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STRESS AS A MAJOR CONTRIBUTOR TO MODERN DISEASES: AN IMRAD-BASED ANALYSIS

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Abstract: Chronic stress has become a major public health concern in modern society due to its widespread impact on both physical and mental health. This study investigates the role of chronic stress as a contributing factor in the development of modern diseases through a qualitative literature review of recent scientific publications (2018–2025). Data were collected from major academic databases such as PubMed, Google Scholar, and ScienceDirect, focusing on peer-reviewed studies related to stress physiology and disease outcomes. The findings indicate that chronic stress disrupts the hypothalamic-pituitary-adrenal (HPA) axis, leading to prolonged cortisol secretion, immune system suppression, increased inflammation, and metabolic imbalance. These biological changes are strongly associated with cardiovascular diseases, mental health disorders, diabetes, obesity, and gastrointestinal conditions. In addition, behavioral factors such as poor sleep, unhealthy diet, and reduced physical activity further intensify stress-related health risks. The study concludes that chronic stress is a key modifiable risk factor in modern diseases and highlights the importance of integrated prevention strategies, including psychological interventions and lifestyle modifications.

Keywords: Chronic stress, modern diseases, HPA axis, cortisol, inflammation, mental health, cardiovascular disease, immune system, metabolic disorders, psychoneuroimmunology.

Introduction

In recent decades, stress has become one of the most pervasive factors affecting human health. With the rapid pace of globalization, technological advancement, and increasing social pressures, individuals are exposed to chronic stress more than ever before. Stress is defined as the body's physiological and psychological response to perceived challenges or threats. While acute stress can be adaptive and beneficial in short-term situations, chronic stress has been strongly associated with the development of numerous modern diseases. [11]

Recent studies in fields such as neuroscience, психоneuroimmunology, and public health have demonstrated that prolonged stress disrupts homeostasis and contributes significantly to both physical and mental disorders. Conditions such as cardiovascular diseases, diabetes, depression, anxiety disorders, and weakened immune function are increasingly linked to chronic stress exposure. According to global health reports, stress-related illnesses account for a substantial proportion of healthcare burdens worldwide. [7],[2]

The aim of this study is to examine the role of stress as a primary contributing factor to modern diseases, using recent research findings and scientific evidence.

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Methods

This study utilized a qualitative literature review design to comprehensively examine the relationship between chronic stress and the development of modern diseases. Relevant scientific publications published between 2018 and 2025 were systematically identified and collected from major academic databases, including PubMed, Google Scholar, and ScienceDirect, which are widely recognized for indexing high-quality peer-reviewed research. A structured search strategy was applied using a combination of keywords and Boolean operators, such as “chronic stress,” “stress-related disorders,” “hypothalamic-pituitary-adrenal (HPA) axis,” “cortisol,” “mental health,” “immune dysfunction,” and “metabolic diseases,” to ensure broad yet relevant coverage of the topic. Only studies published in English and meeting established academic standards were considered. The inclusion criteria focused on peer-reviewed journal articles that investigated the association between chronic stress and physical or psychological health outcomes, particularly those based on human clinical trials, cohort studies, cross-sectional analyses, or epidemiological research. Studies were excluded if they focused solely on acute or short-term stress responses, lacked empirical data, were non-peer-reviewed (such as editorials or opinion pieces), or did not clearly describe their methodology. Following the selection process, the collected studies were carefully reviewed and analyzed using a thematic synthesis approach, which enabled the identification of recurring patterns, mechanisms, and relationships across different research findings. Special attention was given to key biological pathways, including neuroendocrine responses (especially HPA axis dysregulation), immune system alterations, inflammatory processes, and behavioral factors such as sleep disruption and lifestyle changes that contribute to disease progression. To increase the validity and reliability of the analysis, priority was given to studies with robust methodological designs, including large sample sizes, longitudinal follow-up, controlled variables, and statistically significant results. This comprehensive approach allowed for a deeper understanding of how chronic stress functions as a multifactorial risk factor underlying a wide range of modern diseases.[9], [5], 14]

Results

The review of recent literature (2018–2025) consistently demonstrates that chronic stress is strongly associated with multiple modern diseases through interconnected biological and behavioral mechanisms. Across the analyzed studies, chronic activation of the hypothalamic-pituitary-adrenal (HPA) axis and sustained elevation of cortisol were identified as central physiological pathways linking stress to disease development. In addition, inflammatory processes, immune dysregulation, and changes in lifestyle behaviors (such as sleep disturbance, poor diet, and reduced physical activity) were frequently reported as mediating factors.

Overall, the findings indicate that stress does not affect a single organ system but instead influences several body systems simultaneously, increasing the risk of both physical and mental health disorders. The most frequently reported stress-related conditions include cardiovascular diseases, mental health disorders, metabolic syndrome, immune suppression, and gastrointestinal problems.

Summary of Findings from Reviewed Studies

Disease	Main	Stress-Related	Observed Health Effects

Category	Mechanism	
Cardiovascular diseases	HPA axis activation, increased cortisol, chronic inflammation	Hypertension, atherosclerosis, increased risk of heart attack and stroke
Mental health disorders	Neurochemical imbalance, hippocampal and amygdala dysfunction	Depression, anxiety, cognitive impairment, emotional instability
Metabolic disorders	Insulin resistance, hormonal imbalance, cortisol dysregulation	Obesity, type 2 diabetes, metabolic syndrome
Immune system dysfunction	Suppressed immune response, cytokine imbalance	Increased infection susceptibility, slower healing, autoimmune disease risk
Gastrointestinal disorders	Gut-brain axis disruption, altered microbiota	Irritable bowel syndrome (IBS), indigestion, chronic abdominal discomfort

These results highlight that chronic stress acts as a multisystem risk factor, influencing disease development through both biological pathways and behavioral changes. The consistency of findings across multiple studies strengthens the evidence that stress is a significant contributor to the burden of modern diseases globally.

