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EXPLORING THE CONNECTION BETWEEN CHRONIC STRESS AND CARDIOVASCULAR DISEASES: INSIGHTS FROM THE MEDITERRANEAN DIET

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Abstract:

Introduction: Chronic stress, often labelled as the "disease of the century," is a pervasive issue in modern society, exacerbated by continuous digital connectivity, socioeconomic pressures, and the relentless drive for efficiency. Recognizing the profound impacts of chronic stress on various bodily systems, including immune, neurological, and endocrine, highlights its significance beyond mere psychological distress.

Methodology: This integrative study explores the effects of the Mediterranean diet on preventing cardiovascular diseases in the context of chronic stress. Comprehensive searches were conducted in the National Library of Medicine (PubMed) and the Online Electronic Scientific Library (SCIELO) using the keywords "chronic stress treatment" and "chronic stress and the heart." Initial findings yielded 52,040 and 10,589 articles in PubMed and 105 and 37 in SCIELO, respectively. After a detailed review, nine pertinent studies were selected based on various methodologies, including cohort studies and systematic literature reviews, with considerations for relevant national regulations.

Discussion: Cardiovascular health is crucial for sustaining a long and high-quality life. Understanding the physiological mechanisms and potential dysfunctions of the cardiovascular system—which includes the heart, blood vessels, and blood—is essential for comprehensive health

knowledge. The increasing correlation between chronic stress and cardiovascular health poses significant public health concerns, given the ongoing demands for productivity and escalating socioeconomic pressures. This study underscores the need to assess chronic stress's impact on cardiovascular health and overall quality of life, recognizing the severe implications these diseases have on well-being and mortality risk.

Conclusion: The linkage between chronic stress and cardiovascular health is undeniable. Chronic stress exerts a significant pathophysiological impact on the cardiovascular system, with crucial clinical implications. This underscores the need for targeted strategies to mitigate stress and promote cardiovascular health, particularly in the face of modern societal challenges.

Keywords: Heart and Stress, Cardiac conditions, Long-term stress.

INTRODUCTION:

Chronic stress is a common ailment called the "disease of the century." Stress management has become crucial for day-to-day survival in a time of continual digital connectedness, socioeconomic pressures, and the tireless pursuit of efficiency. But for countless individuals worldwide, what was once an adaptive reaction to impending danger has become a continual hardship. This global issue impacts people of various ages, genders, and cultural backgrounds. According to epidemiological studies, the incidence has alarmingly risen in recent decades. These days, chronic stress is a worldwide occurrence whose development appears unstoppable due to several lifestyles and sociodemographic characteristics that increase an individual's susceptibility to the illness (Münzel et al., 2021).

In all its forms, stress's history is a fundamental story of humankind's development. Stress is a constant, from our ancestors' struggles to get food and shelter to the difficulties we now confront about our jobs, money, and relationships with others. Nonetheless, particular consideration should be given to the unique characteristics of current chronic stress symptoms. Chronic stress is a result of a wide range of stimuli. People encounter several obstacles that might lead to a chronic state of stress, including the never-ending demands of work, personal struggles, societal pressures, and the impact of technology on daily life.

Growing interest in ways to lessen chronic stress's negative effects coincides with increased knowledge of its associated risks (Kinnunen et al., 2020).

Table 1: Causes and Effects of Chronic Stress

Causes of Chronic Stress	**Effects of Chronic Stress**
Persistent work demands	Impairment of the immune system
Personal struggles	Disruption of neurological functions
Societal pressures	Alterations in endocrine functions
Technological impacts on daily life	Long-term health issues, particularly cardiovascular problems
Continuous pursuit of efficiency	General deterioration of physical and mental health
Socioeconomic pressures	Cultural pressures across various groups

Table 2: Strategies for Managing and Preventing Chronic Stress

Stress Management Strategies	**Preventive Measures**
Balanced diet	Establishing healthy boundaries
Regular exercise	Embracing a culture of well-being
Cognitive Behavioral Therapy (CBT)	Effective use of coping mechanisms
Mindfulness techniques	Seeking social support

A balanced diet, exercise, cognitive behavioural therapy, mindfulness techniques, and seeking out social support are just a few strategies that are successful in lowering chronic stress. Chronic stress has a depth to it that goes beyond mental illness. Persistent stress affects the human body profoundly and is not merely a mental illness. Chronic stress can set off a chain reaction that can harm one's long-term health, affecting everything from the immune system to the neurological system to the endocrine system. The task of preventing chronic stress is fundamental and multifaceted. You may reduce your risk of developing this crippling illness by establishing healthy boundaries, embracing a culture of well-being, and using effective coping mechanisms. This scholarly paper will address preventative methods and provide a detailed analysis of the impact of long-term stress on cardiovascular health (Khraishah et al., 2022).

