

Relation to Social Determinants in Cardiovascular Disease Risk Profile: An Alarming View

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Abstract

Globally, Cardiovascular disease (CVD) is one of the major reasons for mortality. Cardiovascular health in children and adults is profoundly affected by the milieu of early life. Currently, CVD is taking a different turn based on social antecedents like poverty, the difference in socio-economic status, gender inequality, being a fluid person, and work life in harmony increases the risk of getting into CVD, that too in vulnerable populations like racial and ethnic minorities, women, the elderly, the chronically ill individual with disabilities, lesbian, gay, bisexual, transgender, queer and racism play a significant role in conditioning disease burden and modulating outcomes of CVD. People with low socioeconomic status increase the hypothalamic pituitary adrenal axis (HPA axis) in the body, due to stress response, and at the end, increased cortisol and sympathetic nervous system activity lead to decreased angiogenic activity. People from low socioeconomic backgrounds, loneliness, and social isolation in many cases like racism, ethnic minorities, children, women, elderly, and chronically ill individuals with disabilities, are exposed to constant stress because of a lack of their fundamental needs. The wider introduction of universal screening for social factors that impact cardiac health will help to identify children and families at risk. Hence, aggressive screening tests beginning at an early age will be beneficial for early detection and treatment. Healthcare professionals need to pay attention to promoting health education and awareness aids to decrease CVD-associated mortality.

Keyword: Cardiovascular disease; Social determinants of health (SDoH); Vulnerable population; HPA (Hypothalamic Pituitary Adrenal) axis; Angiogenic activity.

INTRODUCTION

In the last two decades, research evidence proved that CVD has occurred due to increased LDL, VLDL, increased insulin resistance, and some

inflammatory response in the body.¹ Now, the current decade focuses on the lack of social determinants that increase the risk of getting into CVD. Social determinants are the factors that influence health based on economic, social, environmental, and psychological factors. Cardiovascular disease is considered one of the major reasons for mortality globally. Nowadays it is fueled by childhood obesity, mental stress, metabolic disorders, lack of nutrition, community racism, discrimination, being stable in this competitive world, and soon.² There is an increase in heart problem cases in India according to the American Heart Association, and mostly adults and children are affected by CVD, due to the drastic changes in the lifestyle of people with good socioeconomic backgrounds, and many

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of them are reported as premature mortality and it has increased to 59% from 1990 to 2010.³

SOCIOECONOMIC STATUS

In low socioeconomic backgrounds, access to basic needs like good shelter, nutritious food, proper road facilities, transportation, public health facilities, and medicines is quite hard for them to get. Even at work or at school, constant exposure to stress over time^{2,4} is frequently simulated by the HPA axis mechanism and can contribute to decreased angiogenic activity, leading to the release of cortisol, and increased sympathetic nervous system activity leading to a complex physiological process.¹ Cortisol, often referred to as the "stress hormone," plays a key role in the body's response to stress. Elevated levels of cortisol, as a result of chronic stress, can have detrimental effects on the cardiovascular system, including the inhibition of angiogenesis. Angiogenesis is a crucial process for the growth of new blood vessels, which is essential for tissue repair and regeneration, including in the cardiovascular system. Overall, the HPA axis response to stress, particularly the release of cortisol and increased sympathetic nervous system activity can disrupt the normal physiological processes involved in angiogenesis, potentially contributing to decreased angiogenic activity and impacting cardiovascular health. As a result, these are an add-on for the cardiovascular disease risk profile. Over time, they also become resistant to the HPA axis mechanism by the "negative feedback mechanism" causing a high chance of developing early Type-2 diabetes mellitus and hypertension.⁴

LONELINESS AND SOCIAL ISOLATION

Loneliness and social isolation in many cases like racism, ethnic minorities, women, the elderly, the chronically ill individual with disabilities, lesbian, gay, bisexual, transgender and queer, people belonging to other communities, racism, and people having low socioeconomic status activates central response HPA mechanism and causes an increase in cortisol level in the body. As cortisol rushes the feel of hunger derivatives and the glucose is taken up by the body from stored glycogen as this mechanism continues, the person is neither exposed to type-2 diabetic mellitus nor hypertension due to endothelial destruction.^{2,5}

Green Environment^{6,7}

A green environment is said to lower stress, keeping the environment green motivates us to

be physically active, reduces oxidative stress, increases tissue angiogenesis, and reduces the level of catecholamine activity in the body. Catecholamines are indicators of stress as they activate the sympathetic nervous system. New research sheds light on how the immune system reacts to long-term stress and how SDoH can cause CVD. Understanding how detrimental SDoH may impact important signaling pathways facilitates the interpretation of clinical trial data and improves the capacity to quantify important adversity biomarkers. The novel investigations examine the role of stress hormones, inflammation, and other cellular processes induced by SDoH in the risk of CVD.^{6,7}

PHYSICAL INACTIVITY

Physical inactivity leads to obesity and can add as a risk factor for the cardiovascular disease profile, which is highly seen across industrial areas.⁸ In an urban environment, well-developed industrial facilities, transport facilities, parks, schools, corporate offices, industries, sophisticated colleges, and hospitals make lives easier and become a barrier to physical activity among children and adults. Simultaneously, as their intake is high, their waist circumference and BMI increase, which acts as an add-on to their cardiovascular disease risk profile. Screen time is strongly and consistently linked to an increase in overweight and obesity in both adults and children. Screen time on television is the strongest correlation.⁹ Physical activity must be promoted in older people by asking them to do some small work as they become physically inactive as days pass due to health issues.¹⁰

NEIGHBORHOOD COMPRESSION

However, people from low socioeconomic backgrounds have environments that are noisy and have a higher crime rate, and they "get into the body" to accelerate the progression of cardiovascular disease by activating the amygdala, a region of the brain that senses the degree of threat from external stimuli. When the amygdala is constantly activated, it is associated with greater metabolic activity in the bone marrow. Research also suggests that this connection is mediated by the sympathetic nervous system, which, under conditions of threat, causes hematopoietic stem and progenitor cells to be produced from bone marrow.

