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# Risk Factors Of ACS In Young Adults: A Cross-Sectional Analysis

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***Abstract***
***Introduction:*** *Acute coronary syndrome (ACS) is a leading cause of morbidity and mortality worldwide, with its prevalence rising among younger adults. While traditionally considered a condition affecting older individuals, recent studies have highlighted an increasing incidence of ACS in younger populations, emphasizing the importance of identifying early risk factors. This study aimed to assess the prevalence of risk factors of ACS in young adults.*
***Methods:*** *This cross-sectional observational study was conducted at the Department of Cardiology in 250 Baded General Hospital, Naogaon, Bangladesh. The study duration was one year. The study population consisted of a total of 100 young adults under the age of 35 years who were admitted to the study hospital for some form of acute coronary syndromes and had undergone coronary angiograms during the study period. Data analysis was carried out by using the statistical package SPSS version 23.0 Windows software.*
***Result:*** *The study of 100 participants found that 90% were male, with the majority (67%) aged 31-35 years. Most had normal BMI (83%), and 63% reported no stress. Chest pain was the most common symptom (95%), and hypertension (70%) was the most prevalent risk factor, followed by diabetes (55%) and smoking (43%). ECG findings showed that 50% had ST-segment elevation. Lipid profiles revealed elevated triglycerides (212.0 mg/dl) and LDL-C (138.3 mg/dl), with HDL-C within normal limits (39.1 mg/dl).*
***Conclusion:*** *This study concludes that the increasing prevalence of ACS among young adults and emphasizes the role of traditional risk factors such as hypertension, diabetes, dyslipidemia, smoking, and stress. The clinical and diagnostic findings in this study, including typical chest pain, ST-segment elevation on ECG, and elevated lipid levels, align with previous research, underlining the need for early detection and intervention to reduce the burden of ACS in younger populations.*

***Keywords:*** *Acute Coronary Syndrome (ACS), Young adults, Risk factors, Hypertension*

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## I. Introduction

Acute Coronary Syndrome (ACS), which includes conditions like unstable angina and myocardial infarction (MI), is a leading cause of morbidity and mortality worldwide. While ACS has traditionally been viewed as a disease affecting older adults, an increasing number of young adults are being diagnosed with cardiovascular diseases, including ACS. Recent studies indicate that ACS is becoming more prevalent in younger populations, which challenges the long-standing assumption that coronary artery disease (CAD) is primarily a concern for older individuals (1). In young adults, poor dietary habits, lack of physical activity, and rising obesity rates contribute to an increase in lipid abnormalities, placing individuals at higher risk of early-onset cardiovascular disease. Research has shown that young adults with dyslipidemia are at a significantly higher risk

of developing ACS compared to those with normal lipid profiles (2). Smoking is a well-known and modifiable risk factor for ACS. The harmful chemicals in tobacco smoke cause endothelial dysfunction, increase clotting, and accelerate atherosclerosis (3). Additionally, smoking reduces the levels of HDL-C, thus exacerbating the lipid abnormalities that contribute to ACS (4). Smoking is especially prevalent among younger populations, and its impact on cardiovascular health is seen at an earlier age compared to other risk factors. Researchers found that young adults who smoked were significantly more likely to experience a myocardial infarction than non-smokers(4). Diabetes mellitus, particularly type 2 diabetes, is increasingly common among young adults due to rising rates of obesity and sedentary lifestyles. Diabetes accelerates the development of atherosclerosis by promoting inflammation, insulin resistance, and endothelial dysfunction (5). High blood glucose levels can damage the blood vessels and increase the risk of plaque rupture, which is a primary trigger for ACS (6). In addition, diabetes often coexists with other risk factors such as hypertension and dyslipidemia, which further increases the likelihood of developing CAD at an early age (7). According to a study by Rask-Madsen et al. (8), diabetic young adults have a significantly higher risk of ACS compared to their non-diabetic counterparts, and effective management of diabetes is crucial for preventing early cardiovascular events. A family history of CAD is an important risk factor for ACS, particularly when it involves first-degree relatives. Genetic predispositions contribute to early-onset CAD and may involve inherited lipid disorders, early-onset hypertension, or other metabolic conditions that increase the risk of atherosclerosis (9). Individuals with a family history of heart disease are more likely to develop CAD at a younger age, which predisposes them to earlier ACS events. According to the Framingham Heart Study (10), the risk of cardiovascular disease doubles if a first-degree relative experiences a heart attack before the age of 55. Early screening and preventive measures are essential for individuals with a family history of cardiovascular disease to mitigate the risk of ACS. Chronic stress is increasingly recognized as an important modifiable risk factor for ACS in young adults. Stress can trigger the release of stress hormones such as cortisol and adrenaline, which can increase blood pressure, heart rate, and contribute to inflammation, all of which accelerate atherosclerosis and increase the likelihood of ACS (11). This study aimed to assess the prevalence of risk factors of ACS in young adults.

