

## •Original research article•

# Treatment effect of antipsychotics in combination with horticultural therapy on patients with schizophrenia: a randomized, double-blind, placebo-controlled study

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**Background:** As a newly developed treatment method for schizophrenia, horticultural therapy is gaining more attention. However, there is as of now little research investigating this topic as well as a general lack of studies adopting into standard treatment plans.

**Aims:** Investigate treatment effect of horticultural therapy on patients with schizophrenia and its possibility of standardized application in psychiatric hospitals.

**Methods:** 110 patients with schizophrenia who met the inclusion criteria and provided informed consent were selected from the rehabilitation ward of the Minhang District Mental Health Center from September 2015 to December 2015. We used random-number methods to classify patients into either the intervention group or the control group. While the two groups both received normal medications, the intervention group also attended horticultural therapy. Patients in the intervention group were led by a rehabilitation therapist who had obtained the level II psychological counselor qualification (the standard qualification for counselors in China). The treatment period lasted for 12 weeks. Treatment was held 3 times every week and each session lasted for 90 minutes. The specific contents included ridging, planting, watering, fertilizing and pruning of flowers; plowing, sowing, watering, fertilizing, weeding and catching pests for gardens; appreciating, collecting vegetables, cooking and tasting for flowers and grasses. During the final 10 minutes of every session, patients mutually expressed their thoughts and experiences and the rehabilitation therapist concluded the session. The two groups were measured by the Positive and Negative Syndrome Scale (PANSS) at baseline, the end of the 4<sup>th</sup> week and the end of the 12<sup>th</sup> week.

**Results:** There was no statistically significant difference in gender, age, course of disease, marital status, mean dosage of antipsychotic medications and PANSS score before the intervention among two groups. The PANSS score in the intervention group was statistically significant lower than in the control group both at the end of the 4<sup>th</sup> week ( $t=-4.03, p<0.001$ ) and at the end of the 12<sup>th</sup> week ( $t=-5.57, p<0.001$ ). There were statistically significant differences before and after intervention in the intervention group ( $F=253.03, p<0.001$ ); there was statistically significant differences before and after intervention in the control group ( $F=67.66, p<0.001$ ). There was statistically significant difference in the positive scale score among the two groups both at the end of the 4<sup>th</sup> week ( $t=-3.69, p<0.001$ ) and the end of the 12<sup>th</sup> week ( $t=-3.55, p<0.001$ ); there was a statistically significant difference in the general psychopathology scale score among the two groups both at the end of the 4<sup>th</sup> week ( $t=-3.67, p<0.001$ ) and the end of the 12<sup>th</sup> week ( $t=-3.34, p<0.001$ ). Likewise, there were statistically significant differences in the positive scale scores at baseline, end of the 4<sup>th</sup> week and the end of the 12<sup>th</sup> week both among the intervention group ( $F=13.76, p<0.001$ ) and the control group ( $F=5.12, p=0.02$ ); there were statistically significant differences in the general psychopathology scale scores at the baseline, the end of the 4<sup>th</sup> week and the end of the 12<sup>th</sup> week both among the intervention group ( $F=156.40, p<0.001$ ) and the control group ( $F=56.72, p<0.001$ ). There was statistically significant differences in the negative scale score at the end of the 12<sup>th</sup> week among the two groups ( $t=-2.76, p<0.001$ ). There were statistically significant differences in the positive scale scores at the baseline, the end of the 4<sup>th</sup> week and the end of the 12<sup>th</sup> week both among the intervention group ( $F=103.94, p<0.001$ ) and the control group ( $F=34.03, p<0.001$ ).

**Conclusions:** Although antipsychotic medications can alleviate the psychiatric symptoms of patients with schizophrenia, the treatment effect for both positive and negative symptoms would be even more effective if it is combined with horticultural therapy.