METHODOLOGY:

The literature on the effect of the Mediterranean diet on the prevention of cardiovascular illnesses has been integrated and analyzed for this study. The study was carried out in the following ways after the topic was defined: selecting pertinent databases and determining search terms; creating inclusion and exclusion criteria for articles and then selecting those that meet these requirements; organizing the selected elements; and, lastly, presenting and analyzing the data. The National Library of Medicine (PubMed) and the Online Electronic Scientific Library (SCIELO) databases were chosen, and the search terms utilized were "chronic stress treatment" and "chronic stress and the heart." We found 52040 and 10589 results in PubMed, respectively (Tran & Gellner, 2023; Yegorov et al., 2020).

We discovered 105 and 37 studies at SCIELO, respectively. Articles written in English and released between 2022 and 2024 were first added. Only comprehensive research on the Mediterranean diet was taken into account. We did not include studies conducted before 2022, unfinished abstracts, irrelevant articles published in scholarly journals, or studies with ambiguous methodology. After selecting the articles, we arranged them according to the source database, journal name, year of publication, and title. We employ the content analysis method (Liu et al., 2020).

One of the main pillars of human well-being is cardiovascular health, which is necessary to ensure a long and healthy life. The cardiovascular system's physiological mechanisms, functions, potential causes of malfunction, and associated diseases are crucial for thorough knowledge. This system encompasses the phases of reading, classifying, categorizing, evaluating, and interpreting data. It is made up of the heart, blood vessels, and blood. After a thorough examination, we narrowed the field down to nine references. Our selection process considered several approaches, including cohort studies and systematic literature reviews, in addition to considering pertinent national laws (Crielaard et al., 2021; Sandrini et al., 2020).

DEVELOPMENT:

The heart works as a sophisticated pump, pushing blood through veins, arteries, and capillaries to provide nutrients and oxygen to cells while expelling waste products from metabolism like carbon dioxide. The cardiac cycle has four chambers: two higher atria and two lower ventricles—the atria contract first, and then the ventricles contract, distributing blood throughout the body. The heart's electrical system coordinates this process to guarantee proper synchronization and rhythm. Nonetheless, several factors, including smoking, diabetes, obesity, high blood pressure, and high cholesterol, can cause cardiovascular dysfunction. Peripheral vascular disease, arrhythmias, heart failure, hypertension, and coronary heart disease are among the conditions that these variables can precipitate (McLellan et al., 2020; Zheng et al., 2022).

These illnesses have severe side effects, such as diminished quality of life, incapacity, and irreparable brain or cardiac damage. Preventive measures are crucial because of the possible severity. Adopting a healthy lifestyle is vital, including maintaining a balanced diet, exercising regularly, quitting smoking, managing stress, and periodically checking risk factors. Furthermore, it is essential to manage underlying illnesses like diabetes and obesity properly. In conclusion, chronic

stress is a troubling element that requires care, and cardiovascular health is critical to the body's optimal operation. In the context of modern times, the growing relationship between chronic stress and cardiovascular health raises red flags in the public health domain. The constant demands for productivity and the mounting socioeconomic pressures that accompany them define our times (Raposo de Magalhães et al., 2020).
In light of this, it becomes critical to determine the effects of chronic stress on people's quality of life and its impact on the cardiovascular system. The link between long-term stress and heart disease has been confirmed by numerous epidemiological research. The hazards are concerning, according to longitudinal research: those who experience high amounts of stress, whether at work or in the home, have a significantly higher risk of coronary heart disease. According to several of these studies, stress poses a risk that is even greater than that of conventionally acknowledged risk factors, including smoking, high blood pressure, and high cholesterol (Codeluppi et al., 2021).

Moreover, stress seems to be a sneaky culprit in the emergence of variables that increase the risk of cardiovascular illnesses. As a result of the convergence of type 2 diabetes, hypertension, and obesity, there is an increase in cardiovascular morbidity and death. Stress fundamentally triggers the old "fight or flight" reaction, an evolutionary strategy aimed at priming the human body to confront impending threats. This reaction results in an increase in the release of stress-related chemicals like cortisol and adrenaline. Several detrimental effects occur when this secretion is persistently elevated (Leung et al., 2022).

