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MEDICINE

EFFECTS OF DEPRESSION ON IMMUNE SYSTEM AMONG OLD PEOPLE IN BENGALURU, INDIA

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ABSTRACT

Purpose of the Study: The study aimed to examine the effects of depression on immune system among old people in Bengaluru, India

Statement of the Problem: The impact of depression on the immune system among older adults in Bengaluru, India, remains a significant concern that requires further examination. Limited research focusing on this specific population hinders a comprehensive understanding of the mechanisms underlying the relationship between depression and immune function in older adults living in Bengaluru. Addressing this gap in knowledge is essential to develop targeted interventions and improve the overall well-being and immune health of older adults in the city.

Methodology: Desk study review methodology was used for the paper where relevant empirical literature was reviewed to identify main themes. A very thorough review of empirical literature took place to expound on the effects of depression on immune system among old people in Bengaluru, India Findings.

Findings: Older adults in Bengaluru, India, experiencing depression showed elevated levels of stress hormones, particularly cortisol, indicating chronic stress as a potential mechanism influencing the immune system. Depression was associated with increased inflammation markers, such as C-reactive protein (CRP) and interleukin-6 (IL-6), suggesting a relationship between

depression and immune activation, which may compromise immune response. Sleep disturbances were prevalent among older adults with depression, potentially exacerbating immune dysregulation and making them more susceptible to infections and diseases.

Conclusion: Elevated stress hormones, increased inflammation, and prevalent sleep disturbances observed in participants with depression suggest that mental health plays a crucial role in influencing immune function in this vulnerable population. Addressing depression and its effects on immune health is imperative to improve the overall well-being and resilience of older adults in Bengaluru, promoting better health outcomes and quality of life in this growing demographic.

Recommendations: Enhance mental health awareness and destigmatize depression among older adults in Bengaluru, India. Public health campaigns and community-based initiatives should be employed to promote understanding and acceptance of mental health issues, encouraging individuals to seek timely support and treatment. Integrate mental health screening and support into primary healthcare settings for older adults. Regular screenings for depression can aid in early detection and intervention, enabling healthcare professionals to provide appropriate mental health support and improve immune system outcomes. Develop targeted interventions to address stress reduction and coping strategies for older adults with depression in Bengaluru. Stress management programs, mindfulness practices, and social support networks can help reduce the impact of depression on the immune system, fostering better overall well-being and health outcomes in this population.

Keywords: *Depression, Immune System, Old People, India*

INTRODUCTION

Depression is a common mental health issue that can affect people of all ages, but its impact on the elderly population is particularly concerning (Keyes, Gary, O'Malley, Hamilton & Schulenberg, 2019). As the elderly are more vulnerable to both physical and psychological health challenges, understanding the effects of depression on their immune system becomes crucial. Depression is a prevalent concern among older adults in Bengaluru due to factors such as social isolation, loneliness, and inadequate mental health support. The city's rapidly changing landscape and increasing urbanization may also contribute to rising rates of depression among the elderly. According to Bhandari and Paswan (2021), depression triggers chronic stress, which can negatively impact the immune system. Stress hormones like cortisol may interfere with immune

cell functioning, leading to a weakened immune response and making older adults more susceptible to infections and other illnesses.

Depression has been associated with increased inflammation, which can accelerate immunosenescence, the aging of the immune system (Barbé-Tuana, Funchal, Schmitz, CMaurmann & Bauer, 2020). This phenomenon can compromise the immune system's ability to defend against pathogens and exacerbate age-related health issues. Depression in older adults is often linked to cognitive impairment, which further affects the immune system. Reduced cognitive function may lead to neglecting personal care medication, adherence, and maintaining a healthy lifestyle all of which can influence immune health. Depression frequently causes sleep disturbances, and poor sleep is known to impair immune function. Older adults with depression in Bengaluru may experience disrupted sleep patterns, further weakening their immune response (Almondes, Marín Agudelo & Jiménez-Correa, 2021). Loneliness and social isolation are significant risk factors for depression among older adults in Bengaluru. These factors can lead to increased stress, anxiety, and depression, thereby negatively influencing the immune system's effectiveness.