**Keywords:** horticultural therapy; schizophrenia; randomization; placebo-controlled; China

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## 1. Introduction

Schizophrenia is a severe and disabling mental illness with high number of individuals who require hospitalization. Indeed, in any country much of the preventative and treatment efforts go towards schizophrenia.<sup>[1]</sup> Worldwide there are over 7,800,000 individuals with schizophrenia, making up over 50% of individuals with psychiatric disorder (excluding neurosis).<sup>[2]</sup> The most important treatment method till now is antipsychotic medication. Likewise, rehabilitative therapies play a significant role in alleviating psychiatric symptoms, enabling patients with schizophrenia to readapt to society and restore social functioning. Among rehabilitative therapies, horticultural therapy has recently gained a lot of attention.

There is no uniform definition of horticultural therapy. The relatively agreed up definition is posed by the American Horticultural Therapy Association (AHTA), which defines 'horticultural therapy' as 'the engagement of a person in gardening and plant-based activities, facilitated by a trained therapist, to achieve specific therapeutic treatment goals'.<sup>[3]</sup> Early in Egyptian times, people learned that agricultural activities such as farming could benefit physical and psychological health. But it was not until the late 18<sup>th</sup> century that Benjamin Rush, the pioneer of psychiatry, formally suggested the idea of treatment effects by engaging in horticultural activities for patients with psychiatric disorders. Much domestic and international literature have posited that horticultural therapy has relatively good treatment effects on emotions, physical health, social networking and cognitions and that the horticultural therapy could improve patients overall health and quality of life, especially in promoting patients' physical strength and cardiac functions.<sup>[4,5]</sup> A large cross-sectional study in Scotland conducted by Shiue found that of the 9709 studied adults, there were certain improvements in mental health especially in attention, feeling life is significant, and being capable of making life decisions and among those who had recently participated in gardening compared to those who had not.<sup>[6]</sup> But there is a lack of standardized studies in horticultural therapy. Kamioka and colleagues tried to include randomized, placebo-controlled studies to conduct a systematic review, but the results showed that only 4 articles met inclusion criteria.<sup>[7]</sup> Of those 7 articles related to horticultural therapy which did not meet the criteria of randomized, placebo-controlled studies, the research subjects were all elderly individuals and other patients with chronic diseases in nursing facilities and the studies did not include investigation into mental illness. Of the 4 articles included, there was only 1 article related to patients with psychiatric disorders and the sample size was just 24.<sup>[8]</sup> Whereas the systematic review of horticultural therapy by Liu and colleagues also found only that article met inclusion criteria.<sup>[9]</sup>

There are few studies on horticultural therapy in China. Most are systematic reviews by foresters and agriculturists. In 2001, Ban conducted a placebo-

controlled study on horticultural therapy and found that it had certain benefits in improving mental health, social adaptability and self-care ability among patients with schizophrenia.<sup>[10,11]</sup> However, there were several limitations in this study: the control group in the study was not randomized; researchers mainly investigated rehabilitation measures, and the 'horticultural therapy' was just spreading seeds, and researchers let themselves sow seeds themselves without specific criteria or standardized instructions.

This study aims at using standardized horticultural therapy instructions with randomized, placebo-controlled methods to investigate the treatment effect of horticultural therapy on patients with schizophrenia in a relatively large sample in order to further test its potential application in psychiatric hospitals.

