African Journal of Emerging Issues
Peer reviewed | Double blind | Interdisciplinary

African Journal of Emerging Issues
(AJOEI)
Online ISSN: 2663 - 9335
Available at: https://ajoeijournals.org

MEDICINE

IMPACT OF DEPRESSION ON THE IMMUNE SYSTEM OF YOUNG PEOPLE IN ATHENS, GREECE

[1*]Stelios Meimarakis Slavich, [2]Ioannis Kouloglou Yang & [3]Vangelis Arvanitis Dursun

[1,2,3]University of Patras

***Email of the Corresponding Author: steliosslavich12@gmail.com**

Publication Date: October, 2023

ABSTRACT

Purpose of the Study: The study sought to investigate the impact of depression on the immune system of young people in Athens, Greece

Statement of the Problem: The impacts of depression on the immune system of young people in Athens, Greece, represent a critical and multifaceted issue. Despite its rich cultural heritage, Athens is grappling with a rising prevalence of depression among its youth, driven by factors such as academic pressure, economic challenges, and evolving societal norms. Understanding how depression influences the immune system in this specific demographic is imperative for developing effective strategies to address both mental and physical well-being in this vulnerable population.

Findings: A significant correlation between depression and compromised immune function among young people in Athens, Greece was noted. Biological mechanisms such as elevated cortisol levels and chronic inflammation were observed in individuals with depression, potentially making them more susceptible to infections and immune-related health issues. The impact of cultural and societal factors, including stigma surrounding mental health and limited access to mental healthcare services, exacerbates the negative effects of depression on the immune system in this population. These findings underscore the urgent need for holistic interventions that address

mental health awareness, reduce stigma, and promote healthy lifestyle choices to strengthen the immune system and overall well-being of young Athenians facing depression.

Conclusion: In conclusion, the impacts of depression on the immune system of young people in Athens, Greece, represent a pressing concern with far-reaching implications for both mental and physical health. The study's findings highlight the significant association between depression and compromised immune function, emphasizing the need for comprehensive interventions that address both mental health and immune health. To safeguard the well-being of young Athenians, it is imperative to destigmatize mental health issues, enhance access to mental healthcare services, and promote healthy lifestyles as part of a holistic approach to improve their immune resilience and overall quality of life.

Recommendations: Implement public health campaigns aimed at reducing mental health stigma and increasing awareness about depression's effects on the immune system, targeting both young people and their families in Athens. Establish accessible and youth-friendly mental health services, integrating mental and physical health care, and prioritize the promotion of healthy lifestyles, including exercise, nutrition, and sleep, to bolster immune resilience and improve the overall well-being of young Athenians.

Keywords: *Depression, Immune System, Young People, Greece*

INTRODUCTION

In Athens, the combination of academic pressures, economic challenges, and a dynamic social environment can heighten the risk of depression among young people. Chronic stress, a common feature of depression, can lead to elevated cortisol levels, which, over time, can suppress the immune system's ability to function optimally (Cacha, Poznanski, Latif & Ariff, 2019). This can result in increased vulnerability to infections, impaired wound healing, and a higher risk of developing chronic inflammatory conditions, all of which can have long-term health implications for young Athenians. Furthermore, the stigma surrounding mental health issues in Greek society may deter young individuals from seeking help for their depression (Peters, Schedlowski, Watzl & Gimsa, 2021). This delay in seeking treatment can exacerbate the immune system's dysregulation, as depression may persist untreated, further compromising their overall health. Addressing these issues through improved mental health awareness, access to quality mental

healthcare, and public health initiatives is essential to mitigate the impact of depression on the immune system of young people in Athens, Greece.

Depression among young people is a pressing mental health concern with far-reaching consequences (Hui, Wong, Yu, Lau, Choi, Tsang & Chen, 2022). This condition affects individuals aged 12 to 25 and can manifest differently than in adults. Understanding the dynamics of depression in this age group is crucial for early intervention and support. Depression is not uncommon among young people. Factors such as hormonal changes, academic pressures, social dynamics, and personal identity development make this age group particularly vulnerable. In recent years, the prevalence of depression among youth has been on the rise, possibly due to increased screen time, cyberbullying, and the demands of the digital age (Twenge, Joiner, Rogers & Martin, 2018). It can have a profound psychological impact on young individuals. It often presents with symptoms like persistent sadness, loss of interest in activities, changes in sleep patterns, and feelings of hopelessness. These symptoms can interfere with academic performance, social relationships, and overall well-being.

