



## Risk Factors for Coronary Artery Disease in Patients Undergoing Coronary Angiogram at a Tertiary Level Hospital in Nepal.

Jeetendra Mishra<sup>1</sup>, Achutanand Lal Karn<sup>2</sup>, Alok Kumar Singh<sup>3</sup>, Asraf Hussain<sup>4</sup>,  
Ramji Ram<sup>5</sup>, Pratibha Kaushik<sup>6</sup>

<sup>1</sup>Lecturer, Department of Internal Medicine, National Medical College, Birgunj, Nepal

<sup>2</sup>Lecturer, Department of Internal Medicine, National Medical College, Birgunj, Nepal

<sup>3</sup>Lecturer, Department of Internal Medicine, National Medical College, Birgunj, Nepal

<sup>4</sup>Lecturer, Department of Internal Medicine, National Medical College, Birgunj, Nepal

<sup>5</sup>MBBS Final Year, National Medical College, Birgunj, Nepal

<sup>6</sup>MBBS Final Year, Dali University, Yunnan, China

**Conflicts of Interest:** Nil

**Corresponding author:** Dr. Jeetendra Mishra

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### **Abstract:**

**Background:** Ischemic heart disease is the leading cause of CVD health loss globally, as well as in each world region, followed by stroke. In Nepal, CVD was found to be the second most common non-communicable disease among indoor patients of the non-specialist hospital. Age, gender, smoking, obesity, dyslipidemia, physical inactivity, hypertension, and diabetes mellitus (DM) are established risk factors for CVD. In Nepal, hypertension is found to be the most prevalent risk factor for CVD.

**Aims and Objectives:** This study aimed to assess risk factors for coronary artery disease in patients undergoing coronary angiograms in Nepal. This study also investigated the socio-demographic characteristics of the participants and the nature of the involvement of coronary arteries.

**Materials and Methods:** We examined in this cross-sectional study a total of 74 patients who underwent coronary angiography (CAG) at National Medical College between May 2020 and June 2021. Patients were grouped according to the number of major epicardial coronary arteries involved in SVD, DVD, and TVD. Patients were checked for risk factors like smoking, diabetes mellitus, hypertension, dyslipidemia, family history of coronary artery disease, and obesity. Microsoft Office Excel and SPSS version 21.0 were used for data analysis. The study was approved by the ethical committee.

**Results:** Among 74 participants 53 were male. The mean age was 59.65±10 years. Premature coronary artery disease was present in six patients. SVD was the commonest CAD type. Hypertension was the commonest risk factor followed by Diabetes mellitus. Hypertension, Diabetes mellitus, Family history of premature CAD, and obesity were found to be statistically significant.

**Keywords:** CAD, Risk factors for CAD, Premature CAD, Hypertension, Diabetes, obesity, family history of CAD, dyslipidemia, Smoking, SVD, DVD, TVD, Nepal

## Introduction:

As per an estimate in 2015 there were about 422.7 million cases of CVD and 17.92 million CVD deaths, Ischemic heart disease is the leading cause of CVD health loss globally, as well as in each world region, followed by stroke.<sup>1</sup> In Nepal, the estimated age-standardized death rates caused by CVD (Ischemic Heart Disease and Cerebrovascular Diseases) were 152 and 82 per 100,000 population respectively in 2008.<sup>2</sup> CVD were found to be the second most common (40.0%) noncommunicable diseases among indoor patients of the non-specialist hospitals of Nepal in 2010.<sup>3</sup> Moreover, 13.8% of industrial workers of Nepal were diagnosed with CVD in 2016.<sup>4</sup> Age, gender, smoking, obesity, dyslipidemia, physical inactivity, hypertension, and diabetes mellitus (DM) are established risk factors for CVD.<sup>5-8</sup> Whilst the incidence of CVD is declining in many parts of the world,<sup>9</sup> several lifestyle factors render Nepal vulnerable to CVD in the coming decades. In Nepal, hypertension is found to be the most prevalent risk factor for CVD which ranged from 26.0% to 38.9%.<sup>10-14</sup> Moreover, as per a study done in Nepal diabetes mellitus is seen in 8.4% of the Nepalese population.<sup>15</sup> STEPS surveys of Nepal in 2013 detected hypercholesterolemia in 23.0%, smoking in 19.0%, overweight in 21.0%, raised blood glucose in 4.0%, physical inactivity in 3.0%, and harmful use of alcohol in 2.0%.<sup>10</sup> These behavioral and metabolic risk factors usually cluster together, interact, and multiply so that the total risk of developing acute cardiovascular events is increased.<sup>16,17</sup> In Asia, for instance, almost 44.0% of the Chinese adult population have clustered at least two cardiovascular risk factors.<sup>18</sup> Moreover, in Nepal, more than 60.0% have a minimum of two clustered risk factors.<sup>10</sup> Evidence shows that about a 58.0% decline in CVD mortality has been attributed to reductions in the population levels of these risk factors.<sup>19,20</sup> A

recent study from China reported that low-income areas have a higher prevalence of total CVD compared to high-income areas.<sup>21</sup> Although national data for incidence and prevalence of CAD in Nepal is not available, hospital-based data on admission patterns in different hospitals of Kathmandu, the capital city of Nepal show 40 fold increase in the incidence of acute myocardial infarction (AMI) in the last 30 years. Prevalence of coronary artery disease (CAD) estimated from these figures of AMI cases indicates that 5 % of the adult population in Kathmandu suffers from CAD. Hence, Coronary artery disease is emerging as an epidemic in Kathmandu, Nepal.<sup>22</sup>

