	8(26.7)

Table 2: Characteristics of Myocardial Infarction among cases

Variables	Cases (%)
Type of Myocardial Infarction	
STEMI	23(77)
NSTEMI	7(23)
Number of Vessels Affected	
Single vessel	18(60)
Multiple vessels	12(40)
Vessels Involved	
Right coronary artery	6(20)
Left coronary artery	15(50)
Both arteries	9(30)

Table 3: Risk factors for premature Myocardial Infarction

Variables	Cases (%)	Controls (%)	Odds Ratio	P Value
Physical Activity				
Inadequate	20(67)	7(23)	6.571	<0.01*
Adequate	10(33)	23(77)		
Body Mass Index				
>/=23	23(77)	3(10)	29.571	<0.001*
<23	7(23)	27(90)		
Family H/O Diabetes				
Present	14(47)	6(20)	3.5	<0.05*
Absent	16(53)	24(80)		
Perceived Stress				
No-Mild	28(93)	22(73)	5.091	<0.05*
Moderate-high	2(7)	8(27)		
Type of Personality				
Type A	23(77)	2(7)	46	<0.001*
Type B	7(23)	28(93)		
Alcohol Consumption				
Yes	4(13)	6(20)	0.615	>0.05
No	26(87)	24(80)		
Smoking				
Yes	12(40)	4(13)	4.333	<0.05*
No	18(60)	26(87)		
Hypertension				
Present	16(53)	2(7)	16	<0.001*
Absent	14(47)	28(93)		
Diabetes Mellitus				
Present	11(37)	0(0)	2.579	<0.001*
Absent	19(63)	30(100)		
Family H/O Hypertension				
Present	13(43)	9(30)	1.784	>0.05
Absent	17(57)	21(70)		
Parental Consanguinity				
Present	22(73)	10(33)	5.5	<0.01*
Absent	8(27)	20(67)		
Family H/O IHD				
Present	9(30)	2(7)	6	<0.05*
Absent	21(70)	28(93)		
Locality				
Rural	15(50)	22(73)	0.364	>0.05
Urban	15(50)	8(27)		
Education				
Illiterate	1(3)	5(17)	0.172	>0.05
Literate	29(97)	25(83)		
Dietary Fibre Intake				
Inadequate	28(93)	14(47)	12.251	<0.001*
Adequate	2(7)	16(53)		

*significant

On evaluating for various risk factors for myocardial infarction, significantly higher Odds of having premature Myocardial Infarction was found in participants with inadequate physical activity, BMI>23kg/m², Family history of diabetes, moderate to higher levels of perceived stress, type A personality, smoking, pre-existing diabetes and hypertension, parental consanguinity, family history of ischemic heart disease (IHD) and inadequate dietary fibre intake. (Table 3)

DISCUSSION

In the present study, it was found that, premature Myocardial Infarction had male preponderance. A study conducted by Vinod Kumar Balakrishna et al showed that Acute Coronary Syndrome (ACS) in age below 40 years was predominant in males.¹⁰

In the current study, persons with inadequate physical activity were at higher odds of having premature Myocardial Infarction (OR: 6.571, p<0.01). A study conducted by Vinod Kumar Balakrishna et al inadequate physical activity was significantly associated with Acute Coronary Syndrome in persons aged <40years.¹⁰ A study conducted by Santosh Kumar Sinha et al concluded a similar association between physical activity and premature Myocardial Infarction.¹¹

In the current study, smoking was significantly associated with higher odds of having premature Myocardial Infarction (OR: 4.33, p<0.05.). A study conducted by Santosh Kumar Sinha et al also showed similar association between smoking and premature Myocardial Infarction.¹¹

Overweight and obese individuals had higher odds of having premature Myocardial Infarction (OR=29.571, p<0.001). A study conducted by Santosh Kumar Sinha et al and a study conducted by Aram J. Mirja et al, concluded a similar association of premature Myocardial Infarction with overweight and obesity.^{11,12}

Family history of IHD (OR: 6, p<0.05) and Diabetes mellitus (OR: 3.5, p<0.05) showed a significant association with having premature Myocardial Infarction. This may be attributable to the role of genetic factors in cardiovascular and endocrinological diseases.

Parental consanguinity was found to be significantly associated with premature Myocardial Infarction (OR: 5.5, p<0.01) A study conducted by J Ismail et al reported a similar finding about parental consanguinity and premature Myocardial Infarction.¹³

Moderate to higher levels of stress was found to be a significant risk factor for premature Myocardial Infarction (OR: 5.091, p<0.05). A study was conducted by J S Chi and R A Klone and a study conducted by Santosh Kumar Sinha et al found stress as a significant risk factor for premature Myocardial Infarction.^{14,11}

Persons with Type A personality were found to have significantly high odds of having premature MI compared to Type B (OR: 46, p<0.001). A study conducted by Ram V et al concluded that type A personality is major aetiology behind the occurrence of coronary artery disease.¹⁵

Inadequate intake of dietary fibre had more odds of having premature Myocardial Infarction (OR: 12.251, $p < 0.001$). A study conducted by Buil-Cosiales et al showed similar association between inadequate intake dietary fibre and premature Myocardial Infarction.¹⁶

The limitations of the study include limited sample size and convenience method of sampling the participants. Since the study was retrospective, there may be a chance of recall bias.

CONCLUSION

The study concluded that, both modifiable and non-modifiable risk factors play an important role in premature myocardial infarction. Individual modifiable risk factors include inadequate intake of dietary fibre, inadequate physical activity, obesity, smoking, stress and type A personality. Social factors in premature Myocardial Infarction include parental consanguinity and psychosocial stress.

Based on the findings in the current study, it is recommended that a comprehensive approach consisting of healthy diet, weight reduction, regular physical exercise and smoking cessation should be widely adopted. Stress management can significantly reduce the risk of premature Myocardial Infarction. Health education and awareness about these risk factors can bring down the epidemic of Premature Myocardial Infarction.

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