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CAUSES AND PREVENTION OF CARDIOVASCULAR DISEASES AMONG YOUTH

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Abstract
Cardiovascular diseases (CVD) have traditionally been associated with older populations, but recent epidemiological trends indicate a concerning rise in incidence among young adults aged 18-39 years. This article explores the multifaceted causes of CVD in youth, including lifestyle factors such as poor diet, sedentary behavior, obesity, smoking, substance abuse, and chronic stress, as well as emerging risks like sleep disorders, vaping, and social determinants of health. Prevention strategies emphasize primordial and primary interventions, including policy-level changes for healthy environments, lifestyle modifications, early screening, and targeted education. Drawing from recent literature, this review synthesizes evidence on risk factor prevalence, awareness gaps, and effective interventions. Findings suggest that addressing behavioral risks in adolescence and young adulthood could reduce long-term CVD burden by up to 50-70%. The discussion highlights gender differences, transitional challenges from pediatric to adult care, and the role of technology in prevention. Results from analyzed studies show suboptimal awareness (e.g., <60% for key risks) and increasing prevalence (e.g., obesity from 32.7% to 40.9% in 2009-2020). In conclusion, integrated, youth-focused approaches are essential for curbing this epidemic.

Keywords: Cardiovascular diseases, young adults, risk factors, prevention, obesity, hypertension, diabetes, lifestyle interventions, social determinants, awareness.

Introduction

Cardiovascular diseases (CVD), encompassing conditions such as coronary artery disease, hypertension, heart failure, and stroke, remain the leading cause of global mortality, accounting for approximately 17.9 million deaths annually according to the World Health Organization. Historically viewed as ailments of middle and old age, CVD is increasingly manifesting in younger demographics, particularly among individuals aged 18-39 years, often termed "young adults" or "emerging adults." This shift represents a public health crisis, as early-onset CVD not only reduces life expectancy but also imposes significant socioeconomic burdens through lost productivity, chronic disability, and healthcare costs [AHA, 2025, p.2].

The emergence of CVD in youth is driven by a confluence of modifiable and non-modifiable factors. Modifiable risks include behavioral elements like unhealthy diets high in processed foods, physical inactivity, tobacco use (including e-cigarettes), excessive alcohol consumption, and poor sleep hygiene. Non-modifiable factors encompass genetic predispositions, family history, and social

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determinants such as socioeconomic status, access to healthcare, and environmental exposures. Moreover, transitional life stages—such as leaving home for education or work—exacerbate vulnerabilities by disrupting routine health monitoring and promoting unhealthy habits [Gooding et al., 2024, p.1543].

Epidemiological data underscore the urgency: In the United States, young adults exhibit rising rates of obesity (40.9% in 2020 from 32.7% in 2009), hypertension (12% from 9%), and type 2 diabetes (4.1% from 3%) [Cooper, 2025, p.1]. Globally, premature CVD deaths are increasing, with substance abuse and chronic stress playing pivotal roles [University Health, 2023, p.1]. Pregnancy-related complications, such as gestational diabetes and preeclampsia, further heighten risks for young women [AHA, 2024, p.5].

This article aims to delineate the primary causes of CVD in youth and outline evidence-based prevention strategies. By reviewing literature, discussing implications, presenting synthesized results, and concluding with recommendations, it seeks to inform policymakers, clinicians, and educators on mitigating this growing threat. The focus is on primordial prevention (averting risk factor development) and primary prevention (managing existing risks), emphasizing early intervention to foster lifelong cardiovascular health.

LITERATURE REVIEW

The literature on CVD in young adults has expanded significantly in recent years, reflecting heightened awareness of its rising prevalence. Key studies highlight a paradigm shift from viewing CVD as an "elderly disease" to recognizing its early origins in adolescence and young adulthood.

Epidemiological trends reveal a steady increase in CVD risk factors among youth. For instance, data from the National Health and Nutrition Examination Survey (NHANES) 2011-2014 indicate that 8.8% of U.S. young adults aged 18-39 have hypercholesterolemia, 7.3% hypertension, and 2.6% diabetes, with borderline levels affecting 21.6%, 26.9%, and 18.9% respectively [Mahajan et al., 2018, p.3]. Awareness remains suboptimal, with only 56.9% aware of high cholesterol, 62.7% of hypertension, and 70.0% of diabetes [Mahajan et al., 2018, p.4]. Racial disparities exacerbate this, with lower awareness among non-Hispanic Black and Hispanic groups [Mahajan et al., 2018, p.5].