## Methods

### Patient recruitment

Patients who presented to NMCTH with acute coronary syndrome (ACS), and underwent CAG based on the ACC/ESC indications for CAG for the first time whose coronary angiograms revealed documented coronary lesions and gave consent were included in this study. A total of 74 patients were included in the study period between May 2020 and June 2021. CAD manifested in patients less than 45 years of age were grouped as premature CAD.<sup>23</sup>

### CAG findings and risk factors

Expert intervention cardiologists performed CAG and patients were grouped according to the number of major epicardial coronary arteries involved into SVD, DVD, and TVD. Patients were checked for risk factors like smoking, diabetes mellitus, hypertension, dyslipidemia, family history of coronary artery disease, and obesity.

### Statistical Analysis

Microsoft Office Excel and SPSS version 21.0 were used for data analysis. Continuous

variables were calculated as mean  $\pm$  (SD), and categorical variables were presented as counts and percentages. A chi-square test was used to compare categorical variables. A Student t-test was used for continuous variables. A logistic regression model was used to identify risk factors of premature CAD. *P*-value  $< 0.05$  was

regarded as significant. The study was approved by the ethical committee at the National Medical College and teaching hospital, Birgunj, Nepal.

## Results

**Table 1: Respondent demography**

Disaggregated by:	Variable	Number (N)	Percentage (%)	Remarks
Total	Total	74	100%	
Sex	Male	53	72%	
	Female	21	28%	
Age (M: 59.65, SD: $\pm$ 10.74)	Premature ( $\leq 45$ )	6	8%	Mean: 41.33, SD: $\pm$ 3.83
	Mature ( $>45$ )	68	92%	Mean: 61.26, SD: $\pm$ 9.59
Approach	Right Femoral	19	17%	
	Right Radial	55	64%	
Lesion	SVD	28	38%	
	DVD	22	30%	
	TVD	24	32%	

**Table 2: Chi-square test of independence**

Variables	Value	N	%	X <sup>2</sup> value	Significance
Smoking	N	37	50%	0.000, df 1	P=1.000
	Y	37	50%		
Diabetes	N	16	22%	23.838, df 1	P=0.000
	Y	58	78%		
Hypertension	N	15	20%	26.162, df 1	P=0.000
	Y	59	80%		
Dyslipidemia	N	43	58%	1.946, df 1	P=0.163
	Y	31	42%		
Family Hx	N	53	72%	13.838, df 1	P=0.000
	Y	21	28%		
Obesity	N	23	31%	10.595, df 1	P=0.001
	Y	51	69%		

**H<sub>0</sub>: Two variables are independent (If P>0.05)**

**H<sub>A</sub>: The variables are dependent (If P<0.05)**

## Results

A total of 74 subjects were evaluated in the study. There were 53 males and 21 females. The mean age was 59.65±10 years. Premature coronary artery disease was present in six patients. 28 patients had SVD followed by 24 patients who had TVD and 22 patients had DVD. These characteristics are shown in table 1.

Hypertension was the most prevalent risk factor present in 59(80%) of patients. Diabetes was present in 58(78%) of patients. Obesity was present in 51(69%) of participants. Smoking 37(50%) Dyslipidemia was present in 31(42%), A family history of premature CAD was present in 21(28%) of the study population. Hypertension, Diabetes, Family history of premature CAD, and obesity were found to be statistically significant as independent risk factors ( $p<0.05$ ) as shown in table 2.

## Discussion

We studied demographic data and risk factors present in patients who were diagnosed with coronary artery disease after coronary angiography.

In our study prevalence of coronary artery disease was more prevalent in males this finding was similar to findings of studies done in Nepal and abroad.<sup>24,25</sup>

The mean age of participants in our study was 59.65 years. this finding of mean age of onset of coronary artery disease was higher than that of the southeast Asian population (53 years) but lower than the European population (63).<sup>26</sup>

The prevalence of premature coronary artery disease in our study was eight percent. Various studies showed the prevalence of premature coronary artery disease to be between 5-10 %.<sup>27-29</sup>

Hypertension (80%) was found to be the most prevalent risk factor followed by diabetes (78%). Hypertension and diabetes were the

most prevalent risk factors also in a study done in Jordan.<sup>25</sup> However Dyslipidemia was the commonest risk factor in a study carried out in Lithuania.<sup>30</sup> It adds to the importance of similar studies in different populations to identify significant risk factors for coronary artery disease in different subtypes of populations.

Hypertension, Diabetes, Family history of premature CAD, and obesity were found to be statistically significant as independent risk factors ( $p<0.05$ ).

## Limitation of Study

Single centered study

## Conclusion

Hypertension, Diabetes, Family history of premature CAD, and obesity were found to be statistically significant as independent risk factors in our study. Strategies regarding awareness of the population at risk need to be deployed to prevent coronary artery disease. Surprisingly smoking and dyslipidemia were not found to be statistically significant in our study. More studies are warranted to study the significance of these risk factors in our population. Newer studies investigating novel markers and risk factors are also required.

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