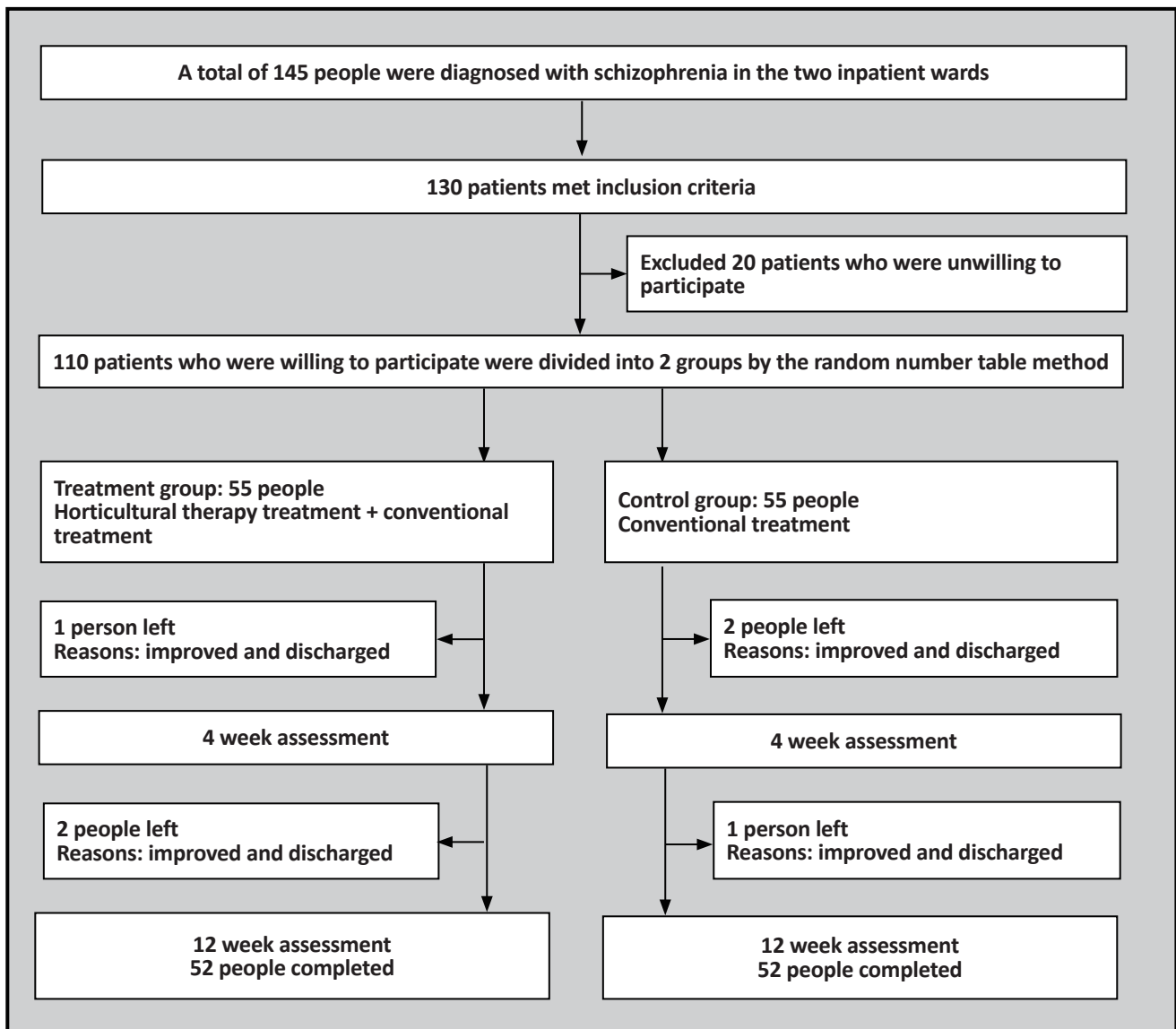
## 2. Methods

### 2.1 Participants

Inpatients on two rehabilitation wards in the Minhang District Mental Health Center were screened for possible participation in this study from September to December 2015. The inclusion criteria were: (a) patients met ICD-10 diagnostic criteria for schizophrenia; (b) course of disease was more than two years (c) aged 18 to 70; (d) basic control of the psychiatric symptoms (PANSS<60) (e) ability to communicate and express feelings (f) having a certain degree of motility; and (g) signed informed consent. Exclusion criteria included: (a) comorbidity with other psychiatric disorders (b) violent, suicidal or self-injurious behaviors (c) difficulty in communication; (4) presence of severe somatic diseases in patients, restraining the patients from performing a certain level of physical activity.

In the two rehabilitation wards, there were 189 inpatients and 130 of them fulfilled the inclusion criteria. In the end, 110 of the 130 qualified patients consented to join the study and were randomized into two groups. Medication treatment was given to both the intervention and control groups based on the clinical application, whereas horticultural therapy along with the medication treatment was only assigned to the intervention group for twelve months. By the fourth week of follow-up, one patient from the intervention group and two patients from the control group were discharged from the hospital. By the twelfth week, an additional two patients and one patient were discharged from the intervention and control groups respectively. At the end of the study, there were 52 patients who could complete the follow-up in each group. See the figure1 for details. There were 55 participants (24 males) in the intervention and control groups respectively. The mean (sd) age for the two groups was 46.5 (9.0). The median age was 48 and there was no significant difference in age between the two groups ( $t=-0.867$ ,  $p=0.39$ ). The mean (sd) course of disease was 20.1 (8.9) years; the median were 19 and 21.2 (10.5) years respectively; the median was 20 years. There was no significant