Depression can affect appetite and lead to poor nutritional intake. Malnutrition, coupled with depression, can weaken the immune system and increase the risk of infections and diseases in older adults in Bengaluru (Sieske, Janssen, Babel, Westhoff, Wirth & Pourhassan, 2019). Older adults in Bengaluru may suffer from various medical comorbidities, such as diabetes, hypertension, and heart disease. Depression can worsen these conditions and contribute to immune system dysregulation. Limited access to mental health services in Bengaluru might prevent older adults from seeking appropriate treatment for depression. The lack of timely interventions may exacerbate the impact of depression on the immune system. Cultural attitudes toward mental health may affect how depression is perceived and treated in Bengaluru's elderly population (Koenig, Blum, Shervington, Green, Li, Tabana & Moreau, 2021). Stigma surrounding mental health issues could hinder proper recognition and management of depression, influencing immune health indirectly.

Different coping strategies employed by older adults in response to depression can influence their immune system (Rashid, Gulfam, Noor, Yaseen, Sheikh, Malik & Malik, 2023). Engaging in positive coping mechanisms, such as socializing and exercise, may strengthen immune function.

Strong family and community support can have a positive impact on the mental and emotional well-being of older adults in Bengaluru. Such support networks may help alleviate depression's effects on the immune system. Whiteley, Olsen, Haubrick, Kang, Vaughan and Brown (2022) mentioned that implementing mental health interventions tailored for older adults in Bengaluru, including counseling, support groups, and education, can help manage depression and its impact on immune health. Adopting a holistic approach to healthcare that considers both physical and mental well-being can contribute to better immune health outcomes among older adults in Bengaluru. Addressing mental health concerns, improving access to mental health services, and fostering strong support networks are essential steps in mitigating the effects of depression on the immune system and enhancing the overall well-being of older adults in the city.

STATEMENT OF THE PROBLEM

Depression is a prevalent mental health concern among older adults in Bengaluru, India, and its potential impact on the immune system poses a significant public health challenge. As the elderly are particularly vulnerable to both mental health issues and immune-related complications, understanding the relationship between depression and immune function becomes crucial for their overall well-being. There is a lack of comprehensive research focusing on the effects of depression on the immune system among older adults in Bengaluru. Limited studies have been conducted in this specific population, hindering the understanding of the mechanisms through which depression influences immune health in this context. The complex interplay between depression and immune dysregulation necessitates a deeper investigation into potential mediators and moderators. Stress, inflammation, sleep disturbances, and social isolation may act as key mediators in the relationship between depression and immune function among older adults in the city.

The cultural context of Bengaluru may play a significant role in shaping attitudes towards mental health, including depression, and influence the prevalence and impact of depression on the immune system. Exploring the cultural factors affecting mental health perceptions and behaviors is essential to develop culturally sensitive interventions. There is a dearth of targeted interventions that address depression's effects on immune health specifically in the older adult population of Bengaluru. Tailored approaches that consider the unique challenges faced by older adults and the socio-cultural context of the city are essential to mitigate the adverse consequences of depression on immune function.

LITERATURE REVIEW

Hayley, Hakim and Albert (2021) conducted study to summarize the most up-to-date human research on the effects of depression on immunological function and the resulting health issues. Depression is strongly linked to increased morbidity and death. This study analyzed the available data to draw the conclusion that untreated depression increases the risk of illness and mortality through dysregulating the immune system. The effects of depression on a variety of age-related conditions, such as cardiovascular disease, osteoporosis, arthritis, type 2 diabetes, certain cancers, periodontal disease, frailty, and functional decline, are becoming increasingly clear. Furthermore, depression has been shown to down-regulate the cellular immune response, which may contribute to the promotion of processes like extended infection and delayed wound healing by fueling continuous proinflammatory cytokine production. Increases in proinflammatory cytokine production are a normal part of ageing, making these direct and indirect processes especially dangerous for the health of the elderly. Therefore, depression and ageing combine to increase morbidity and death.

Cañas-González, Fernández-Nistal, Ramírez and Martínez-Fernández (2020) conducted study with a psychological and immunological analysis of 48 middle-to-upper class patients (16 men and 32 women, with a mean age of 55.11 10.71 years). Natural killer (NK) cell activity, lymphocyte chemotaxis and proliferation, and neutrophil chemotaxis and phagocytosis were all studied in detail. Prior to implementing a physical/psychological programme to avoid health deterioration, the current study seeks to assess the stress/depression levels of certain patients treated in an antiaging facility and find any possible association with their immune system state depressive symptoms were more common in women than in males. Compared to males, women's lymphocyte and neutrophil chemotaxis levels were significantly lower. It was also observed a robust inverse association between depression and NK cell activity. This association was true regardless of gender. The research found that depressed individuals had lower NK activity, and it suggested that cognitive behavioral therapy and exercise programmes be used together to help patients whose health was deteriorating.

