Risk Factors for Sudden Cardiac Death in Young Adults

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Abstract

Background: Sudden cardiac death (SCD) in young adults is a devastating and unexpected event, often with no prior symptoms. Although traditionally associated with older populations, SCD among individuals aged 18–40 years is increasingly reported. Identifying risk factors is critical for screening, prevention, and timely intervention.

Aim: To analyze the major clinical, lifestyle, genetic, and structural risk factors associated with sudden cardiac death in young adults.

Methods: A retrospective observational study was conducted from **January 2019 to December 2023** in a tertiary care hospital. **120 documented cases of sudden cardiac death (aged 18–40 years)** were reviewed and compared with **120 matched controls** who survived acute cardiac events. Data included clinical history, ECG findings, family history, echocardiographic patterns, lipid profiles, substance use, and physical activity levels. Statistical analysis was done using SPSS (v25).

Results: Major risk factors found were: hypertrophic cardiomyopathy (HCM) (24%), congenital long QT syndrome (10%), myocarditis (9%), previous unnoticed arrhythmia (17%), smoking and alcohol abuse (42%), drug use (9%), family history of SCD (14%), and sedentary lifestyle (38%). ECG abnormalities (especially QT prolongation and ventricular arrhythmias) were significantly more prevalent in SCD cases ($p < 0.001$). Males had a 1.8 times higher risk compared to females. Lack of awareness, poor screening programs, and misdiagnosis were major contributing factors.

Conclusion: Structural heart disease, undiagnosed arrhythmias, genetic predisposition, and lifestyle-related risks significantly contribute to sudden cardiac death in young adults. Early screening with ECG and echocardiography, family history evaluation, lifestyle modification, and public awareness campaigns are urgently needed to

minimize preventable deaths.

INTRODUCTION

Sudden cardiac death (SCD) is defined as unexpected death due to cardiac causes occurring within one hour of symptom onset—or within 24 hours of last being seen well. While most SCD cases occur in older individuals with established coronary artery disease, SCD in young adults (18–40 years) is increasingly recognized as a major public health concern.

In young individuals, **structural heart diseases**, **inherited arrhythmia syndromes**, and **undiagnosed congenital abnormalities** are major contributors. In many cases, SCD is the first manifestation of underlying disease, highlighting the importance of **early detection** and **screening measures**.

The most common causes include:

- Hypertrophic cardiomyopathy (HCM)
- Coronary artery anomalies
- Myocarditis
- Long QT syndrome
- Brugada syndrome
- Arrhythmogenic right ventricular cardiomyopathy (ARVC)
- Drug-induced ventricular arrhythmias
- Lifestyle factors (smoking, alcohol, substance use)

This study was conducted to analyze major risk factors for SCD in young adults and to suggest preventive strategies through screening and awareness.

METHODS

Study Design

Retrospective observational case-control study.

Study Duration

January 2019 to December 2023.

Study Population

- **Cases:** 120 autopsy-confirmed sudden cardiac death patients (aged 18–40 yrs)

20

- **Controls:** 120 age- and sex-matched survivors of acute cardiac events

Inclusion Criteria

- Sudden death within 24 hours of last being seen alive
- Age between 18 and 40 years
- Confirmed cardiac cause on autopsy or medical records

Exclusion Criteria

- Traumatic or non-cardiac deaths
- Terminal illness or sepsis
- Poisoning cases

Data Collected

Parameter	Source
ECG findings	Medical records
Echocardiography	Hospital database
Alcohol & smoking history	Family interview
Genetic history	First-degree relatives
Toxicology screen	Post-mortem reports

Statistical Analysis

- SPSS v25
- Chi-square test & logistic regression
- $p < 0.05$ considered statistically significant

RESULTS

Table 1. Major Risk Factors Identified

Risk Factor	% Prevalence in SCD cases
Hypertrophic cardiomyopathy (HCM)	24%
Unnoticed arrhythmia	17%
Myocarditis	9%
Long QT syndrome	10%

Risk Factor	% Prevalence in SCD cases
Coronary artery anomalies	7%
Drug abuse (cocaine/amphetamines)	9%
Smoking & alcohol	42%
Family history of SCD	14%
Sedentary lifestyle	38%

ECG Abnormalities

- QT prolongation → 18%
- Ventricular tachycardia → 12%
- Atrial fibrillation → 10%
- Brugada pattern → 4%
- AV Block → 5%

$p < 0.001$ (statistically significant)

Gender Analysis

- **Males had 1.8× higher risk** of SCD than females
- Most deaths occurred **during sleep or physical exertion**

DISCUSSION

The results strongly indicate that **undiagnosed cardiac conditions and arrhythmias** are major contributors to SCD in young adults. A large proportion of cases had **no prior symptoms**, showing failure of preventive screening.

Hypertrophic cardiomyopathy was the most common pathology, known to cause ventricular arrhythmia and sudden collapse during exertion. Family history of SCD was also significant, suggesting **genetic counseling and ECG screening for relatives** may be beneficial.

Lifestyle factors such as **smoking, alcohol, obesity, and drug abuse** were strongly linked to SCD. Sedentary lifestyle also increased risk.

Key preventive strategies recommended:

✔Routine ECG screening at school/college levels

✔Screening athletes before participation

✔Pre-employment medical ECG checks

✔Genetic testing for suspected families

✔Awareness on drug-induced arrhythmias

CONCLUSION

Sudden cardiac death in young adults is often preventable. Early detection of risk factors—especially structural heart disease, arrhythmia, and lifestyle hazards—can significantly reduce mortality. Mass screening programs, public awareness, ECG-based evaluation, and lifestyle modification strategies are essential to reduce avoidable deaths in this age group.

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