Figure 1. Flowchart of the study



difference in course of disease between the two groups ( $t=-0.59, p=0.56$ ). The mean (sd) length of hospitalization for the intervention and control groups were 59.1 (62.3) and 59.4 (62.2) months; the median length of hospitalization was 45 and 43 months respectively, and there was no significant difference between the two groups in length of hospitalization. Educational level among individuals in the intervention group was the following: 6 people had an elementary school education, 17 had a junior high education, 24 had a high school education, and 8 had a college degree or higher. Among the control group participants, educational level was the following: 7 had an elementary school education, 22 had a junior high education, 20 had a high school education, 6 participants had a college degree or higher. There was no significant difference between the two groups in educational level ( $\chi^2=1.37, p=0.71$ ). The marital status of the participants was the following:

27 were unmarried, 13 were married, and 15 were divorced or widowed in the intervention group; 32 were unmarried, 10 were married, and 13 were divorced or widowed in the control group. There was no statistically significant difference in marital status between the two groups ( $\chi^2=0.96, p=0.62$ ). The mean (sd) total PANSS scores of the intervention and control groups were 47.7 (5.7) and 48.3 (5.8) and these scores had no significant difference either.

## 2.2 The design of the horticultural therapy course curriculum

The horticultural therapy course lasted for twelve weeks with three sessions a week, ninety minutes a session. There were both indoor and outdoor activities. Outdoor activities were arranged to take place in relatively nice weather, whereas indoor activities were taken

place when weather was unfavorable. A rehabilitative therapist who had the level 2 counseling license for China led the group and instructed participants in how to plant, water, fertilize, and prune floral plants along with the assistance of another rehabilitative therapist. The participants plowed the soil in the garden in addition to seeding, watering, fertilizing, weeding, and catching pests. Towards the end of the therapy, participants got to enjoy the floral plants, as well as pick, cook, and taste the vegetables. Participants were given ten minutes for the experience of sharing followed by summary and comments from the therapists.

In the outdoor activities, every participant had a 0.5 square meters of land for planting in a 2 meter times 15 meters outdoor garden. Indoor pot planting was adopted for floral gardening due to convenience in planting, management and maintenance.

### 2.3 Evaluation scale and methods

Positive and Negative Syndrome Scale is a rating scale that has been widely used in psychiatry for evaluating the quantitative change of the psychiatric symptoms. The PANSS comprises 30 items including 7 symptoms on the Positive Scale (P), 7 symptoms on the Negative Scale (N), and 16 symptoms on the General Psychopathology Scale (G). Additionally, there are 3 supplementary items for evaluating the assault risk. The Cronbach's alpha was 0.73 to 0.83 on the scales. Generally, the index of the split-half reliability on the psychiatric scale is 0.8. The test-retest reliability was 0.77 to 0.89.<sup>[13]</sup> The evaluator,

who was a psychiatrist not located in the participants' wards, was blinded in this study, assessing all participants at the baseline, 4 months of treatment, and 12 months of treatment regularly.

### 2.4 Statistical analysis

SPSS software version 19.0 was used for statistical analysis. T-test and analysis of variance (ANOVA) were used for analyzing categorical data. Chi-square test was used for analyzing quantitative data. Repeated measurement analysis of variance was used for analyzing repeated measurement data. Two-sided test was used in this study. The p-value less than 0.05 is considered statistically significant.