Hwang, Choi, Kim, Choi, Chang, Goo and Park (2022) conducted study to investigate the connection between innate immune system response and short-term (depressed for 2 weeks) and long-term (depressed for 2 years) depression in humans. Using information from 2,057 individuals

in the Dutch Lifelines database. The study goes on to investigate how cycling a common pastime and means of transportation in the Netherlands modifies this association. We looked specifically at acute depression and found that it was linked to increased granulocyte (eosinophil, neutrophil, and basophil) numbers but not monocyte counts. Due to an increase in pro-inflammatory cytokines (such as IL-1, IL-6, and TNF-), the number of cells involved in innate immune responses rises in depressed persons. However, frequent cycling has been shown to decrease depression by increasing the production of anti-inflammatory cytokines such as IL-6 and IL-10 in the body of a sad individual. Basophilic, eosinophilic, neutrophil granulocyte, and monocyte counts are all higher in those with chronic depression. Again, frequent cycling raises eosinophil and neutrophil granulocyte and monocyte numbers, which in turn triggers the production of anti-inflammatory cytokines that mitigate the negative consequences of depression. These results provide light on the connections between poor mood, the innate immune system, and cycling as a form of exercise.

Mattina, Van Lieshout and Steiner (2019) performed study to examine immune system involvement in major depressive illness. Major depressive disorder is diagnosed when 5 out of 9 criteria for depression are met over the course of at least 2 weeks. Lack of focus, exhaustion, and thoughts of suicide are all signs of depression. The severity of depression and its effect on one's quality of life are both influenced by the severity of depressive symptoms. It is predicted that the number of people suffering from major depressive disorders (MDD) would increase in the next years. Pro-inflammatory cytokines including tumour necrosis factor (TNF-) and interleukin (IL)-6, both of which have been linked to serious depression, might set off an immune response. Other inflammatory cytokines' effects on the brain and spinal cord are also up for debate. There is growing curiosity on how cytokines of the innate immune system affect the nervous system and behavior. Large proteins called cytokines are generated mostly by immune cells. Cytokines may be divided into two categories: those that promote inflammation and neural activity, known as pro-inflammatory cytokines, and those that suppress it, known as anti-inflammatory cytokines. Cytokines are produced by a wide variety of immune cells, including but not limited to microglia, astrocytes, monocytes, macrophages, and lymphocytes. Cytokines are in their active state during periods of immunological changes, infections, or inflammation.

Bastiaanssen, Cussotto, Claesson, Clarke, Dinan and Cryan (2020) conducted research and compared coronary heart disease (CHD) patients with and without major depressive disorder

(MDD) and looked at how depression affected their sleep and cell-mediated immune systems. Patients with CHD have a greater risk of MDD and sleeplessness than the general population. Both mental illness and coronary heart disease may have a same etiological factor: immunological inflammation. Poor sleep quality and impaired cell-mediated immune function may also be linked with MDD, however it is not known whether or not the two are causally related. The Zhejiang University School of Medicine at Sir Run Run Shaw Hospital performed this retrospective cross-sectional investigation. Eighty-four CHD patients were divided into two groups based on their Hamilton Depression Rating Scale (HAMD) scores: those with MDD; HAMD score 10 and those without MDD. Patients with coronary heart disease (n=50) and those without (n=34) MDD had their sleep quality, systemic inflammatory response, and cell-mediated immune functions evaluated using the Pittsburgh Sleep Quality Index (PSQI), standard blood tests, and flow cytometry. Pearson's product-moment analysis was performed to determine the associations between variables, and linear discriminant analysis was used to investigate the elements that serve as divides in the sample. Sleep quality was substantially worse in CHD patients with MDD compared to those without MDD (Z=6.864, p0.001). Patients with CHD and MDD had greater CD4+ / CD8+ T-cell ratios and a higher Systemic Inflammation Index (SII) than those without MDD (Z=3.249, p=0.001). Compared to CHD patients without MDD (t=2.032, p=0.045), individuals with CHD and MDD had significantly less CD3+ CD8+ and CD3+ T cells (Z=3.422, p=0.001). In addition, the PSQI, SII, and T-cell levels properly identified the depressed and non-depressed groups with a 96.4% rate of success, suggesting that these factors may be useful in distinguishing patients with CHD with MDD from those without MDD. Poor sleep quality, elevated cell-mediated immunity, and SII in CHD patients may all be attributable to MDD. These variables help differentiate CHD in the depressed state. Treatment for depressed symptoms may potentially enhance CHD prognosis, therefore clinicians should be aware of this connection.

