



Association of Known Risk Factors (Smoking and Hypercholesterolemia) with Acute Coronary Syndrome– A Case Control Study in a Tertiary Care Hospital in Kerala

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Background and Rationale

Over the last decade, cardiovascular disease has become the single largest cause of death worldwide. It is predicted that more cardiovascular risk burden will be borne by the Indian subcontinent in the next decade according to recent epidemiological studies¹. There exists significant difference in the prevalence of coronary artery disease with respect to gender, age and ethnicity. Cardiovascular disease [CVD] has emerged as a major health burden in developing countries². [CVD] is the leading cause of death in India and in the southern Indian state of Kerala⁵.

In India, prevalence of coronary artery disease (CAD) has been reported as being 11% in 2001³. India has the highest burden of acute coronary syndrome [ACS] in the world⁴.

The health status of Kerala population differs from that of other Indian states owing to its higher literacy rate, better distribution of its healthcare facilities among rural and urban areas, and its better access to healthcare institutions.

Methodology

Study Design: Case Control Study

Study Setting: Coronary care unit of Sree Gokulam Medical College, Venjaramoodu, Trivandrum.

Study Subjects

Cases- Patients with ACS in CCU of Sree Gokulam Medical College.

Controls- patients who have undergone master health checkup in Sree Gokulam medical college.

Selection Criteria: Patients with ACS admitted in CCU of Sree Gokulam medical college

Study Period: November 2012 to December 2013.

Sample size (calculated by Kelsey method) = 80 cases and 80 controls

Exclusion Criteria

- Patients who are terminally ill
- Patients who are unconscious
- Patients with cardiac problems other than acute coronary syndrome
- Patients who are not willing

Data Collection

Data was obtained using semi-structured questionnaire. Details on personal history, socio demographic details, smoking and diet history as well as history with respect to cardiac and extra cardiac symptoms were taken. Detailed physical examination including recording of blood pressure, pulse rate and respiratory rate was done. Height and weight were measured. BMI was calculated. Laboratory investigations including complete hemogram were done. ECG was taken. Case – control ratio was 1:1.

Statistical Analysis

- Microsoft Excel and SPSS 17 were used for data compilation and analysis.
- Found out simple proportions, Mean, Standard deviation and Odds ratio with 95% CI by univariate analysis.
- Study was conducted after receiving approval from the institutional ethical committee. Informed consent was taken from each participant in the study.

Results

Smoking as a Risk Factor of ACS

In this study, smoking is seen in 35% of the controls and 68.8% of the cases. As a risk factor, smoking has an Odds ratio [OR] is 4.09 with 95% confidence interval [2.11 -7.90]. So we can infer that, smokers have 4.09 times greater risk of developing ACS than non – smokers.??? In a study conducted by Indre Ceponiene et al, smoking as a risk factor of ACS has an OR of 7.03.¹⁴ Another study conducted by Ioannis Vogiatzis et al observed an OR of 4.32 for smoking as a risk factor of ACS.¹⁵

The result of this study corroborates those of many other studies held in various places. Even the Framingham Heart Study, the biggest on-going study ever conducted clearly states that smoking is an important risk factor of ACS. According to the Mayo clinic, cigarette smoking is an important risk factor of ACS¹¹.

WHO has included tobacco use [which includes both active and passive smoking] as one of the major modifiable risk factors of ACS. According to Achutha Menon Centre for Health Science Studies, Sree Chitra Thirunal Institute for Medical Sciences & Technology, Thiruvananthapuram, India¹², prevalence of tobacco use in Kerala/ Thiruvananthapuram? is similar to the national average. Smoking is the commonest form of tobacco usage among men in the State whereas chewing tobacco is more common among women and children. Tobacco chewing is increasing among men in Kerala probably due to the smoking ban and industry strategy to focus on smokeless tobacco. Tobacco use is significantly more among the low socio-economic (SE) groups compared to the high SE group. Mortality and morbidity attributed to tobacco is highest? among the poorest people in the State. ???

Hypercholesterolemia as a risk factor of ACS

In this study, subjects with cholesterol value greater than 200 mg% were considered to have high cholesterol. The following were the cardinal findings:

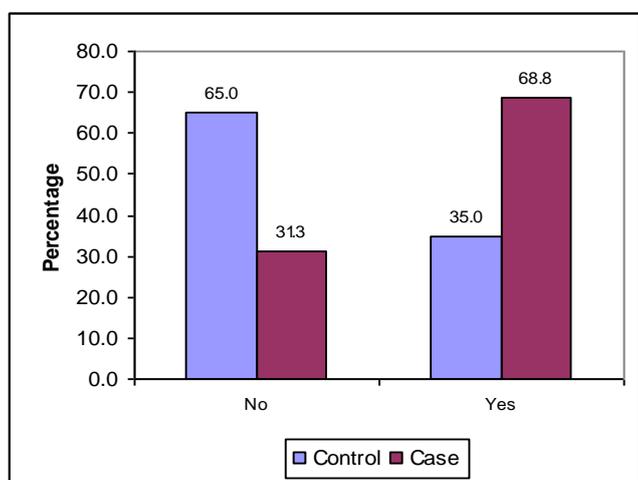
- 1) In this study, association of hypercholesterolemia with ACS is not statistically significant. This result is in contrast with those of many other studies. This could be because most of the cases had a history of hyperlipidaemia and were on medication for the same.
- 2) Association of low HDL cholesterol levels with ACS was found to be statistically insignificant. This again could be because of the fact that most of the cases were on empirical hypolipidemic drugs.
- 3) High LDL was found to have an OR of 2.25 with 95% CI [1.20-4.24]. This means that persons with high LDL levels (of over 130 mg%) have a 2.25 times higher risk of developing ACS than those with normal levels. So high LDL cholesterol levels was found to be a risk factor of ACS in this study.

