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The role of horticultural therapy in adjunctive treatment of depression. A review of the literature

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ABSTRACT

Depression is a population-wide disease with a rising prevalence trend. Currently, there is a pressing need for new therapeutic approaches, especially since the disorder poses a significant risk of mortality. One potential avenue for treatment appears to be horticultural therapy, which has demonstrated positive impact on reducing depressive symptoms and improving patients' quality of life in studies conducted thus far. However, randomized trials involving patients across various age groups remain lacking.

Keywords: horticultural therapy, garden therapy, depression, dementia, adjunctive therapy

1. INTRODUCTION

The positive impact of nature on human functioning is widely known. Benefits include reduced stress and anxiety, increased life satisfaction and higher quality of life. (Tillmann et al., 2018). This is the basis for horticultural therapy, a therapeutic method in which physical activities necessary for garden maintenance enhance patients' overall health. Consequently, the idea of utilizing horticultural therapy as an adjunctive treatment for mental disorders has emerged.

Depression is a mental disorder characterized by a chronically low mood (Thornicroft et al., 2017). Currently, this condition affects up to 5% of the global population. Given that it is a potentially fatal illness and that the number of affected individuals shows a rising trend, all efforts to explore treatment methods synergistic with pharmacotherapy and psychotherapy appear justified. There is a growing body of scientific evidence suggesting that horticultural therapy may demonstrate the desired efficacy as an adjunctive treatment for depression. The purpose of this paper is to summarize the available knowledge and provide a scientific basis for the clinical application of this method in the treatment of depression.

2. METHOD

This article reviews already published literature on the use of horticultural therapy in the adjunctive treatment of depression. Using a database of 39 articles, we summarized the knowledge on this topic to establish a scientific foundation for implementing this method in the clinical treatment of depression. The literature was sourced from the PubMed database, ResearchGate, and book references, covering publications from 1997 to 2021. Appropriate articles were identified using search terms such as: “horticultural therapy”, “garden therapy”. The reviewed studies examined the impact of horticultural therapy as a supplementary treatment for depression, highlighting its potential benefits in enhancing mental well-being.

3. RESULTS & DISCUSSION

Depression and its treatment

Depression is a mental disorder whose symptoms may manifest within the course of various nosological entities, including unipolar depressive disorder, bipolar disorder, schizophrenia, neurocognitive disorders, as well as somatic diseases (DSM-5, 2013). The global prevalence of unipolar depressive disorder alone is estimated at 5%, which has significant economic repercussions –for instance, in the United States, medical care costs amount to \$200 billion annually (Thornicroft et al., 2017; Greenberg et al., 2015). Depression presents with chronically low mood, insomnia, anhedonia, and psychomotor retardation (DSM-5, 2013). Low self-esteem and excessive guilt may lead to recurrent suicidal thoughts or even attempts. Notably, more than half of the individuals who die by suicide were suffering from depressive disorders. Among the numerous risk factors for developing depression, age plays a critical role (Hasin et al., 2018). Peaks in incidence are observed in two age groups: adolescents and individuals over the age of 65. In the elderly population, the risk of depression is further exacerbated by a higher prevalence of systemic diseases (e.g., coronary artery disease, neurocognitive disorders, hypothyroidism), chronic pain associated with these conditions, and the consequent polypharmacy (Kessler et al., 1997). Treatment for depression predominantly relies on a combination of psychotherapy and pharmacotherapy (Cuijpers et al., 2009).

According to Cuijpers et al., (2009) combined therapy is more effective than either method alone. Psychotherapy encompasses cognitive-behavioral therapy, interpersonal psychotherapy, and therapy for families and couples. However, no single method has been proven superior, and the choice of treatment often depends on availability and patient preferences (American Psychiatric Association, 2010). Pharmacological treatment is currently more accessible, cost-effective, and preferred by most patients (Marcus et al., 2010; Givens et al., 2007). Commonly used medications include SSRIs (selective serotonin reuptake inhibitors), SNRIs (serotonin-norepinephrine reuptake inhibitors), and TCAs (tricyclic antidepressants) (Schatzberg et al., 2017). However, such treatments often lead to adverse effects, including diarrhea, nausea and vomiting, sexual dysfunction, drowsiness, and weight gain (Gartlehner et al., 2011). Consequently, it seems reasonable to look for novel treatment methods that minimize adverse side effects by allowing for reduced medication doses.

Applications of horticultural therapy

Horticultural therapy is a therapeutic method that engages patients in non-commercial gardening activities (Soga et al., 2017). The positive effects of gardening on physical, mental, and social health have been observed since ancient times. According to the American Horticultural Therapy Association (AHTA) (2021), this form of therapy was recognized by Dr. Benjamin Rush and employed in the treatment of mental disorders. In the 1940s and 1950s, due to the spread of horticultural therapy among war veterans, the method became more recognizable, widespread, and acceptable, and its use expanded beyond mental disorders.

Gardens used in horticultural therapy are specially designed to enhance their rehabilitative nature, and patients are supervised by trained therapists. The beneficial effects of this therapy are multifaceted. These include reductions in anxiety and depressive symptoms, stress relief, decreases in BMI, improved quality of life, a greater sense of community, higher physical activity levels, and enhanced cognitive functions (American Psychiatric Association, 2010). Horticultural therapy supports both cognitive functioning and social interaction. However, it is essential to note that the evidence for these benefits is of low quality, mainly due to its methodology and the heterogeneity of the assessed variables and applied horticultural therapy techniques. It results from the lack of specific recommendations regarding the use of this therapy, such as the time spent working in the garden or its intensity (Kamioka et al., 2014).