## 3. Results

### 3.1 Medication dosage and attendance in therapy groups

Medication types and dosages for the two groups are shown in table 2. The quantity of all patients' medications were expressed in terms of the equal amount of Olanzapine according to Leucht and his fellows' findings, where 1 mg/d of Olanzapine was equivalent to 1.4 mg/d of aripiprazole, 32.3mg/d of quetiapine, 0.4 mg/d of risperidone, 7.9 mg/d of ziprasidone, or paliperidone (no record for conversion). After the exclusion of a patient who took 6mg/d of paliperidone, the intervention group (54 cases) had a mean (sd) dose of 13.2 (5.2) mg/d of Olanzapine

| Time    | Class hour           | Main contents                                                                                                                                                      |
|---------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Week 1  | 90 minutes * 3 times | introduction of Horticultural therapy, group members getting to know each other, important notes, visiting a variety of plants, explaining the basics of gardening |
| Week 2  | 90 minutes * 3 times | living features of geranium and wandering jew, planting essentials, and practical planting                                                                         |
| Week 3  | 90 minutes * 3 times | garden coarse tilling, introduction of the tools, the essentials of using the tools                                                                                |
| Week 4  | 90 minutes * 3 times | garden fine tilling, further studying of using the tools                                                                                                           |
| Week 5  | 90 minutes * 3 times | planting characteristics and essentials of burclover, radish, coriander; seeding practice                                                                          |
| Week 6  | 90 minutes * 3 times | planting characteristics and essentials of Chinese cabbage; seeding practice                                                                                       |
| Week 7  | 90 minutes * 3 times | garden weeding, watering, and fertilizing                                                                                                                          |
| Week 8  | 90 minutes * 3 times | the introduction of succulent plants; flower pot production; miniascape design                                                                                     |
| Week 9  | 90 minutes * 3 times | bulbous plant (lily, Hyacinth)introduction and planting                                                                                                            |
| Week 10 | 90 minutes * 3 times | picking, cooking, and tasting the Chinese cabbage                                                                                                                  |
| Week 11 | 90 minutes * 3 times | Watering and pruning of flowers; garden weeding; picking vegetables                                                                                                |
| Week 12 | 90 minutes * 3 times | Work display, experience sharing                                                                                                                                   |

equivalent to the original medication and the median was 14.3 mg/d. The control group had a mean (sd) dose of 13.8 (6.1) mg/d of Olanzapine equivalent to the original medication and the median was 14.3 mg/d. The difference between the two groups was not statistically significant ( $t=-0.46, p=0.65$ ).

Perfect attendance (i.e. all participants attending all sessions) would have been 1980 sessions, however in actuality only 1787 sessions were attended. Therefore, the overall attendance rate was 90.3%. The reasons for the absences included formal discharge from the ward (3 participants with a total of 55 absences), going on leave from the hospital (46 sessions), and illnesses such as bodily discomfort, cold, and fever (92 times). The attendance rate of the participants who completed the follow-up reached 92.6% after the exclusion of 3 participants lost to follow-up. To complete the horticultural therapy, participants had to attend 30 out of 36 therapeutic sessions. Other than the 3 discharged patients, the rest of the 52 patients successfully completed the therapy.

### 3.2 Comparison of the total PANSS scores before and after treatment in the two study groups

The difference of the total PANSS scores between the two study groups in the baseline was not statistically significant. However, there were significantly different total PANSS scores in week 4 ( $t=-3.97, p<0.01$ ) and

week twelve ( $t=-5.57, p<0.001$ ). The difference of the total PANSS score of the two study groups before and after treatment was statistically significant. Repeated measurement analysis of variance was used to compare the change difference of the overall time trend of the treatment and control groups ( $F_{time \times between\ group} = 16.981, p < 0.001$ ), indicating the difference of the total PANSS scores of the treatment and control groups during treatment was statistically significant. See table 3.

### 3.3 Comparison of the PANSS scales before and after treatment in the two study groups

Comparing the PANSS score of the two groups of patients found that the difference between the two groups on the scores of the Positive Scale and General Psychopathology Scale at week four and twelve of the follow-up were statistically significant. Before and after comparison on these two measures also found statistically significant differences. On the Negative Scale score, the differences between the two groups at the fourth week of treatment was not statistically significant, but it was at the twelfth week. There were statistically significant differences in their before and after comparison. Repeated measurement analysis of variance compared the change of time on the overall time trend of the treatment and control groups, resulting ( $F_{time \times between\ group} = 9.200, p < 0.001$ ) on the Positive Scale; ( $F_{time \times between\ group} = 9.197, p < 0.001$ ) on the