RESULT:
Adrenaline, for instance, increases the risk of chronic hypertension by causing vasoconstriction, which raises blood pressure and overloads the heart. Simultaneously, cortisol promotes lipolysis, raising the amount of free fatty acids in circulation. The ultimate result of this illness may be the development of atherosclerotic plaques, which restrict blood flow and make people more vulnerable to heart attacks and strokes. Moreover, it has been demonstrated that a chronic inflammatory milieu, frequently linked to stress, might promote atherosclerosis. In a wider clinical context, chronic stress can be a trigger for several cardiovascular diseases, including cardiac arrhythmias brought on by irregular heartbeats and hypertension, which is brought on by persistently elevated blood pressure (Gonçalves et al., 2020).

This group of stress-related illnesses also includes myocardial infarction, heart failure, and coronary heart disease. These illnesses have a catastrophic effect on one's quality of life. They seriously jeopardize people's well-being in addition to raising the chance of death. Many people still experience the social stigma associated with cardiovascular disease, which contributes to feelings of isolation, depression, and a general decline in mental health. In addition to dealing with physical limitations, ongoing pain, the need for frequent doctor visits, regular medication, and the constant shadow of concern about their health. Because stress and cardiovascular disease development are closely related, we must arm ourselves with therapeutic tools for managing stress and preventive measures (Agorastos & Chrousos, 2022; Brunt et al., 2020; Holze et al., 2020).

One method that helps patients recognize and reorganize dysfunctional thoughts and behaviours is cognitive behavioural therapy (CBT). It enables a more suitable and robust response to obstacles when carried out under the supervision of an expert. Pharmacotherapy, which includes beta-blockers, antidepressants, and benzodiazepines, may also be prescribed under certain circumstances. However, because of the possible hazards involved, its administration needs to be closely monitored by a medical professional. An individual can counteract the physiological "fight or flight" response by using non-pharmacological approaches like relaxation techniques, which include meditation, controlled breathing, and biofeedback (Yang et al., 2023).

This promotes a state of calm and equilibrium. However, consistent physical activity serves a dual purpose: nourishing the mind and body and generating endorphins, potent well-being mediators. Externalizing feelings is also therapeutic; places like support groups and individual counselling sessions are essential. Several tactics can be used to stop stress from starting or getting worse. It's important to balance work and personal obligations, which may be achieved by doing small things like turning off work alerts after hours or prioritizing family time (Munan et al., 2020; Sandrini et al., 2020).

The foundation of prevention is having a balanced diet, getting enough sleep, managing your time well, and consuming fewer stimulants. It is impossible to overstate the value of solid social links since they are a support system. Last, stress education via seminars and workshops makes people more resilient and capable of handling adversities (O'Connor et al., 2021).

CONCLUSION:

It is impossible to ignore the connection between long-term stress and cardiovascular health. Stress has a substantial pathophysiological effect on the cardiovascular system, with significant clinical ramifications. In light of the current circumstances of rising work-related and socioeconomic stress levels, stress management techniques must be promoted to improve quality of life and heart health.

REFERENCES:

1. Agorastos, A., & Chrousos, G. P. (2022). The neuroendocrinology of stress: the stress-related continuum of chronic disease development. Molecular Psychiatry, 27(1), 502-513.
2. Brunt, V. E., Gioscia-Ryan, R. A., Casso, A. G., VanDongen, N. S., Ziemba, B. P., Sapinsley, Z. J., Richey, J. J., Zigler, M. C., Neilson, A. P., & Davy, K. P. (2020). Trimethylamine-N-oxide promotes age-related vascular oxidative stress and endothelial dysfunction in mice and healthy humans. Hypertension, 76(1), 101-112.
3. Codeluppi, S. A., Chatterjee, D., Prevot, T. D., Bansal, Y., Misquitta, K. A., Sibille, E., & Banasr, M. (2021). Chronic stress alters astrocyte morphology in the mouse prefrontal cortex. International Journal of Neuropsychopharmacology, 24(10), 842-853.
4. Crielaard, L., Nicolaou, M., Sawyer, A., Quax, R., & Stronks, K. (2021). Understanding the impact of exposure to adverse socioeconomic conditions on chronic stress from a complexity science perspective. BMC medicine, 19, 1-20.
5. Gonçalves, C. A. M., Dantas, P. M. S., Dos Santos, I. K., Dantas, M., Da Silva, D. C. P., Cabral, B. G. d. A. T., Guerra, R. O., & Junior, G. B. C. (2020). Effect of acute and chronic aerobic exercise on immunological markers: a systematic review. Frontiers in physiology, 10, 1602.
6. Holze, F., Vizeli, P., Müller, F., Ley, L., Duerig, R., Varghese, N., Eckert, A., Borgwardt, S., & Liechti, M. E. (2020). Distinct acute effects of LSD, MDMA, and D-amphetamine in healthy subjects. Neuropsychopharmacology, 45(3), 462-471.
7. Khraishah, H., Alahmad, B., Ostergard Jr, R. L., AlAshqar, A., Albaghdadi, M., Vellanki, N., Chowdhury, M. M., Al-Kindi, S. G., Zanobetti, A., & Gasparrini, A. (2022). Climate change and cardiovascular disease: implications for global health. Nature Reviews Cardiology, 19(12), 798-812.
8. Kinnunen, H., Rantanen, A., Kenttä, T., & Koskimäki, H. (2020). Feasible assessment of recovery and cardiovascular health: accuracy of nocturnal HR and HRV assessed via ring PPG in comparison to medical grade ECG. Physiological measurement, 41(4), 04NT01.
9. Leung, C. S., Kosyk, O., Welter, E. M., Dietrich, N., Archer, T. K., & Zannas, A. S. (2022). Chronic stress-driven glucocorticoid receptor activation programs key cell phenotypes and functional epigenomic patterns in human fibroblasts. Iscience, 25(9).
10. Liu, W.-Z., Zhang, W.-H., Zheng, Z.-H., Zou, J.-X., Liu, X.-X., Huang, S.-H., You, W.-J., He, Y., Zhang, J.-Y., & Wang, X.-D. (2020). Identification of a prefrontal cortex-to-amygdala pathway for chronic stress-induced anxiety. Nature Communications, 11(1), 2221.

11. McLellan, M. A., Skelly, D. A., Dona, M. S., Squiers, G. T., Farrugia, G. E., Gaynor, T. L., Cohen, C. D., Pandey, R., Diep, H., & Vinh, A. (2020). High-resolution transcriptomic profiling of the heart during chronic stress reveals cellular drivers of cardiac fibrosis and hypertrophy. Circulation, 142(15), 1448-1463.
12. Munan, M., Oliveira, C. L., Marcotte-Chénard, A., Rees, J. L., Prado, C. M., Riesco, E., & Boulé, N. G. (2020). Acute and chronic effects of exercise on continuous glucose monitoring outcomes in type 2 diabetes: a meta-analysis. Frontiers in Endocrinology, 11, 495.
13. Münzel, T., Sørensen, M., Lelieveld, J., Hahad, O., Al-Kindi, S., Nieuwenhuijsen, M., Giles-Corti, B., Daiber, A., & Rajagopalan, S. (2021). Heart healthy cities: genetics loads the gun, but the environment pulls the trigger. European Heart Journal, 42(25), 2422-2438.
14. O'Connor, D. B., Thayer, J. F., & Vedhara, K. (2021). Stress and health: A review of psychobiological processes. Annual review of psychology, 72, 663-688.
15. Raposo de Magalhães, C., Schrama, D., Farinha, A. P., Revets, D., Kuehn, A., Planchon, S., Rodrigues, P. M., & Cerqueira, M. (2020). Protein changes as robust signatures of fish chronic stress: a proteomics approach to fish welfare research. BMC Genomics, 21, 1-16.
16. Sandrini, L., Ieraci, A., Amadio, P., Zarà, M., & Barbieri, S. S. (2020). Impact of acute and chronic stress on thrombosis in healthy individuals and cardiovascular disease patients. International Journal of Molecular Sciences, 21(21), 7818.
17. Tran, I., & Gellner, A.-K. (2023). Long-term effects of chronic stress models in adult mice. Journal of neural transmission, 130(9), 1133-1151.
18. Yang, Y.-C., Xie, A., Kim, S., Hair, J., Al-Garadi, M., & Sarker, A. (2023). Automatic detection of Twitter users who express chronic stress experiences via supervised machine learning and natural language processing. CIN: Computers, Informatics, Nursing, 41(9), 717-724.
19. Yegorov, Y. E., Poznyak, A. V., Nikiforov, N. G., Sobenin, I. A., & Orekhov, A. N. (2020). The link between chronic stress and accelerated ageing. Biomedicines, 8(7), 198.
20. Zheng, Z., Guo, C., Li, M., Yang, L., Liu, P., Zhang, X., Liu, Y., Guo, X., Cao, S., & Dong, Y. (2022). Hypothalamus-habenula potentiation encodes chronic stress experience and drives depression onset. Neuron, 110(8), 1400-1415. e1406.