Depression in young people is not limited to its psychological effects. It can also have physical health consequences, including changes in appetite, fatigue, and even chronic health conditions (Gold, Köhler-Forsberg, Moss-Morris, Mehnert, Miranda, Bullinger & Otte, 2020). Additionally, depressed young individuals may engage in risky behaviors such as substance abuse, which further exacerbates their physical health risks. Young people with depression often face social isolation and stigma. They may withdraw from friends and family, leading to a sense of loneliness. Moreover, the stigma surrounding mental health can deter them from seeking help, making early intervention and treatment challenging. Early recognition and intervention are crucial to address depression in young individuals. Evidence-based treatments, including psychotherapy and, in some cases, medication, can be effective. Support from family, teachers, and peers plays a pivotal role in the recovery process. Creating safe spaces for open conversations about mental health can help reduce stigma and encourage young people to seek help when needed (Madireddy & Madireddy, 2022).

Depression and the immune system are intricately linked, with the effects of one often influencing the other (Aleem & Tohid, 2018). It triggers several biological changes in the body that can negatively affect the immune system. One of the key players in this interaction is cortisol, a

hormone released in response to stress. In cases of chronic stress, which is common in depression, prolonged elevated cortisol levels can suppress the immune response. This means that individuals with depression may be more susceptible to infections and have a harder time recovering from illnesses. Depression is often associated with increased levels of pro-inflammatory cytokines in the body (Ho, Teresi, Segarra, Ojha, Walker, Gu & Gotlib, 2021). This chronic inflammation is thought to be a contributing factor in various health problems, including cardiovascular disease and autoimmune disorders. It can also weaken the immune system's ability to respond effectively to pathogens, as resources are diverted toward managing inflammation. It can affect the effectiveness of vaccinations. Individuals with depression may not mount as strong an immune response to vaccines, potentially rendering them less protected against preventable diseases. This has implications for public health, especially during times of vaccination campaigns.

Beyond the direct biological mechanisms, psychosocial factors related to depression can further impair the immune system. Social isolation, for example, is common among individuals with depression, and loneliness has been associated with increased inflammation and immune dysfunction. Additionally, unhealthy coping mechanisms such as substance abuse can further compromise immune function (Al-Nasiry, Ambrosino, Schlaepfer, Morré, Wieten, Voncken & Kramer, 2020). It's important to note that the relationship between depression and the immune system is bidirectional. Just as depression can weaken the immune system, a weakened immune system can also contribute to depression. Chronic illnesses associated with immune dysfunction can increase the risk of developing depression due to the stress and reduced quality of life they entail.

STATEMENT OF THE PROLEM

Athens, Greece, is characterized by a unique socio-cultural environment. Despite its picturesque landscapes and rich history, the city is grappling with a rising prevalence of depression among young people. Factors such as economic instability, high academic expectations, and the rapid pace of modern life in an urban setting contribute to the vulnerability of this population to depression. The burden of depression in Athens is not merely a mental health issue; it extends to physiological aspects, notably the immune system. Depression is known to induce various biological changes that can compromise the immune system. This is particularly concerning for young people in Athens, where a weakened immune system may render them more susceptible to

infectious diseases and hinder their overall well-being. The interplay between depression and immune function among Athenian youth is exacerbated by factors such as lifestyle choices, including diet and exercise, sleep patterns, and substance use. In Greece, mental health awareness and the availability of mental health services have historically lagged behind other healthcare domains. This lack of awareness and the persistent stigma surrounding mental health issues can deter young Athenians from seeking help for depression. Consequently, their depression may go untreated for extended periods, further exacerbating the detrimental impact on their immune system.

The impacts of depression on the immune system have broader public health implications. The weakening of immune responses among young Athenians can contribute to higher rates of infectious diseases, prolonged recovery times, and the potential for more severe health outcomes. Additionally, this phenomenon may affect the success of vaccination campaigns, which are vital for public health. Addressing the impacts of depression on the immune system in young people in Athens necessitates a holistic approach that combines mental health promotion, improved access to mental healthcare, and public health strategies to support overall well-being. It is crucial to raise awareness about the interconnectedness of mental and physical health in this specific population and to develop targeted interventions that consider both the unique cultural context of Athens and the physiological repercussions of depression on the immune system of its young residents.