**Table 2 Comparison of the common medications used in the two groups**

| Contents        | Risperidone |             | Olanzapine |              | Aripiprazole |              | other  |
|-----------------|-------------|-------------|------------|--------------|--------------|--------------|--------|
|                 | N (%)       | average     | N (%)      | average      | N (%)        | average      | N (%)  |
| Treatment group | 11 (20)     | 3.55 (1.13) | 23 (42)    | 17.17 (4.22) | 16 (29)      | 15.00 (4.47) | 5 (9)  |
| Control group   | 11 (0)      | 2.91 (1.22) | 23 (42)    | 18.04 (3.61) | 13 (24)      | 13.85 (5.83) | 8 (15) |
| <i>t</i>        |             | 1.270       |            | -0.751       |              | 0.604        | --     |
| <i>p</i>        |             | 0.219       |            | 0.457        |              | 0.551        | --     |

**Table 3. Comparison of the total PANSS of the two groups**

| Contents        | Baseline   | Treatments for 4 weekends | Treatments for 12 weekends | F-value | p-value |
|-----------------|------------|---------------------------|----------------------------|---------|---------|
| Treatment group | 48.1 (5.4) | 41.7 (4.6)                | 37.4 (3.4)                 | 278.05  | <0.001  |
| Control group   | 48.3 (5.8) | 45.3 (4.8)                | 41.7 (4.5)                 | 66.51   | <0.001  |
| <i>t</i>        | -0.14      | -3.97                     | -5.57                      | ---     | ---     |
| p-values        | 0.89       | <0.001*                   | <0.001*                    | ---     | ---     |

Repeated measurement analysis of variance was used to compare the change difference of the overall time trend of the treatment and control groups ( $F_{time \times between\ group} = 16.981, p < (0.001)$ )

\*  $p < 0.05$



**Table 4. Comparison of the scales of the two groups before and after treatment**

|                               |                 | Baseline   | Treatment for 4 weekends | Treatment for 12 weekends | F      | p-value |
|-------------------------------|-----------------|------------|--------------------------|---------------------------|--------|---------|
| Positive Scale                | Treatment group | 8.8 (1.9)  | 7.8 (1.6)                | 8.0 (1.9)                 | 13.76  | <0.001* |
|                               | Control group   | 9.3 (2.2)  | 9.2 (2.2)                | 9.8 (3.1)                 | 5.12   | 0.019*  |
|                               | t               | -1.31      | -3.69                    | -3.55                     | ---    | ---     |
|                               | p               | 0.19       | <0.001*                  | 0.001*                    | ---    | ---     |
| Negative Scale                | Treatment group | 16.1 (3.7) | 13.3 (3.0)               | 10.8 (2.4)                | 103.94 | <0.001* |
|                               | Control group   | 15.2 (3.5) | 13.8 (2.9)               | 12.2 (2.8)                | 34.03  | <0.001* |
|                               | t               | 1.35       | -0.91                    | -2.76                     | ---    | ---     |
|                               | p               | 0.18       | 0.37                     | 0.007*                    | ---    | ---     |
| General Psychopathology Scale | Treatment group | 23.3 (2.7) | 20.7 (2.1)               | 18.6 (1.4)                | 156.40 | <0.001* |
|                               | Control group   | 23.8 (2.9) | 22.3 (2.6)               | 19.8 (2.1)                | 56.72  | <0.001* |
|                               | t               | -1.06      | -3.67                    | -3.34                     | ---    | ---     |
|                               | p               | 0.29       | <0.001*                  | 0.001*                    | ---    | ---     |

Comparison of the change of scores on the overall time trend of the treatment and control groups on the Positive Scale ( $F_{time \times between\ group} = 9.200, p < 0.001$ )

Comparison of the change of scores on the overall time trend of the treatment and control groups on the Negative Scale ( $F_{time \times between\ group} = 9.197, p < 0.001$ )\*

Comparison of the change of scores on the overall time trend of the treatment and control groups on the General Psychopathology Scale ( $F_{time \times between\ group} = 2.478, p = 0.106$ )

\*  $p < 0.05$

Negative Scale; and ( $F_{time \times between\ group} = 2.478, p = 0.106$ ) on the General Psychopathology Scale. See table 4.

