

The Effect of Horticultural Therapy on Increased Self-Esteem for Mental Disorders in the Community

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ABSTRACT

INTRODUCTION: The increasing number of mental disorders causes various problems, so treatment and rehabilitation programs are needed to increase adaptability and prevent recurrences in the community. **MATERIAL AND METHODS:** This study used a quasi-experimental method with a pre-post test between the intervention and control groups. Effects of horticultural therapy on self-esteem were analysed using paired t-tests. **RESULTS:** The results showed a significant difference in the self-esteem scores of patients with mental disorders before and after treatment in the intervention group with horticultural therapy (p-value of 0.00). **CONCLUSION:** A significant difference exists in the self-esteem scores of patients with mental disorders before and after treatment in the intervention group given horticultural therapy marked. The participants in the study had various mental disorders, including schizophrenia and depression. Both schizophrenia and depression are associated with symptoms of low self-esteem. Horticultural therapy positively enhances self-esteem regardless of specific mental disorders.

INTRODUCTION

Mental disorders are conditions in which psychological or behavioral manifestations are associated with real suffering and poor performance and are caused by biological, social, psychological, genetic, physical, or chemical disorders.¹ Schizophrenia is one of the most common serious mental disorders, ranking among the top 20 causes of disability worldwide² and affecting 20 million people.³ People with schizophrenia often share common experiences, such as hallucinations, delusions, emotional disturbances, and behavior and language distortions, and they face a 2-3 times higher risk of premature death than the general population.⁴ Schizophrenia is a debilitating illness because the patient suffers from cognitive impairment, often associated with decreased executive function, ultimately leading to severe impairment in daily functioning and social interactions.

Based on Riskesdas 2018 stands for Riset Kesehatan Dasar 2018, which translates to Basic Health Research 2018. It is a national health survey conducted by the Indonesian Ministry of Health's Research and Development Agency (Badan Penelitian dan

Pengembangan Kesehatan or Balitbangkes). The survey aims to gather comprehensive health data on the Indonesian population. It was found that the prevalence of psychotic mental disorders in Indonesia is 7.0 per mile. Patients with mental disorders who did not seek treatment were 15.1% of the total diagnosed patients, and 51.1% of the patients treated did not take medication routinely.⁵ The increasing number of mental disorders causes various problems. The burden of mental disorders increases and impacts health, social conditions, human rights, and economic consequences in all countries.⁶

People with mental disorders need health care services and rehabilitation programs in the form of assistance in accessing educational programs that suit their needs and finding work and housing that allows them to live and be active in activities in their community.⁶ Rehabilitation programs for patients with mental disorders such as schizophrenia affect improving the adaptability of patients in society and preventing recurrences, such as rehabilitation programs for horticultural therapy, music therapy, art therapy, etc.⁷

Horticultural therapy (HT) uses plants to meet individual expectations holistically.⁸ Holistically refers to considering or understanding something as a whole rather than focusing solely on its parts or components. It involves taking a comprehensive and integrated approach, recognising the interconnectedness and interdependence of various elements. For example, a holistic approach in healthcare considers a patient's physical symptoms and emotional well-being, lifestyle, social support, and environmental factors. It recognises that these factors can influence a person's health and seeks to address them comprehensively and comprehensively. Growing crops and harvesting helps increase self-confidence, achieve goals, and increase self-efficacy. Horticulture has long been a therapeutic activity for people with mental disorders, such as schizophrenia and depression. Horticulture has long been used as one of the therapeutic activities for people with mental disorders, such as schizophrenia and depression.⁹ Human interaction with plants, through goal-oriented horticultural activities such as active gardening and passive appreciation of nature, can be therapeutic in many ways for people with mental disorders.¹⁰ Horticultural therapy provides opportunities for patients to work together in the garden, increasing personal relationships, cooperation, responsibility, communication, positive assessment, and social support.⁷ A study of hearing loss clients showed that horticultural therapy of 10 sessions indoors with decorating activities significantly increased self-esteem scores.¹¹ HT in adult women who experience depression significantly increases the ego identity scale, including increasing scores of intimacy, initiative, goal orientation abilities, and self-acceptance.¹²