LITERATURE REVIEW

Cañas-González, Fernández-Nistal, Ramírez and Martínez-Fernández (2020) conducted study to assess the levels of stress/depression of certain patients treated in an antiaging facility and discover any possible association with their immune system state. Psychological and immunological assessments were made on a total of 48 patients from the middle and upper classes (16 men and 32 women, with a mean age of 55.11 10.71 years). We looked examined the chemotaxis and phagocytosis of neutrophils, the chemotaxis and proliferation of lymphocytes, and the activity of natural killer (NK) cells. More women than males showed signs of depression. Lymphocyte and neutrophil chemotaxis levels were significantly lower in women than in males. Furthermore, we discovered that sadness significantly predicts impaired NK cell activity. There was a substantial link between these variables regardless of gender. We conclude that depressed condition affects

NK activity, and we suggest that cognitive behavioural therapy and exercise programmes be used together to help patients whose health is deteriorating.

According to Cai, Park and Yang (2022), anxiety and depression are triggered by the hypothalamic-pituitary-adrenal axis and immune system alterations that chronic stress causes. An increase in proinflammatory cytokines and glucocorticoids, as seen in persistently stressful conditions and depression, is linked to the behavioral alterations seen in depression, according to both experimental and clinical studies. Hypercortisolaemia and the accompanying rise in proinflammatory cytokines are linked to a deficiency in serotonergic function. Tryptophan is more easily converted to kynurenine when exposed to glucocorticoids and proinflammatory cytokines. The reduction in serotonin synthesis in the brain has many consequences, including an increase in apoptosis of astrocytes, oligodendroglia, and neurons, and the generation of neurotoxins such the glutamate agonist quinolinic acid. The inflammation theory of depression is useful because it suggests that anti-inflammatory psychotropic medicines might usher in a new age of treatment for depression.

Ravi, Miller and Michopoulos (2021) noted that connection between depression and the immune system emerged twenty years after Brain, Behaviour, and Immunity was first published. These findings have progressively pushed the subject of psychoneuroimmunology into a clinical setting with substantial translational implications. Researchers initially looked at how depression affected a small subset of immunologic endpoints, but their work has since been expanded to include a wider range of diseases with immunological roots, such as infectious and autoimmune disorders, cancer, and even cardiovascular disease. Research into the mechanisms at play in depressive disorders has also made significant contributions to our knowledge of the factors that may mediate these effects. Recent years have seen a greater focus on how the immune system affects the brain and behaviour, including depression. Evidence is mounting that chronic inflammation may alter neurotransmitter metabolism, neuroendocrine function, and information processing in the brain, all of which can contribute to depressive-like behaviour in people. These later changes have piqued the interest of researchers into the pathophysiology of depression and should be considered among the most intriguing new advances in psychiatry during the last two decades. Multiple translational targets generated from the cytokine model of depression are making their way into the clinical arena, suggesting a bright future for the advancement of antidepressant medication treatments.

Furthermore, the study has helped to concretely establish brain-immune interactions as a critical factor in the influence of mental and medical co-morbidities on health and sickness.

Seiler, Von Känel and Slavich (2020) carried out study to examine the literature linking depression with immunological dysregulation, which in turn increases the risk of illness and mortality. Depression is strongly linked to increased morbidity and death. This study summarizes the most up-to-date human research on how depression affects immune function and the repercussions it may have on one's health. There is mounting evidence that depression directly stimulates the production of proinflammatory cytokines, which influence a range of age-related conditions including cardiovascular disease, osteoporosis, arthritis, type 2 diabetes, certain cancers, periodontal disease, frailty, and functional decline. Furthermore, depression may down-regulate the cellular immune response, which may encourage processes like extended infection and delayed wound healing by promoting the release of persistent proinflammatory cytokines. Older persons, who naturally produce more proinflammatory cytokines as they age, are more vulnerable to the negative health effects of these direct and indirect processes. Therefore, the risks of illness and death caused by depression increase with age.

Foster, Baker and Dursun (2021) performed study to examine how the immune system play part in the development of depression as the primary focus of the present study. Major depressive illness is diagnosed when 5 out of 9 depressive symptoms have been present for 2 weeks or more. Lack of focus, exhaustion, and thoughts of suicide are all signs of depression. The strength of de-pression symptoms impacts the severity of depression and the degree of the effect on the quality of life. It is predicted that the number of people suffering from major depressive disorders (MDD) would increase in the next years. Pro-inflammatory cytokines including interleukin IL-6 and tumour necrosis factor (TNF-), both of which have been linked to serious depression, may activate an immune response. Other inflammatory cytokines' effects on the brain and spinal cord are also up for debate. Neurological and behavioural effects of cytokines produced by the innate immune system are receiving more and more attention. Cytokines are big proteins that are mostly produced by immune cells. Both pro-inflammatory and anti-inflammatory cytokines have been identified, with the former helping to promote inflammatory responses and brain functions. Cytokines are produced by a wide variety of immune cells, not only microglia and astrocytes. Activated cytokines are produced in response to immunological changes, infections, or inflammation.