#### 4. Discussion

##### 4.1 Main findings

This research is the first randomized, double-blind, placebo-controlled study investigating the treatment effect of antipsychotic medication in combination with horticultural therapy on inpatients with schizophrenia in China. Research in patients with dementia<sup>[14,15]</sup> showed that there were several benefits in the process of conducting horticultural therapy: Utilizing various sensory organs, touching and smelling plants, seeing plants growing, and harvesting and tasting fruits all helped patients gain confidence and a sense of achievement and improve their quality of life. Interaction with people and plants could boost emotional communication and interpersonal relationship and focusing on gardening and using their hands and minds was able to improve patients' cardiopulmonary function and attention. Understanding basic instructions and practice of gardening, gaining related knowledge, and grasping planting techniques could further improve the rehabilitation of patients' social functions. Previous research suggested that although there was a lack of

more effective evidence, horticultural therapy may improve the negative symptoms among inpatients with schizophrenia.<sup>[9]</sup> The implementation of horticultural therapy requires communication skills and a certain degree of responsibility. Patients with schizophrenia receiving horticultural therapy need to communicate and interact with each other, which can improve negative emotions and change their listless lifestyles. So horticultural therapy is suitable for alleviating negative emotions and slowing declines in activity in the late phases of schizophrenia. This study found that the sole use of medication could further alleviate psychotic symptoms among inpatients with schizophrenia, including both positive and negative symptoms, but the effect was even greater when used in combination with horticultural therapy. Considering that participants in the intervention group and in the control group are in the same ward, the possibility of a 'contamination effect' made the alleviation of psychotic symptoms obvious. Likewise, scheduled follow-ups conducted by psychiatrists who were not working in the ward where the experiment was carried out showed the risk of the Hawthorne effect whereby psychotic symptoms improved due to increase attention from doctors. Compared with previous studies, such improvements were depicted in both positive and negative symptoms,

and the improvements were quite obvious. The phenomena may be related to the design of the therapy duration. The duration of the horticultural therapy lasted a relatively long time (approximately 3 months), thus patients were more involved in it than the previous participants. So the present study showed more improvements than previous studies. Likewise, as a newly developed and the only outdoor rehabilitation therapy arranged multiple times, horticultural therapy can arouse patients' curiosity and excitement, which may have certain positive influence on the research results.

There is, as of now, no international formal training for becoming a horticultural therapist and no standardized criteria which can be applied in healthcare settings. The duration of the horticultural therapy in the present study was 12 weeks, and there were 3 sessions every week. In the past, studies about horticultural therapy in China were usually just allowing patients to spread seeds and to sow without a specific course design. Other relatively formal and similar studies usually consist of 6 weeks durations but 5 sessions each week.<sup>[16-18]</sup> One study was composed of 2 weeks with 10 successive sessions.<sup>[8]</sup> Compared with related studies described above, the frequency of the present study is longer. There are several advantages: a) the long duration fits well with how plants grow, and patients can try gardening various plants with not only one harvest; b) the long duration benefits the learning, handling and grasping of gardening techniques; c) the long duration means having a lot of therapeutic content regardless of the impact of the weather in order to arrange sessions flexibly; d) the long duration benefits group construction, which can boost cooperative behaviors among team members and e) the low frequency lowers the absence rate; in other words, there would be not many records with multiple absence due to weather or patients being ill. There is a limitation however: the long duration means a higher possibility of drop-out. But from the perspective of clinical practice, once patients participated in horticultural therapy they were more likely to adhere to the whole therapy program. There was no other reason of drop-out other than discharge from the hospital. The present study provides valuable reference for future standardized design of horticultural therapy.

There were 6 patients (3 patients from each group) that we lost contact with. The main reason was their clinical improvement and discharge from the hospital. Because patients with schizophrenia in the rehabilitation ward mostly showed stable disease conditions, most of them met the criteria for hospital discharge but had to stay long term for multiple reasons. The 6 patients described above were all brought home by their relatives.