## II. Methods

This cross-sectional observational study was conducted at the Department of Cardiology*250 Baded General Hospital, Naogaon, Bangladesh*. The study duration was one year. The study population consisted of a total of 100 young adults under the age of 35 years who were admitted to the study hospital for some form of acute coronary syndromes and had undergone coronary angiograms during the study period. Informed written consent was obtained from all the participants before data collection, and ethical approval was obtained from the ethical review committee of the study hospital. Data were collected using the predesigned semi-structured data collection sheet. Data analysis was carried out by using the statistical package SPSS version 23.0 Windows software. Categorical data were analyzed by the Chi-Square test. A p-value of less than 0.05 was considered significant.

**Inclusion Criteria**

- Patients aged 35 years or younger
- Patients who underwent coronary angiogram
- Patients who had given consent to participate in the study.

**Exclusion Criteria**

- Patients over the age of 35 years
- Unable to answer the criteria question.
- Exclude those affected with other chronic diseases etc.

## III. Results

**Table 1**: Distribution of the participants by physical characteristics (n=100)

| Characteristics | n | % |
|---|---|---|
| Gender | | |
| Male | 90 | 90.0 |
| Female | 10 | 10.0 |
| Age | | |
| ≤20 | 5 | 5.0 |
| 21-30 | 28 | 28.0 |
| 31-35 | 67 | 67.0 |
| BMI | | |
| Normal (18.0-22.9) | 83 | 83.0 |
| Overweight (23.0-24.0) | 5 | 5.0 |
| Obese (>24.0) | 12 | 12.0 |

Among the participants (n=100), males constituted the majority (90%), with females accounting for only 10%. The age distribution showed that 5% were aged ≤20 years, 28% were between 21-30 years, and the majority (67%) were between 31-35 years. Regarding BMI, 83% of participants had normal weight (18.0-22.9), 5% were overweight (23.0-24.0), and 12% were classified as obese (>24.0). [Table 1]

**Table 2**: Distribution of study participants according to stress levels (n=100)

| Stress Level | n | % |
|---|---|---|
| No stress | 63 | 63.0 |
| Mild Stress | 22 | 22.0 |
| Moderate Stress | 15 | 15.0 |

Among the participants (n=100), 63% reported no stress, while 22% experienced mild stress. Moderate stress was observed in 15% of the participants. [Table 2]

**Table 3**: Distribution of the study subjects according to clinical presentation (n=100)

| Clinical presentations | n | % |
|---|---|---|
| Chest pain Atypical | 5 | 5.0 |
| Chest pain Typical | 95 | 95.0 |
| Shortness of breath | 30 | 30.0 |
| Nausea/vomiting | 10 | 10.0 |
| Palpitation | 8 | 8.0 |
| Sweating | 5 | 5.0 |

Chest pain was the most common clinical presentation among participants (n=100), with 95% reporting typical chest pain and 5% reporting atypical chest pain. Shortness of breath was noted in 30%, nausea/vomiting in 10%, palpitations in 8%, and sweating in 5% of the participants. [Table 3]

**Table 4**: Risk factor distribution of the participants (n=100)

| Risk Factors | n | % |
|---|---|---|
| Family History of CAD | 20 | 20.0 |
| Smoking | 43 | 43.0 |
| Diabetes Mellitus | 55 | 55.0 |
| Hypertension | 70 | 70.0 |
| Dyslipidemia | 48 | 48.0 |

Among the participants (n=100), hypertension was the most prevalent risk factor, affecting 70%, followed by diabetes mellitus (55%) and dyslipidemia (48%). Smoking was observed in 43% of the participants, while 20% had a family history of coronary artery disease (CAD). [Table 4]

**Table 5**: Distribution of the study subjects according to ECG findings (n=100)

| ECG findings | n | % |
|---|---|---|
| LBBB* | 3 | 3.0 |
| Normal sinus rhythm | 8 | 8.0 |
| Sinus Tachycardia | 18 | 18.0 |
| ST segment depression | 10 | 10.0 |
| ST-segment elevation | 50 | 50.0 |
| T wave changes | 13 | 13.0 |

*LBBB- Left Bundle Branch Block

ECG findings among participants (n=100) revealed that 50% had ST-segment elevation, while 18% showed sinus tachycardia and 13% exhibited T wave changes. ST segment depression was observed in 10%, normal sinus rhythm in 8%, and left bundle branch block (LBBB) in 3% of the participants. [Table 5]

**Table 6**: Distribution of the study subjects according to lipid profile (n=100)

| Lipid profile | Mean ± SD | Range (min-max) |
|---|---|---|
| Triglycerides (mg/dl) | 212.0 ± 52.9 | 91.0 – 368.0 |
| Total cholesterol (mg/dl) | 201.8 ± 81.8 | 66.0 – 446.0 |
| LDL-C (mg/dl) | 138.3 ± 46.1 | 48.0 – 268.0 |
| HDL-C (mg/dl) | 39.1 ± 6.1 | 29.0 – 49.0 |