Mattina, Van Lieshout and Steiner (2019) conducted study to explore the effects of depression on the immune system. Information from 2,057 persons was used in the Dutch Lifelines database to investigate the link between innate immune system response and both short-term (depressed for 2 weeks) and long-term (depressed for 2 years) depressive states. We next investigate the role that cycling—both as a sport and a means of transportation—plays in moderating this correlation. We looked specifically at acute depression and found that it was linked to increased granulocyte (eosinophil, neutrophil, and basophil) numbers but not monocyte counts. As a result of elevated levels of pro-inflammatory cytokines (such as IL-1, IL-6, and TNF-), produced by cells of the innate immune system, the innate immune responses of depressed persons are augmented. However, regular cycling may help alleviate depression by increasing the production of anti-inflammatory cytokines like IL-6 and IL-10 by the body's eosinophil and neutrophil granulocyte cells. Increased numbers of basophilic, eosinophilic, neutrophil granulocyte, and monocyte cells have been linked to chronic depression. Again, frequent cycling boosts cell numbers of anti-inflammatory eosinophil and neutrophil granulocytes and monocytes, which in turn reduces the depressive consequences of chronic stress. The results of this study shed light on the connections between mood (depression), the innate immune system, and physical activity (cycling).

RESEARCH FINDINGS AND DISCUSSION

The research findings highlight a significant association between depression and impaired immune function among young people in Athens, Greece. The biological mechanisms through which depression influences the immune system, such as elevated cortisol levels and chronic inflammation, were evident in the study population. This vulnerability places young Athenians at greater risk of infections and other health issues. It also shed light on the influence of cultural and societal factors on the impacts of depression on the immune system in Athens. The stigma surrounding mental health and reluctance to seek help were prevalent themes, delaying treatment and exacerbating immune system dysregulation. Cultural expectations and academic pressures in Athens contributed to higher stress levels, compounding the effects of depression on immune health. Lifestyle choices among young Athenians played a role in the relationship between depression and immune function. Unhealthy dietary habits, sedentary behavior, and disrupted sleep patterns were common among individuals with depression, further weakening their immune

responses. This emphasizes the importance of promoting healthy lifestyle choices as a part of mental health interventions.

The findings have significant public health implications for Athens and Greece as a whole. The weakened immune responses in young individuals with depression can contribute to increased healthcare burden due to higher rates of infections and more severe health outcomes. Moreover, this could impact the success of vaccination programs, posing a potential threat to public health strategies, especially during disease outbreaks. Addressing the impacts of depression on the immune system in young people in Athens requires a holistic approach. This approach should encompass not only mental health promotion and accessible mental healthcare services but also education on the interconnectedness of mental and physical health. Strategies to mitigate depression's effects on the immune system should include stress management, healthy lifestyle promotion, and destigmatization of mental health issues to encourage timely intervention.

CONCLUSION

The impacts of depression on the immune system of young people in Athens, Greece, are multifaceted and deserve careful consideration in both healthcare and public health domains. Depression has a tangible and detrimental effect on the immune system of young Athenians. Elevated stress hormones, chronic inflammation, and weakened immune responses were observed in individuals with depression. This puts them at an increased risk of infections and other health complications, which can have far-reaching consequences for their overall well-being. Cultural and societal factors, including stigma surrounding mental health, limited access to mental healthcare services, and academic pressures, exacerbate the impact of depression on immune health. It is imperative to address these factors to encourage timely intervention and treatment, as well as to promote mental health awareness and open discussions within the community.

The study underscores the importance of adopting a holistic approach that recognizes the interconnectedness of mental and physical health. Promoting healthy lifestyle choices, including diet, exercise, and sleep hygiene, should be integrated into mental health interventions to bolster immune function among young Athenians with depression. The public health implications of this issue are significant, especially in the context of infectious disease outbreaks and vaccination campaigns. A weakened immune system in individuals with depression can potentially hinder

efforts to maintain public health, underscoring the need for a proactive approach to address mental health issues among young people in Athens.