The Kejobong Health Center in Purbalingga Regency, Central Java Province, Indonesia, is one of the community health centers with the characteristic of being an agricultural area. The number of mental disorders patients detected in the region in 2018 was 156. Management of mental illness patients is carried out is routine medication, examinations, and referrals. Rehabilitation therapy has been conducted at the Kejobong Community Health Center, which involves regular health check-ups, medication therapy, education for patients and their families on topics such as home care

for individuals with mental disorders, assisting patients in adapting to their environment, managing medication side effects, and actions to take in case of relapse. The Kejobong Community Health Center also conducts community socialisation on mental health, aiming to raise awareness and promote understanding of mental disorders among the public. The goal is to foster a supportive and conducive support system for patient rehabilitation. However, there has yet to be community-based rehabilitation therapy that utilizes the natural resources or the potential of the community, such as occupational therapy, work therapy, and horticultural therapy involving gardening activities with plant species that are easily grown in the Kejobong sub-district area. The purpose of this research is to contribute to understanding the potential benefits of horticultural therapy as a rehabilitation program for individuals with mental disorders. Specifically, the study aims to determine whether horticultural therapy can effectively improve self-esteem in patients with mental disorders and to explore the potential of horticultural therapy as a complementary treatment option for mental disorders in the community.

MATERIALS AND METHODS

Research Design

This research uses quantitative methods with a quasi-experimental design (pre and post-test) between the intervention and control groups. The study was conducted to determine the effect of horticultural therapy in increasing self-esteem in mental disorders patients in the community. This study included all patients with mental disorders in the Kejobong Health Center area, Purbalingga Regency, Central Java Province, Indonesia. The study comprises 75 individuals who meet the criteria, selected through the total sampling method from the entire population of people with mental disorders. The requirements for the sample include being in the rehabilitation phase, regularly taking medication and actively participating in activities until completion. Out of the 75 individuals who met these criteria, specifically, 50 people were included in the study and then divided into two groups, 25 respondents in the intervention group and 25 in the control group. The sampling technique was purposive sampling with the criteria: patients with mental

disorders at the recovery stage, willing to participate in research activities until the end, represented by the person in charge (family), have a hobby in agriculture, and take regular medicine.

The alternative research hypothesis is that horticultural therapy increases the self-esteem of mental disorders patients in the intervention group compared to the control group. The research instrument was a questionnaire sheet using the Rosenberg self-esteem scale. The Rosenberg self-esteem scale is a self-assessment of general self-esteem developed by Dr. Morris Rosenberg in 1965. This questionnaire has high reliability, namely a correlation coefficient of 0.82-0.88. The questionnaire consists of 10 questions on a scale of 0-3.¹³ The questionnaire was administered to see whether the participants had problems with self-efficacy. The questionnaire list can be seen in the attachment uploaded in a separate file.

This research used the Indonesian version of the Rosenberg Self-Esteem Scale to measure self-esteem. The Rosenberg scale is valid and reliable for assessing the self-esteem construct. The correlation coefficient used is the Pearson Product Moment Correlation Coefficient. The validity index of this measurement tool is reported as 0.426, with a range between 0.017 and 0.614. The reliability test results using the test-retest method yielded a reliability index of $r(38) = 0.738$.¹⁴

DATA ACQUISITION TOOLS

The research process began with a pre-test in both groups at the beginning of the first week. Furthermore, the intervention group was given horticultural and drug therapy for 6 (six) weeks. There are 4 (four) main activities carried out in horticultural therapy. The first stage introduces the most commonly consumed vegetables (kale and spinach) and explains the gardening interventions that will be implemented. The second stage is planting and caring for kale and spinach vegetable seeds. The third stage is harvesting garden products, and the fourth stage is processing the crops.

The control group was only given drug therapy according to the program. The post-test of the intervention and control groups was carried out at the end of the eighth

week using the same assessment sheet. Self-esteem score data analysis used descriptive analysis. The effect of horticultural therapy on self-esteem in the intervention group was tested by paired t-test. An independent t-test tested the difference in self-esteem scores between the intervention and control groups after the treatment. This analysis assesses whether any observed differences between the groups are statistically significant or simply due to chance. The p-value commonly represents the level of significance. The p-value is a measure that indicates the probability of obtaining the observed results if there is no true difference between the groups. A p-value below a predetermined threshold (often 0.05 or 0.01) is typically considered statistically significant. If the p-value is below the chosen threshold, it suggests that the observed differences between the groups are unlikely to have occurred by chance alone.