Progenitor cells are selectively mobilized in response to stress, and immature myeloid cells with a high pro-inflammatory bias dominate this process.^{1,6} This chain of events starts to occur and starts to migrate to trauma and infection, including atherosclerotic lesions, and over time adds to the risk of getting CVD.

QUALITY OF EDUCATION

Research from 2010, has found that CVD biomarkers in low socioeconomic status populations are comparatively high.^{11,12} That too, students are pushed into a zone where their basic nutrition and education quality have to be compromised. These children experience stress from a variety of sources, including inadequate transportation, clothing, and bullying at school or in college. As a result, over time, children develop endothelial dysfunction (caused by hypertension), inflammation, and increased platelet activation; in certain cases, these symptoms may also manifest as adiposity metrics, insulin resistance, and metabolic syndrome.

WORK LIFE BALANCE

The recent study reported that, couples have found that a dysfunctional relationship puts the female under more stress compared with the male. For the majority of males who already have cardiovascular disease and are under job stress, their chances of getting affected are constantly increasing because of the frequent stimulation of the sympathetic nervous system.¹ This has a negative response in the myocardial contractility, and if days pass, they start to loosen their muscle's elastic nature, where proper relaxation and constriction of blood vessels don't occur.

Adverse early childhood exposure is an important determinant of lifetime health settings for children on a trajectory of increased risk for the development of cardiometabolic risk. Psychological stressors, negative life events, and low family income are associated with childhood overweight and obesity.¹³ Similarly, socioeconomic disadvantage at individual to neighborhood levels, poor hygiene, unhealthy lifestyle habits, limited access to health care, childhood obesity, and cardiometabolic risk are predicted cardiovascular disease and related mortality. Importantly, early life of childhood cardiovascular disease risk factors, particularly childhood obesity, independently predict adult

cardiovascular disease.

FUTURE ROADS

Healthcare professionals will need to consider a public health paradigm of preventing and promoting cardiac health across the lifespan. First, need to recognize the social determinants of health have a profound influence on CVD. In this continuation, need to implement universal screening for social factors that identify children at risk for heart disease and connect them to community resources. The following strategies are initial steps to detect and reduce cardiac vascular mortalities. They are,

Based on the action

- Schemes have to be introduced to meet the needs of low socioeconomic people, which includes free medicine and the setting up of Public Health Centers in many rural places.
- Providing the basic set-up for personal hygiene and providing a peaceful environment.
- Low cost, high quality treatment must be provided.
- To increase social workers and assist in conducting more activities in homes, rehabilitation centers, cancer centers, and so on.
- Laws must be framed against people opposing or discriminating against the vulnerable population.

Lab research

- Identify key biological markers associated with social determinants, which may serve as an effective CVD risk prediction tool.
- To develop tests for these poor CVD markers with high risk.
- To develop a risk factor tool panel based on social determinants of health.

Educational Institution

- In educational institutions, physical activity must be incorporated, and the art of handling stress must be incorporated from childhood.
- Educational preaching must be done to students based on physical inactivity and stress.

- Special care and steps must be taken for the students who are coming under low Socioeconomic Status, as they may have nutrition deficiency, inappropriate BMI, and unhealthy life structure.¹⁵

In-Home

- Raising awareness and promoting physical activity among children through parents.
- A proper diet must begin from home and maintaining a proper BMI it may reduce the risk of getting MI.

Finally, need to detect early and intervene for developmental delays in children with CHD to optimize long-term child potential. Hence, professionals need to pay attention to promoting health education, and creating awareness activities such as walking, yoga, and meditation to be practiced regularly will certainly aid in preventing the rising epidemic of cardiac vascular diseases.^{14,15}

CONCLUSION

Significant effects of SDoH are seen on CVD risk and outcomes, especially in under privileged areas. Apart from enhancing SDoH measurement in cardiovascular research and care, there is a chance to form interdisciplinary teams that delve further into the connections between SDoH and the biological processes that influence CVD risk and consequences. Hence, all efforts are required to be proactively taken to clearly understand the role of risk factors in the emerging epidemic and for their effective control. General screening for conventional risk factors right from a younger age may increase awareness; and help in promoting lifestyle changes that can prevent or slow atherogenesis. A healthy lifestyle, balanced diet, and regular physical exercise should be instilled right from the beginning of childhood aids to reduce Cardiovascular mortalities. Lastly, need to develop customized interventions based on a nuanced understanding of social and environmental influences on cardiovascular health. Further, future research on mixed method approaches of relationships between SDoH and CVD should be used to better understand how individual lived experiences of marginalization and discrimination affect cardiovascular health outcomes.

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