FINDINGS AND DISCUSSION

The study found a significant relationship between depression and immune system dysregulation among older adults in Bengaluru. High levels of stress hormones, such as cortisol, were observed in participants with depression, indicating chronic stress as a potential mediator between depression and immune function. Inflammation markers, such as C-reactive protein (CRP) and interleukin-6 (IL-6), were found to be higher in older adults with depression. Increased

inflammation suggests a relationship between depression and immune activation, which can lead to a compromised immune response. Sleep disturbances were prevalent among depressed older adults in our study, with a higher incidence of insomnia and disrupted sleep patterns. Poor sleep quality is known to adversely affect immune health and may contribute to the observed immune dysregulation.

The impact of social isolation and loneliness on immune health was evident in this findings. Older adults experiencing loneliness were more likely to have weakened immune responses, highlighting the importance of social support in maintaining immune function. The findings underscore the complex relationship between depression and the immune system among older adults in Bengaluru, India. The observed dysregulation of the immune system in individuals with depression suggests that mental health plays a crucial role in influencing overall health and well-being in this population. Chronic stress, as indicated by high cortisol levels, appears to be a significant mechanism through which depression affects the immune system. This finding aligns with previous research highlighting stress hormones' detrimental impact on immune cell functioning, leading to increased vulnerability to infections and diseases.

The relationship between depression and inflammation is another crucial aspect of this study. Chronic inflammation has been associated with various health conditions, and the results suggest that depression may be a contributing factor to increased inflammation in older adults, potentially accelerating the aging of the immune system. Sleep disturbances emerged as a prevalent issue among depressed older adults, and this could be a vital area for intervention. Improving sleep quality through behavioral and therapeutic approaches may positively influence immune health and overall well-being in this population. The impact of social isolation and loneliness on immune health is of particular concern, given the cultural context of Bengaluru. Strengthening social support networks and fostering a sense of community among older adults may prove beneficial in mitigating the effects of depression on immune function.

CONCLUSION

The study demonstrated a clear relationship between depression and immune dysregulation, with high stress hormones and increased inflammation observed in older adults experiencing depressive symptoms. The study concluded that chronic stress and inflammation may act as potential pathways through which depression affects immune health. Sleep disturbances were prevalent

among depressed older adults, indicating the importance of addressing sleep quality as a factor that could further compromise immune function. Improved sleep patterns may offer a viable intervention to enhance immune health in this population. Moreover, social isolation and loneliness were identified as significant contributors to immune system dysregulation among older adults with depression. Cultivating social support networks and community engagement could be pivotal in mitigating the adverse effects of depression on immune health.

The implications of this research are particularly relevant in the context of Bengaluru, where urbanization and changing socio-cultural dynamics may exacerbate mental health issues among the elderly. Recognizing and addressing depression in older adults could have profound implications for their overall well-being and resilience to illnesses. To enhance immune health among older adults in Bengaluru, a multi-faceted approach is crucial. This approach should encompass targeted mental health interventions, stress management programs, and initiatives to improve sleep quality and combat social isolation. Integrating mental health services into primary healthcare settings could also facilitate early detection and appropriate management of depression. Finally, public health campaigns aimed at reducing stigma surrounding mental health and promoting awareness about the impact of depression on immune function are imperative. By fostering a more supportive and empathetic society, there can be development of an environment that empowers older adults to seek help and access the necessary resources to maintain their mental and physical well-being.

RECOMMENDATIONS

Enhancing mental health awareness and reducing the stigma surrounding depression is essential. Public health campaigns should be implemented to educate the community, including families, caregivers, and healthcare professionals, about the prevalence and impact of depression on the immune system among older adults in Bengaluru. Additionally, efforts should be made to increase access to mental health services, including counseling, therapy, and support groups, tailored to the specific needs of older adults. Integrating mental health screening into routine primary care visits for older adults can help identify depression early on and facilitate timely intervention. Regular screenings can help healthcare providers assess the mental well-being of their patients and provide appropriate referrals for mental health support when needed.

Stress management techniques and coping strategies should be promoted among older adults in Bengaluru. These strategies may include mindfulness practices, relaxation exercises, and engaging in hobbies and social activities. By reducing chronic stress, the negative effects of depression on the immune system and overall health can be mitigated. Addressing social isolation and loneliness is crucial for improving immune health among older adults with depression. Community-based programs and initiatives should be developed to foster social support networks, enabling older adults to engage in meaningful social interactions and combat feelings of isolation. Community centers, senior clubs, and intergenerational programs can play a vital role in providing opportunities for social connection and emotional support.

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