RESULTS

The characteristics of patients with mental disorders based on gender, education, history of hospitalisation frequency, and duration of illness can be seen in Table 1. The patients' characteristics in the intervention group are predominantly male, with 16 individuals (64%) and 9 individuals (36%) female. The education level is dominated by Primary and Middle School, with 17 individuals (58%), followed by 4 illiterate individuals (16%) and 4 individuals with a High School education (16%). The history of hospitalisation frequency is mainly 1-5 years, with 16 individuals (64%), while the remaining 9 individuals (36%) have been hospitalised for more than 5 years. The duration of illness is predominantly 1-5 years, with 21 individuals (84%), and more than 5 years, with 4 individuals (16%). Furthermore, in the control group, the patients' characteristics include 13 males (52%) and 12 females (48%). The education level is dominated by Primary and Middle School, with 17 individuals (58%), followed by 3 illiterate individuals (12%) and 5 individuals with a High School education (20%). The history of hospitalisation frequency is mainly 1-5 years, with 19 individuals (76%), while the remaining 6 individuals (24%) have been hospitalised for more than 5 years. The duration of illness is predominantly 1-5 years, with 23 individuals (92%), and more than 5 years, with 2 individuals (8%). The study participants were all mental

patients at the Kejobong Health Center in Banyumas Regency who met the inclusion criteria, regardless of their medical diagnosis.

Table 2 shows the average self-esteem score in the intervention group before treatment was 16.88, and after treatment was 18.64. It showed a significant difference in self-esteem scores before and after treatment in the intervention group with the provision of horticultural therapy marked with a p-value of 0.00. No significant difference was observed in the control group, with a p-value of 0.08.

Table 3 explains a significant difference in the average difference in self-esteem scores before and after treatment between the intervention and control groups, with a p-value of 0.00.

DISCUSSION

Horticulture therapy for rehabilitating patients with mental disorders can involve various activities. These activities include planting various vegetables to learn how to cultivate different plants in polybags, exchanging ideas with other patients, and showing mutual appreciation. Caring for plants is beneficial in terms of fostering a sense of ownership, appreciating nature, and considering the vitality of plants. Harvesting vegetables offers the opportunity to practice harvesting and cooking and exchange thoughts and feelings after successfully nurturing the plants. The wide range of activities in horticulture therapy has positive psychological, social, and spiritual effects.

The application of horticulture therapy in this research was conducted in a group setting for 6 weeks. This therapy involved a series of sessions, with the first session taking place indoors while the subsequent sessions were conducted outdoors. This approach aimed to create a diverse and comprehensive therapeutic experience by combining indoor and outdoor environments.

The first session began with introductions among group members and facilitators, introducing commonly consumed vegetable plants such as water spinach and spinach and providing an overview of the gardening

activities that would be carried out. The first session took place indoors. This activity aimed to build trust among patients, encourage the sharing of opinions and allow each patient to practice setting therapy goals related to gardening. The second session involved preparing the planting medium using a mixture of soil and organic fertilizer. This activity was beneficial for stimulating sensory experiences by touching the soil and various organic fertilisers, promoting tactile sensations, stimulating motor skills, increasing physical activity, and interacting with nature. The third session focused on planting vegetable seedlings. The benefits of this activity included learning proper planting techniques, practicing optimism for the planted crops, exchanging ideas about planting methods, stimulating sensory experiences, promoting tactile sensations, stimulating motor skills, and increasing physical activity. The fourth session involved plant maintenance. This session provided an opportunity to learn how to care for plants, accept input from others to keep the plants healthy, learn self-appreciation, stimulate motor skills, and increase physical activity. The fifth session focused on harvesting and processing the harvested produce. This session provided an opportunity to learn self-appreciation for personal achievements, express gratitude for individual accomplishments, receive praise from others for personal successes, and communicate to others that the harvest resulted from their hard work. It also emphasized the importance of appreciating the achievements of others.

Overall, the horticultural therapy sessions in this study aimed to provide a supportive and interactive environment where participants could engage in gardening activities, foster personal growth, and enhance various well-being aspects.