??? In a study conducted by Wang TY et al,¹⁶ association of hypercholesterolemia as a risk factor of ACS was not found to be statistically significant which is similar to the result of this study. However, several other studies have proved significant association of hypercholesterolemia with ACS. For eg in a study conducted by Salimzadeh Hamideh et al,¹⁷ hypercholesterolemia was seen to have an odds ratio of 12 as a risk factor of ACS.

Unhealthy food habits like increased intake of fried food, fast food etc. lead to increased cholesterol level. Family history of hypercholesterolemia is also an important cause. High blood cholesterol, according to Mayo clinic, is one of the major risk factors of ACS¹¹. WHO states that hypercholesterolemia is responsible for one third of cardiovascular diseases worldwide. The Framingham Heart Study clearly mentions high levels of cholesterol as one of the preventable causes of coronary heart disease. High cholesterol level, high LDL level and low HDL levels are proven risk factors of ACS. According to AHA and ACC, cholesterol levels greater than 200 mg% is considered as high cholesterol level. ???

Table Distribution of study subjects based on smoking

SMOKING	YES	NO	Total
CASES	55 [68.8%]	25 [31.3%]	80
CONTROLS	28 [35%]	52 [65%]	80



Distribution of high total cholesterol level and low HDL cholesterol level among study subjects

Serum total cholesterol greater than 200 mg% is taken as the cut off value. Values above 200 mg% are considered having hypercholesterolemia and below 200mg% is normal⁶. Hypercholesterolemia was seen in 42 cases [52.5%] and 35 controls [43.75%]. OR was 1.42 with 95% CI [0.76 – 2.64]. Odds ratio of hypercholesterolemia is not found to be statistically significant in this study.

Discussion

In this study of 160 subjects which included 80 cases and 80 controls, 25 % [40 out of 160] were females and 75% [120 out of 160] were males. Among the cases, 63 were males and 17 were females whereas among the controls, 57 were males and 23 were females.

Risk Factors Observed in this study

The main objective of the study is to find out the association of known risk factors, smoking and hypercholesterolemia with ACS among patients admitted in CCU of Sree Gokulam Medical College, Venjaramoodu, Trivandrum.

??? By univariate analysis, crude odds ratio of the risk factors with 95% confidence intervals were obtained. For a variable to be a risk factor for a particular disease, the OR must be above one. For example, if x is the OR of a particular risk factor of ACS, the person with that risk factor will be having x times greater risk of developing ACS than a person who is not having that risk. Now this OR must be statistically significant and the upper and lower limit of 95% CI must be above one.???

Smoking

In this study, smoking is seen in 35 % controls and 68.8% cases. Smokers have 4.09 times higher risk of developing ACS than the persons who do not smoke.

In a study conducted by Indre Ceponiene et al, smoking as a risk factor of ACS has an OR of 7.03.¹⁴ Another study conducted by Ioannis

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Hypercholesterolemia as a Risk factor of ACS

There was no statistically significant association seen between hypercholesterolemia and ACS. This result is in contrast to that seen in several other studies. This could be because most of the cases had a history of hyperlipidemia and were on medication for the same.

In a study conducted by Wang TY et al,¹⁶ association of hypercholesterolemia as a risk factor of ACS was not found to be statistically significant which is similar to the result of this study. However, several other studies have proved significant association of hypercholesterolemia with ACS. For eg in a study conducted by Salimzadeh Hamideh et al,¹⁷ hypercholesterolemia was seen to have an odds ratio of 12 as a risk factor of ACS.

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Summary and Conclusion

Our study entitled 'Biosocial risk factors of Acute Coronary Syndrome in a Tertiary care Hospital in South Kerala– a Case Control Study' was conducted in 80 cases and 80 controls. The objective of the study was to find out the association of known risk factors [smoking, hypercholesterolemia] of ACS in a tertiary care hospital in south Kerala. Cases were the subjects with ACS admitted in CCU and controls were the subjects attending master health check- up and without ACS. Details were collected by personal interview with a semi structured questionnaire. Following that, stress was assessed by a separate scale known as Perceived Stress Scale by Sheldon Cohen. Data was entered in Microsoft Excel and analysed with SPSS version 17. Simple proportions were found out. Univariate analysis was done to find out the risk factors. In this study, smoking was found to be a risk factor of ACS. For hypercholesterolemia, a statistically significant association was not seen.

Recommendation

In this study, it is found out that smokers have a greater chance of developing ACS. So, the main aim should be measures to counter the risk factors. Public education and control of primordial and primary risk factors is absolutely essential.

Interventions to lower the risk, reduce the chances of developing coronary disease. Adherence to healthy lifestyle may prevent coronary heart disease.

Limitations

The limitations are similar to any other case control study. They are subject to selection bias and information on exposure is subject to observation bias.

Acknowledgements

We thank all the participants, who volunteered for this study.

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