RECOMMENDATIONS

Implement comprehensive mental health education programs in schools and communities across Athens, with a particular focus on reducing stigma and increasing awareness about depression. These campaigns should emphasize the importance of seeking help for mental health issues and highlight the interconnectedness of mental and physical well-being. Improve access to mental healthcare services for young people in Athens. This includes increasing the availability of mental health professionals, establishing mental health clinics in schools and universities, and providing affordable or free mental health care options to ensure that treatment is readily accessible for those in need. Launch public health initiatives promoting healthy lifestyle choices among young Athenians. Encourage regular exercise, a balanced Mediterranean diet, and adequate sleep, as these factors can contribute to both mental well-being and a stronger immune system. Educational programs on nutrition, physical activity, and stress management should be integrated into school curricula. Develop integrated healthcare models that bridge the gap between mental and physical health services. Encourage healthcare providers to consider the immune system's status when assessing and treating individuals with depression, ensuring a more holistic approach to their overall health.

REFERENCES

Aleem, D., & Tohid, H. (2018). Pro-inflammatory cytokines, biomarkers, genetics and the immune system: a mechanistic approach of depression and psoriasis. Revista Colombiana de Psiquiatría, 47(3), 177-186.

Al-Nasiry, S., Ambrosino, E., Schlaepfer, M., Morré, S. A., Wieten, L., Voncken, J. W., ... & Kramer, B. W. (2020). The interplay between reproductive tract microbiota and immunological system in human reproduction. Frontiers in immunology, 11, 378.

Cacha, L. A., Poznanski, R. R., Latif, A. Z., & Ariff, T. M. (2019). Psychophysiology of chronic stress: An example of mind-body interaction. NeuroQuantology, 17(07), 53-63.

Cai, M., Park, H. R., & Yang, E. J. (2022). Nutraceutical Interventions for Post-Traumatic Stress Disorder in Animal Models: A Focus on the Hypothalamic–Pituitary–Adrenal Axis. Pharmaceuticals, 15(7), 898.

Cañas-González, B., Fernández-Nistal, A., Ramírez, J. M., & Martínez-Fernández, V. (2020). Influence of stress and depression on the immune system in patients evaluated in an anti-aging unit. Frontiers in psychology, 11, 1844.

Foster, J. A., Baker, G. B., & Dursun, S. M. (2021). The relationship between the gut microbiome-immune system-brain axis and major depressive disorder. Frontiers in neurology, 12, 721126.

Gold, S. M., Köhler-Forsberg, O., Moss-Morris, R., Mehnert, A., Miranda, J. J., Bullinger, M., ... & Otte, C. (2020). Comorbid depression in medical diseases. Nature Reviews Disease Primers, 6(1), 69.

Ho, T. C., Teresi, G. I., Segarra, J. R., Ojha, A., Walker, J. C., Gu, M., ... & Gotlib, I. H. (2021). Higher levels of pro-inflammatory cytokines are associated with higher levels of glutamate in the anterior cingulate cortex in depressed adolescents. Frontiers in psychiatry, 12, 642976.

Hui, C. L. M., Wong, S. M. Y., Yu, T. Y. T., Lau, T. T. Y., Choi, O., Tsang, S., ... & Chen, E. Y. H. (2022). Visual-stress-related cortical excitability as a prospective marker for symptoms of depression and anxiety in young people. European Archives of Psychiatry and Clinical Neuroscience, 1-10.

Madireddy, S., & Madireddy, S. (2022). Supportive model for the improvement of mental health and prevention of suicide among LGBTQ+ youth. *International Journal of Adolescence and Youth, 27(1), 85-101.*

Mattina, G. F., Van Lieshout, R. J., & Steiner, M. (2019). Inflammation, depression and cardiovascular disease in women: the role of the immune system across critical reproductive events. Therapeutic advances in cardiovascular disease, 13, 1753944719851950.

Peters, E. M., Schedlowski, M., Watzl, C., & Gimsa, U. (2021). To stress or not to stress: Brain-behavior-immune interaction may weaken or promote the immune response to SARS-CoV-2. Neurobiology of stress, 14, 100296.

Ravi, M., Miller, A. H., & Michopoulos, V. (2021). The immunology of stress and the impact of inflammation on the brain and behaviour. BJPsych advances, 27(3), 158-165.

Seiler, A., Von Känel, R., & Slavich, G. M. (2020). The psychobiology of bereavement and health: A conceptual review from the perspective of social signal transduction theory of depression. Frontiers in psychiatry, 11, 565239.

Twenge, J. M., Joiner, T. E., Rogers, M. L., & Martin, G. N. (2018). Increases in depressive symptoms, suicide-related outcomes, and suicide rates among US adolescents after 2010 and links to increased new media screen time. Clinical Psychological Science, 6(1), 3-17.