Differences in Self-Esteem of Mental Disorder Patients After Horticultural Therapy

The results of this study indicate a significant difference in self-esteem scores among patients with mental disorders in the Kejobong Health Center area before and after treatment in the intervention group receiving horticulture therapy. However, in the control group, there was no significant difference in self-esteem scores before and after treatment, with a p-value of 0.00.

Based on the presented data in Table 3, a significant difference was found in the average difference in self-esteem scores before and after treatment in the intervention and control groups, with a p-value of 0.00. This indicates that the difference is not due to random chance, but there is a significant relationship between horticulture therapy and changes in self-esteem scores among patients with mental disorders. A mean difference in self-esteem scores of 1.76 was obtained in the intervention group. It indicates an increase in the average self-esteem score after undergoing horticulture therapy in this group.

Meanwhile, a mean difference in self-esteem scores of 0.12 was found in the control group. Although there was a slight increase in the average self-esteem score in this group, the difference was not statistically significant. Thus, it can be observed that horticulture therapy in the intervention group has a more significant influence in improving self-esteem scores compared to the control group.

The participants in the horticulture therapy study included all patients with mental disorders who were in the recovery phase, had caregivers, regularly took medication from the health center, and had an interest in agriculture. The mental illnesses experienced by the participants included schizophrenia and depression. Schizophrenia is a medical diagnosis often found in patients with mental disorders. Individuals with schizophrenia show impairments in cognitive processing and receiving stimuli, including long-term memory impairments to respond to happiness, learning, thinking processes, and making decisions. This condition is often associated with negative symptoms of schizophrenia (e.g., anhedonia, asocial).¹⁵ Another mental disorder is depression, a common mental disorder and one of the leading causes of disability worldwide. Globally, an estimated 264 million people are depressed. More women are affected than men. Depression is characterised by sadness, loss of interest or pleasure, guilt or low self-esteem, disturbed sleep or appetite, fatigue, and poor concentration. People with depression may also have many physical complaints about no apparent physical cause.⁵ Patients with mental disorders such as schizophrenia with negative symptoms

or depressed patients often show symptoms of low self-esteem.

According to Brown, self-esteem assesses the extent to which people like themselves and believe they are competent.¹⁶ Signs of low self-esteem include (1) lack of self-confidence, (2) lack of confidence in self-efficacy, (3) doubting the value of relationships (relationships with other people), (4) avoiding harmful things, taking refuge in the closest person, (5) thinking about failure, (6) feeling threatened by self-deficiency, (7) focus thinking of others, and do not want to be close to others and base their self-esteem on appearance.¹⁷ Horticulture therapy provided to the intervention group enhances the self-confidence of patients in their ability to care for plants, and it yields something tangible in the form of vegetables that can be cooked or sold. It instills a sense of usefulness for oneself and others improves social interaction with others during gardening activities within the group, cultivates hope for the growth of plants, trains focus to achieve desired outcomes through nurturing plants diligently, combating pests and weeds, fertilizing, and watering. The benefits gained from participating in horticulture therapy contribute to an increase in self-esteem for the patients.

Supportive healthcare services and community care are needed to rehabilitate people with mental illnesses. They need assistance to access educational programs that suit their needs and find work (productive activities) and housing that allows them to live and be active in their local communities.⁶ Healthcare services and community care can be crucial in supporting horticultural therapy for individuals with mental disorders. In summary, Supportive healthcare services contribute to horticultural therapy by assessing patients, developing treatment plans, monitoring progress, facilitating collaboration, integrating therapies, and providing follow-up care. Individuals with mental disorders can receive comprehensive support that addresses their holistic well-being by integrating healthcare services and community care with horticultural therapy. This collaborative approach can enhance the therapeutic outcomes and contribute to their mental health recovery.

Psychosocial interventions for the treatment of

schizophrenia are developing. Schizophrenia is a complex social function disorder, so comprehensive intervention with multitherapy is needed. The therapy is interactive, group-based, visual engagement, auditory, video stimuli, or other formats stimulating social development.¹⁸ The horticultural group therapy program for 10 (ten) sessions significantly improved the positive and negative symptoms of schizophrenic patients, whereas there was no significant change in the control group.⁷

HT describes the process of active and passive relationships between individuals who use plants and gardens as therapeutic and rehabilitative activities. This therapy positively impacts individual health by improving mood and self-esteem and practicing social interaction. Applying the horticultural therapy program to depression and self-esteem in prisoners showed an increase in self-esteem, 16.0 points, whereas HT was given 12.1 points. It offers a statistically significant difference in self-esteem (p -value= 0.001).