Analysis

The findings from the reviewed literature clearly indicate that chronic stress is not merely an emotional or psychological condition, but a complex biopsychosocial factor that significantly contributes to the development of modern diseases. The analysis shows that the key underlying mechanism across almost all disease categories is the prolonged activation of the hypothalamic-pituitary-adrenal (HPA) axis, which leads to sustained secretion of cortisol. While cortisol is essential for short-term survival responses, its chronic elevation disrupts physiological balance (homeostasis), resulting in widespread negative health effects.

One of the most important observations is that stress affects multiple body systems simultaneously. In cardiovascular diseases, for example, chronic stress promotes endothelial dysfunction, inflammation, and increased blood pressure, all of which accelerate atherosclerosis. In mental health disorders, structural and functional changes in the brain—particularly in the hippocampus, amygdala, and prefrontal cortex—explain symptoms such as anxiety, depression, and impaired cognitive control. This suggests that stress directly influences both emotional regulation and neurobiological functioning.

In metabolic disorders, stress-induced hormonal imbalance plays a critical role in insulin resistance and fat accumulation, especially visceral fat, which increases the risk of obesity and type 2 diabetes. Similarly, immune system suppression under chronic stress reduces the body's ability to fight infections and increases vulnerability to autoimmune conditions due to dysregulated cytokine production. The gut-brain axis also emerges as an important pathway, where stress alters gut microbiota composition, contributing to gastrointestinal disorders such as irritable bowel syndrome.

Another key insight from the analysis is that biological mechanisms are closely intertwined with behavioral responses. Individuals experiencing chronic stress often engage in unhealthy coping behaviors such as poor diet, physical inactivity, sleep deprivation, smoking, or excessive alcohol consumption, which further amplify disease risk. This highlights that stress-related diseases cannot be explained by biology alone, but must be understood through an integrated model involving psychological and social factors as well.

Overall, the analysis confirms that chronic stress functions as a central risk factor in modern medicine. Its widespread impact across multiple systems demonstrates the need for holistic prevention strategies, including stress management interventions, lifestyle modification, and mental health support. The consistency of findings across recent studies also suggests that addressing chronic stress could significantly reduce the global burden of non-communicable diseases.

Discussion

The results of this literature review confirm that chronic stress is a major contributing factor in the development and progression of many modern diseases. The evidence consistently shows that stress is not limited to psychological discomfort but functions as a systemic biological stressor that disrupts multiple physiological processes. The most significant mechanism identified across the studies is dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis, leading to prolonged cortisol exposure. This hormonal imbalance is closely linked to inflammation, immune suppression, metabolic disturbances, and neurological changes, all of which contribute to disease formation.

These findings are strongly supported by recent advances in psychoneuroimmunology, which explain how the nervous, endocrine, and immune systems interact under stress conditions. Chronic stress creates a continuous “fight or flight” state, which, when prolonged, becomes maladaptive and damages the body’s regulatory systems. This helps explain why stress is associated with such a wide range of diseases, including cardiovascular disorders, depression, diabetes, and gastrointestinal conditions.

Another important aspect highlighted in this study is the interaction between biological and behavioral pathways. Stress does not only affect internal physiological systems but also influences human behavior. Poor sleep quality, unhealthy dietary patterns, reduced physical activity, and substance use are common stress-related behaviors that further increase disease risk. This creates a feedback loop in which stress leads to unhealthy behaviors, and these behaviors, in turn, worsen physiological health.

The findings also have important implications for public health. In modern society, stress is increasing due to academic pressure, workplace demands, social media influence, and economic instability. Therefore, stress should be considered a global health priority. Preventive strategies such as stress management programs, mindfulness-based interventions, cognitive-behavioral therapy, and lifestyle education can significantly reduce the risk of stress-related diseases. Additionally, workplace reforms and mental health awareness campaigns are necessary to address stress at a societal level rather than only at the individual level.

However, this review has certain limitations. Since it is based on previously published studies, the results depend on the quality and methodology of those studies. Variations in sample size, research design, and measurement of stress levels may influence the consistency of findings. Future research should focus on longitudinal and experimental studies to better establish causal relationships between chronic stress and specific diseases.

Conclusion

This study demonstrates that chronic stress is a significant and multidimensional risk factor for the development of modern diseases. The reviewed literature shows that prolonged stress exposure disrupts key physiological systems, particularly the hypothalamic-pituitary-adrenal (HPA) axis, leading to hormonal imbalance, chronic inflammation, immune suppression, and metabolic dysregulation. These biological changes, combined with stress-related behavioral patterns such as poor sleep, unhealthy diet, and physical inactivity, contribute to a wide range of health problems including cardiovascular diseases, mental health disorders, diabetes, and gastrointestinal conditions.

Overall, the evidence confirms that stress should not be viewed only as a psychological issue but as a major public health concern with systemic effects on the human body. Effective stress management strategies, including psychological interventions, lifestyle modification, and public health policies, are essential for reducing the global burden of stress-related diseases. Future research should focus on long-term experimental studies to better understand causal pathways and improve prevention strategies.

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