The effectiveness of horticultural therapy in depression and disorders accompanied by depressive symptoms

It is worth noting the connection between the pathomechanism and symptoms of depression and the observed effects of horticultural therapy. Detweiler et al. demonstrated that applying horticultural treatment among a group of studied veterans was associated with a

12% decrease in salivary cortisol levels (Detweiler et al., 2015). This hormone plays a role in the development of depressive disorders; however, statistical significance for this measurement was not established ($p=0.43$). Conversely, Yun et al., (2010) observed a statistically significant reduction in cortisol levels ($p=0.037$) among adults with dementia, a condition often accompanied by depressive disorders. Another beneficial effect—a reduction of pro-inflammatory markers—was identified by researchers in Singapore (Ng et al., 2018). After six months of horticultural therapy in the experimental group, there was a significant decrease in IL-6 levels, which contributes to depression by activating the hypothalamic-pituitary-adrenal axis and influencing neurotransmitter metabolism (Ting et al., 2020). Although the same study showed no changes in cortisol levels, a significant increase in brain-derived neurotrophic factor (BDNF) was observed. BDNF reduction is typically seen in patients with depression, while antidepressants work partly by increasing its expression (Dwivedi, 2009).

The goal of depression pharmacotherapy also includes elevating neurotransmitter levels, which can be similarly achieved through moderate physical activity and interaction with nature, such as contact with soil. It has been shown that exposure to a specific soil bacterium, *Mycobacterium vaccae*, leads to increased serotonin release in the dorsal raphe nucleus in mice (Lowry et al., 2007). An increase in neurotransmitter levels was also noted in depression patients during moderate aerobic physical exercises (Kvam et al., 2016). Gardening meets the conditions for such activities.

Based on the program conducted by Siu et al., patients' subjective assessments indicated that gardening improved their mood, increased engagement, sense of purpose and fulfillment, while reducing stress and anxiety—although standardized analyses of these parameters did not reflect these outcomes (Siu et al., 2020). Care home residents exhibited higher self-esteem, reduced helplessness, and scored lower on Beck's Depression Inventory (Tse, 2010).

Horticultural therapy has also shown a significant reduction in depressive symptoms in dementia patients, demonstrated through tests such as The Cornell Scale for Depression in Dementia (CSDD) (Edwards et al., 2013). Active participation of individuals with dementia in garden maintenance led to decreases in psychomotor agitation and anxiety (Edwards et al., 2013; Zhao et al., 2022; Blake et al., 2016). These individuals displayed greater engagement in daily activities and required fewer psychotropic medications. Their families expressed satisfaction with the improved social functioning of their loved ones (Schols et al., 2006).

Patients reported improved appetite and better structured daily rhythms, leading to enhanced sleep quality at night and decreased daytime sleep hours (Lee et al., 2008). In early-onset dementia patients (ages 43–65), systematic gardening activities increased self-esteem, agency, and feelings of usefulness (Hewitt et al., 2013). Observing the results of their work, such as flowering plants, brought satisfaction and a sense of purpose, potentially counteracting suicidal thoughts (Horticultural Therapy for Anxiety and Depression, 2021).

According to Clatworthy et al., (2013), gardening allows patients to focus on the present moment, helping them isolate from pessimistic thoughts. Interaction with other patients during therapy fosters social skill development and teamwork to achieve common goals. This effect has been observed in older adults without dementia, reducing feelings of loneliness (Nicholas et al., 2019).

Horticultural therapy participants also report spiritual benefits, such as a deeper connection with nature, fascination with plants, and outdoor joy (Kam et al., 2010). Physical fitness improvements were noted, which could be beneficial for treating depressed individuals with psychomotor retardation (Austin et al., 2006). Another aspect resulting from the study is the positive change in the patients' dietary habits, which in the case of patients with depression may cause an increase in appetite and an increase in the quality of meals consumed. Due to their close contact with the earth, care for flowering plants, patients decided to eat more vegetables. This was due to the fact that they knew their origin and appreciated the effort put into cultivation.

4. CONCLUSION

Horticultural therapy has a multifaceted effect that is important in the supportive treatment of depression. Its beneficial influence on mood, sleep, appetite, social relationships, cognitive functions, and more improves overall quality of life. Positive results have also been observed in scales measuring depression severity. Unlike pharmacotherapy, horticultural therapy is not associated with adverse effects. Most studies conducted on this therapy involve gardening activities among elderly individuals, for whom depressive disorders often occur in the context of dementia or other diseases. Considering its broad-spectrum effects, horticultural treatment could potentially be explored for application in different conditions with symptoms resembling depression, such as post-traumatic stress disorder (PTSD). Nonetheless, there remains a lack of randomized studies encompassing diverse age groups, as well as depression cases unaccompanied by comorbidities.

Authors' Contributions

Katarzyna Janeczek: conceptualization, writing-rough preparation, investigation

Justyna Kowalczywska: writing - review and editing, visualization, formal analysis

Dominika Jaszczuk: writing - review and editing, conceptualization, supervision

Weronika Śniegowska-Gruberska: writing - review and editing, resources, supervision

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Not applicable.

Informed consent

Not applicable.

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Conflict of interest

The authors declare that there is no conflict of interest.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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