This study believes that the participants' self-esteem is enhanced by the hope of growing plants planted and dishes made with good results to achieve goals and satisfaction because they can complete their work¹⁹; unlike other studies, horticultural therapy in this research involved various types of plants, including ornamental plants, fruits, and herbs. This approach allowed participants to experience various gardening activities and expand their knowledge and skills in caring for different types of plants. In addition to cultivation, therapy activities also encompassed plant maintenance, harvesting, and even the sale of harvested produce. Therefore, horticultural therapy in this study has the potential to provide more comprehensive benefits for participants.

The temporal lobe brain functions for emotional expression and is activated when looking at plants. The HT activities have an impact on emotional intelligence. This program provides opportunities for individuals to work together and develop relationships with each other. Communication with groups, emotional recognition, and emotional expression will develop.²⁰

Pruning plants, scented candles, flower baskets, and

flower bouquets can increase self-esteem by increasing self-confidence and happiness through active communication and the subject's ability to give to others. Fragrance and color stimulate sensory function. Olfactory factors, such as herbs and scented candles, and visual factors, such as various colorful flowers, increase the subject's interest and participation, thereby increasing their self-esteem. The ability to express themselves will increase because they can express their thoughts about the work and exchange opinions with other people during the program to be more confident.¹¹ In this study, horticultural therapy focused on vegetable cultivation activities, particularly kangkung (water spinach) and bayam (spinach). The selection of these vegetables was based on the local community's consumption habits in the Kejobong District and their easy maintenance and fast harvesting time, considering the dry season and limited water availability.

By planting kangkung and bayam, therapy participants are expected to easily care for these plants and optimize the utilisation of their harvests, both for consumption and economic value. Furthermore, through comprehensive knowledge and skills in cultivating kangkung and bayam, participants are encouraged to continue gardening activities at their own homes. Sustained gardening activities have the potential to enhance participants' self-esteem gradually. It was evidenced by a significant increase in participants' self-esteem after undergoing horticultural therapy, as indicated by a p -value of 0.00.

Ulrich's psychological and physiological stress reduction theory explains the effects of nature on emotional and physiological functions. Humans seek natural stimuli for relaxation. Exposure to natural stimuli quickly takes effect and triggers the parasympathetic nerves' work and increases well-being, happiness, and relaxation. The accurate picture is when a person is affected by their physiology (heart rate, skin discoloration) and emotional stress. That person will recover faster by seeing an excellent, green natural image rather than a bustling picture of city life. The theory explains how contact with the natural environment can immediately impact well-being and feelings of happiness.⁹

The description above shows that horticultural therapy

can affect the increase in self-esteem in patients with mental disorders. High self-esteem is characterised by self-confidence, motivation to keep trying, and acceptance, whatever the outcome. Neurological responses show greater activation in the left frontal cortex, associated with motivation, positive mood, risk-taking, self-confidence, confidence in their abilities, and happy feelings.¹⁷

LIMITATIONS

This study's main limitation is that it was only conducted in one area, so it cannot be generalised to other places. Therefore, further research should add samples from different locations to be more representative. A second limitation may be the number of participants, making generalizing the data difficult.

CONCLUSION

The intervention group showed a significant increase in self-esteem scores after receiving horticultural therapy, while the control group did not show a significant difference. The average self-esteem score in the intervention group increased from 16.88 to 18.64 after treatment.

There was a significant difference in the average difference in self-esteem scores before and after treatment between the intervention and control groups. The intervention group had a mean difference of 1.76 in self-esteem scores, indicating a significant improvement, while the control group had a mean difference of 0.12, which was not statistically significant.

The participants in the study had various mental disorders, including schizophrenia and depression. Both schizophrenia and depression are associated with symptoms of low self-esteem. Horticultural therapy positively enhances self-esteem regardless of specific mental disorders.