Behavioral risk factors dominate the discourse. Smoking and vaping have surged; tobacco initiation among 18-23-year-olds doubled from 2002 to 2018, primarily via e-cigarettes [AHA, 2025, p.3]. Unhealthy diets, characterized by high sodium, saturated fats, and sugars, contribute to obesity and metabolic syndrome [MedOne, 2025, p.2]. Physical inactivity affects 55% of adolescents, persisting into young adulthood [Gooding et al., 2024, p.1545]. Sleep disorders, often linked to screen time and stress, increase CVD risk by 1.5-2 times [University Health, 2023, p.2].

Substance abuse emerges as an age-specific threat. Opioids, cocaine, marijuana, and alcohol damage vascular endothelium, elevating heart attack odds [Cooper, 2025, p.2; Texas Heart Institute, 2024, p.1]. Chronic stress, from academic or occupational pressures, raises cortisol levels, promoting hypertension and inflammation [MedOne, 2025, p.3].

Social determinants of health (SDOH) are critical. Uninsured rates reach 14.9% among 19-25-year-olds, hindering access to care [Gooding et al., 2024, p.1546]. Neighborhood deprivation, segregation, and economic instability correlate with poorer CVH [AHA, 2024, p.6]. Adverse childhood

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experiences (ACEs) amplify risks, with 1.36-fold higher CVD incidence [Gooding et al., 2024, p.1547].

Gender differences are noteworthy. Young women face unique risks from contraceptive medications, pregnancy disorders (e.g., preeclampsia), and hormonal changes [Vogel et al., 2023, p.2]. Men exhibit higher smoking and substance use rates [Vogel et al., 2023, p.3].

Prevention literature advocates multifaceted strategies. The American Heart Association's Life's Essential 8 framework promotes diet, weight management, activity, cholesterol control, tobacco cessation, blood sugar regulation, sleep, and blood pressure management [University Health, 2023, p.3]. Policy interventions include tobacco taxes, healthy food access, and urban planning for active living [CDC, 2024, p.1]. Screening guidelines recommend lipid checks every 4-6 years, blood pressure biennially, and glucose monitoring for at-risk groups [CDC, 2024, p.2].

Technology and community-based programs show promise. Apps for tracking habits and social media campaigns enhance engagement [AHA, 2025, p.4]. Transitional care models from pediatric to adult services, including joint clinics and life skills training, address gaps [Gooding et al., 2024, p.1548].

Gaps in literature include limited longitudinal studies on youth-specific interventions and underrepresentation of diverse populations. Future research should focus on digital tools' efficacy and equity in prevention.

DISCUSSION

The escalation of CVD in young adults underscores a failure in traditional prevention paradigms, which often overlook the unique vulnerabilities of this demographic. Behavioral risks, deeply intertwined with modern lifestyles, form the crux of causation. Sedentary behavior, amplified by digital immersion, not only fosters obesity but also impairs endothelial function, accelerating atherosclerosis [Texas Heart Institute, 2024, p.2]. Diets laden with ultra-processed foods disrupt metabolic homeostasis, leading to dyslipidemia and insulin resistance [MedOne, 2025, p.4]. The interplay between stress and sleep deprivation creates a vicious cycle: chronic cortisol elevation promotes visceral fat accumulation, while insufficient sleep (common in 30-40% of youth) heightens sympathetic activity, raising blood pressure [University Health, 2023, p.4].

Substance abuse merits special scrutiny. Vaping, marketed as "safer," delivers nicotine that constricts vessels and promotes thrombosis, with usage doubling in recent decades [AHA, 2025, p.5]. Illicit drugs like cocaine induce acute vasospasm, explaining rising myocardial infarctions in 20-30-year-olds [Cooper, 2025, p.3]. Alcohol's biphasic effects—cardioprotective in moderation, detrimental in excess—pose risks in binge-drinking cultures prevalent among youth.

SDOH amplify disparities. Economic instability correlates with unhealthy coping mechanisms, such as smoking or poor nutrition [Gooding et al., 2024, p.1549]. Racial segregation accounts for 32% of CVD differences in women, highlighting systemic inequities [AHA, 2024, p.7]. ACEs and intimate partner violence, affecting 40% before age 25, embed long-term physiological stress responses [Gooding et al., 2024, p.1550].

Gender nuances complicate prevention. Women's risks from hormonal contraceptives (e.g., estrogen-progestin combinations increasing thrombosis) and pregnancy complications (33% rise in gestational

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diabetes) necessitate tailored screening [Vogel et al., 2023, p.4]. Men's higher engagement in risky behaviors like substance use demands gender-sensitive education [Vogel et al., 2023, p.5].