The lipid profile analysis of participants (n=100) showed elevated mean triglyceride levels (212.0 ± 52.9 mg/dl) with a range of 91.0 to 368.0 mg/dl. The mean total cholesterol level was 201.8 ± 81.8 mg/dl, ranging from 66.0 to 446.0 mg/dl. LDL-C levels were higher than normal, with a mean of 138.3 ± 46.1 mg/dl (range: 48.0

– 268.0 mg/dl). Meanwhile, HDL-C levels were within normal limits, with a mean of 39.1 ± 6.1 mg/dl (range: 29.0 – 49.0 mg/dl). [Table 6]

## IV. Discussion

The age distribution of our study participants reveals that a majority (67%) were between the ages of 31-35, followed by 28% in the 21-30 age group, with only 5% under 20 years of age. These findings are consistent with trends reported in other studies, which suggest that ACS incidence in younger adults is on the rise, particularly in individuals aged 30-40 years (12). The BMI distribution in our cohort indicates that the majority (83%) of participants were classified as having a normal BMI, with a smaller proportion being overweight (5%) or obese (12%). These figures contrast with findings from other studies, where overweight and obesity have been identified as significant risk factors for ACS in younger adults. For instance, a study by Lavie et al. (13) showed that obesity is directly associated with increased cardiovascular risk and adverse outcomes in young adults. Stress levels in our study showed that a majority (63%) of participants reported no stress, with 22% experiencing mild stress and 15% reporting moderate stress. While the majority of participants had low-stress levels, moderate stress, which has been linked to a higher incidence of cardiovascular events, was still prevalent in a notable portion of the cohort. The impact of psychological stress on cardiovascular health, particularly in young adults, has been well-documented in prior research. A study by Steptoe et al. (11) concluded that chronic psychological stress significantly increases the risk of ACS by influencing inflammatory markers and contributing to endothelial dysfunction. The clinical presentations in our study showed that the majority (95%) of participants experienced typical chest pain, which is consistent with the classical presentation of ACS. However, 5% of participants reported atypical chest pain, which could be indicative of less common ACS presentations, especially in younger individuals. Atypical presentations in younger adults are often missed or misdiagnosed, leading to delayed treatment. Our findings are similar to those of a study by McGill et al. (14), which noted that atypical presentations are more common in younger adults with ACS, leading to a higher risk of diagnostic errors and delayed interventions. The risk factor distribution in this study revealed a high prevalence of hypertension (70%), followed by diabetes mellitus (55%), dyslipidemia (48%), and smoking (43%). Hypertension was the most prevalent risk factor, consistent with global studies that highlight its role as a key risk factor for early-onset ACS (15). The association between hypertension and increased cardiovascular risk is well-established, as it promotes atherosclerosis and plaque rupture, which can lead to acute coronary events. Similarly, the high rates of diabetes and dyslipidemia observed in this study align with findings from other studies, which report that metabolic disturbances significantly contribute to the development of early-onset ACS (16). Smoking remains one of the most modifiable risk factors for ACS, and efforts to reduce smoking rates among young adults are critical for preventing early coronary events. Interestingly, only 20% of participants reported a family history of coronary artery disease (CAD), which is lower than what is seen in some populations with a higher genetic predisposition to CAD (10). The lipid profile analysis revealed elevated mean triglyceride levels (212.0 ± 52.9 mg/dl) and LDL-C levels (138.3 ± 46.1 mg/dl), the mean HDL-C levels (39.1 ± 6.1 mg/dl) were within the lower end of the normal range, and low HDL-C is another important contributor to cardiovascular risk. These findings are consistent with studies showing that dyslipidemia, particularly elevated triglycerides and LDL-C, plays a significant role in the development of ACS in younger individuals (17).

*Limitations of The Study*

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

## V. Conclusion

This study concludes that the increasing prevalence of ACS among young adults emphasizes the role of traditional risk factors such as hypertension, diabetes, dyslipidemia, smoking, and stress. The clinical and diagnostic findings in this study, including typical chest pain, ST-segment elevation on ECG, and elevated lipid levels, align with previous research, underlining the need for early detection and intervention to reduce the burden of ACS in younger populations.

## VI. Recommendation

Based on the findings, it is recommended that healthcare professionals focus on early screening and intervention for young adults at risk of acute coronary syndrome (ACS), particularly those with hypertension, diabetes, dyslipidemia, and smoking habits. Lifestyle modifications, including smoking cessation, weight management, and stress reduction, should be emphasized.

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***Ethical approval:*** The study was approved by the Institutional Ethics Committee

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