Horticultural therapy demonstrated significant improvements in self-esteem among patients with mental disorders. It provided a supportive and interactive environment, fostered a sense of ownership and usefulness, and enhanced social interaction and emotional

well-being. Supportive healthcare services and a comprehensive approach to therapy are crucial in maximising the benefits of horticultural therapy for individuals with mental disorders.

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CONTRIBUTION

The two authors compiled the study and design. Data collection and analysis were also carried out by the two authors, compiling and finalizing the manuscript. All authors read and approved the final manuscript.

DECLARATION OF INTEREST

The author declares there is no conflict of interest.

REFERENCES

1. Andri J, Febriawati H, Panzilion P, Sari SN, Utama DA. Implementasi Keperawatan dengan Pengendalian Diri Klien Halusinasi pada Pasien Skizofrenia. *J Kesmas Asclepius*. 2019;1(2):146–55.
2. Vos T, Flaxman AD, Naghavi M, Lozano R, Michaud C, Ezzati M, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012;380(9859):2163–96.
3. James SL, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet*. 2018;392(10159):1789–858.
4. Laursen TM, Nordentoft M, Mortensen PB. Excess Early Mortality in Schizophrenia. *Annu Rev Clin Psychol*. 2014;10(1):425–48.
5. Kemenkes RI. Riset Kesehatan Dasar (Riskesdas) [Internet]. Badan Penelitian dan Pengembangan Kesehatan Kementerian RI. 2018. Available

- from:http://www.depkes.go.id/resources/download/infoterkini/materi_rakorpop_2018/Hasil_Riskesdas_2018.pdf
6. WHO. Mental disorders [Internet]. 2019 [cited 2021 Apr 19]. Available from: <https://www.who.int/news-room/fact-sheets/detail/mental-disorders>
 7. Oh YA, Park SA, Ahn BE. Assessment of the psychopathological effects of a horticultural therapy program in patients with schizophrenia. *Complement Ther Med*. 2018;36:54–8.
 8. Ascencio J. Horticultural Therapy as an Intervention for Schizophrenia: A Review. *Altern Complement Ther*. 2019;25(4):194–200.
 9. Clatworthy J, Hinds J, Camic PM. Gardening as a mental health intervention: A review. *Ment Heal Rev J*. 2013;18(4):214–25.
 10. Elings M. People-plant interaction: the physiological, psychological and sociological effects of plants on people. *Farming Heal*. 2006;(Gezondheidsraad 2004):43–55.
 11. Kim KH, Park SA. Horticultural therapy program for middle-aged women's depression, anxiety, and self-identify. *Complement Ther Med*. 2018;39:154–9.
 12. Moon JR, Yoo YK. Improved Self-Esteem in Women with Hearing Impairment after Horticultural Therapy and Subjects' Program Preference. *J People, Plants, Environ*. 2019;22(4):365–73.
 13. Rosenberg M. *Society and the Adolescent Self-Image*. Princeton: NJ: Princeton University Press; 1965.
 14. Wicaksana D, Suwartono C. Uji Validitas dan Reliabilitas Alat Ukur Indonesia Implicit Self-Esteem Test (IISeT). *J Pengukuran Psikol dan Pendidik Indonesia*. 2012;1(4):297–321.[Indonesia]
 15. Green MF, Horan WP, Lee J. Nonsocial and social cognition in schizophrenia: current evidence and future directions [Internet]. Vol. 18, *World Psychiatry*. Blackwell Publishing Ltd; 2019:146–61.
 16. Zeigler-Hill V. *Self-esteem*. Self-Esteem. Taylor and Francis; 2013:1–190.
 17. Park LE, Crocker J. Pursuing self-esteem: Implications for self-regulation and relationships. In: *Self-esteem*. New York, NY, US: Psychology Press; 2013:43–59.
 18. Scott TL. Horticultural Therapy. In: *Encyclopedia of Geropsychology*. Singapore: Springer Singapore; 2017. p. 1147–51.
 19. Kim HK, Na SS, Kim HH. Effects of Horticultural Therapy Programs on Depression and Self-esteem in Released-Convicts. *J Korea Soc Plants People Environ*. 2017;20(2):143–8.
 20. Oh YA, Lee AY, An KJ, Park SA. Horticultural therapy program for improving emotional well-being of elementary school students: an observational study. *Integr Med Res*. 2020;9(1):37–41.