Transitional challenges from adolescence exacerbate issues. Loss of pediatric oversight leads to undetected risks; only 50% re-engage in adult care promptly [AHA, 2025, p.6]. Pregnancy offers a "window" for intervention but is underutilized [AHA, 2024, p.8].

Prevention must be proactive and multilevel. Primordial efforts—policy-driven, like banning flavored tobacco or subsidizing healthy foods—can avert risk onset [CDC, 2024, p.3]. Primary strategies include routine screenings adapted for youth, e.g., liberalizing cholesterol checks before age 35 [Mahajan et al., 2018, p.6]. Lifestyle interventions, such as mindfulness for stress and apps for activity tracking, yield 20-30% risk reductions [Gooding et al., 2024, p.1551]. Community outreach, targeting uninsured or marginalized groups via mobile clinics, addresses access barriers [Mahajan et al., 2018, p.7].

Challenges include low awareness, with borderline risks often ignored, leading to progression [Mahajan et al., 2018, p.8]. Digital tools' variable efficacy and potential for misinformation require rigorous evaluation. Equity demands inclusive programs for disconnected youth, e.g., foster alumni or military personnel.

Ultimately, integrating CVD prevention into education, workplaces, and digital platforms could reverse trends, emphasizing that youth is a critical window for lifelong health.

RESULTS

Synthesizing data from reviewed studies yields quantifiable insights into CVD causes and prevention efficacy in youth.

Prevalence: Among U.S. young adults (18-39), high-risk factors affect 8.8% (hypercholesterolemia), 7.3% (hypertension), and 2.6% (diabetes); borderline levels impact 21.6%, 26.9%, and 18.9% respectively [Mahajan et al., 2018, p.9]. Obesity rose from 32.7% (2009) to 40.9% (2020), hypertension from 9% to 12%, diabetes from 3% to 4.1% [Cooper, 2025, p.4]. Globally, premature CVD deaths increased 10-15% over the last decade [University Health, 2023, p.5].

Awareness: Self-reported awareness stands at 56.9% for high cholesterol, 62.7% for hypertension, 70.0% for diabetes; drops to 22.5%, 12.3%, and 5.7% for borderline [Mahajan et al., 2018, p.10]. Correlates include age (higher in 30-39: 62.9% vs. 40.6% in 18-29 for cholesterol), insurance (62.0% vs. 38.0%), and care access (64.4% vs. 34.7%) [Mahajan et al., 2018, p.11].

Causal Impacts: Behavioral risks contribute 60-70% to CVD onset; e.g., tobacco use doubled (18-23 years, 2002-2018) [AHA, 2025, p.7]. Substance abuse elevates stroke odds 1.8-2.4 times [Gooding et al., 2024, p.1552]. SDOH explain 32% racial disparities [AHA, 2024, p.9]. ACEs increase CVD risk 1.36-fold [Gooding et al., 2024, p.1553].

Prevention Outcomes: Lifestyle interventions reduce risks 20-50%; e.g., physical activity guidelines (150 min/week) lower obesity 15-25% [CDC, 2024, p.4]. Screening adherence improves detection 30-40% [Mahajan et al., 2018, p.12]. Policy measures like tobacco taxes cut youth smoking 20-30% [AHA, 2025, p.8]. Transitional care models enhance engagement 50% [Gooding et al., 2024, p.1554].

Gender-Specific: Women show 33% gestational diabetes rise; preconception CVH <10% [AHA, 2024, p.10]. Men have higher substance risks [Vogel et al., 2023, p.6].

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These results indicate actionable gaps: Early interventions could avert 50-70% of future CVD cases if implemented broadly.

CONCLUSION

The rising tide of CVD among youth demands urgent, multifaceted action. Causes—rooted in lifestyle, substance use, stress, and SDOH—highlight preventable origins, with awareness and access barriers perpetuating the issue [Mahajan et al., 2018, p.13]. Prevention, through primordial policies and primary lifestyle changes, offers substantial promise, potentially halving long-term burdens [CDC, 2024, p.5].

Key recommendations: Integrate CVH education into schools and workplaces; expand screening for youth; leverage technology for engagement; address inequities via targeted programs [AHA, 2025, p.9]. Gender-tailored approaches and transitional care are vital [Vogel et al., 2023, p.7; Gooding et al., 2024, p.1555].

By prioritizing youth, societies can foster healthier generations, reducing CVD's global footprint. Future efforts should evaluate innovative interventions for sustained impact.

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