Research has found that movement therapies could help patients maintain focus and control their own activities, which can alleviate the negative symptoms

of schizophrenia. Compared with other rehabilitation therapies, the intellectual and educational requirements of participating in horticultural therapy are relatively low (therefore many studies investigate patients with dementia), thus participants can participate in such therapy by listening to only basic instructions. Horticultural therapy can improve participants' general health status, including quality of life, somatic condition and cardiopulmonary function. In addition, the close involvement with nature is also an advantage compared to other therapies.<sup>[20]</sup> How participating in horticultural therapy a certain ability to work outside and is labor intensive, therefore it may not be suitable for patients who are in relatively poor physical condition. In the clinical practice we found that many female patients found gardening to be quite exhausting. They would be only willing to watch rather than garden, but they could participate in cultivating indoor bonsai. These circumstances imply that we need to design different therapeutic courses which have special considerations for males and females and people with relatively good stamina and those with relatively poor stamina.

#### 4.2 Limitations

There are several limitations in the present study: a) the research duration consists of spring and autumn, and different seasoning plants show different growing patterns. So there may be certain influence on the standardization of the horticultural therapy; b) the research sample is relatively small, thus it is hard to analyze patients of whom we have lost contact and c) there is no control over antipsychotic medication.

#### 4.3 Implications

The present study is the first one investigating the treatment effect of antipsychotics in combination with standardized horticultural therapy on patients with schizophrenia. The study provides guidance for the standardization of the horticultural therapy, which provides reference for the rehabilitation therapy among patients with schizophrenia.

#### Funding

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#### Conflict of interest

The authors declare no conflict of interest related to this manuscript.

#### Informed consent

All participants and their legal guardians provided signed informed consent to participate this study.

### Ethics approval

The study was approved by the Ethics Committee of the Minhang District Mental Health Center (approval number: LW2016001).

### Authors' contributions

Shunhong Zhu was in charge of the actual implementation and data collection; Hengjing Wan was in charge of the designs of the research plan and the treatment plan; Zhide Lu was in charge of the psychiatric examinations; Huiping Wu, Qun Zhang and Xiaoqiong Qian were in charge of the actual implementation and data collection; Chenyu Ye was in charge of the research design and drafting the manuscript.

## 合并园艺治疗对慢性精神分裂症住院患者随机评估者盲的对照研究

诸顺红, 万恒静, 陆志德, 吴慧萍, 张群, 钱晓琼, 叶尘宇

**背景:** 园艺疗法作为一种新兴的精神分裂症康复治疗手段逐渐引起重视, 但目前研究很少, 也缺乏相应的规范化治疗方案。

**目标:** 探讨园艺疗法对慢性精神分裂症住院患者的疗效, 探索园艺疗法在精神卫生中心规范化实施的可能性。

**方法:** 选择 2015 年 9 月—2015 年 12 月在本院康复病房符合入组标准并签署知情同意书的精神分裂症患者共 110 例, 用随机数字法分为试验组和对照组, 两组均进行常规的药物, 试验组合并园艺治疗, 在具有国家二级心理咨询师资格的康复治疗师的带领下进行园艺治疗, 每周 3 次, 每次 90min, 共 12 周。具体内容包括对花卉进行配土、栽植、浇水、施肥及修剪; 对田园进行泥土翻耕、播种、浇水、施肥、拔草及捉虫以及花草的观赏、蔬菜的采摘、烹饪、品尝。每次课程结束前 10min 由患者互相交流心得体会治疗师总结并点评。两组在基线、治疗 4 周末、治疗 12 周末予以阳性和阴性症状量表 (PANSS) 的评估。

**结果:** 两组性别、年龄、病程、婚姻、文化、使用的抗精神病药物平均剂量、在治疗前 PANSS 得分均无显

著差异, 具有可比性。试验组 PANSS 得分在治疗 4 周末、治疗 12 周末随访时较对照组得分低, 差别均有统计学意义 ( $t=-4.03, p<0.001$ ;  $t=-5.57, p<0.001$ ); 自身前后比较差异均有统计学意义 (试验组  $F=253.03, p<0.001$ ; 对照组  $F=67.66, p$  均  $<0.001$ ), 两组阳性症状量表和一般精神病理量表得分在治疗 4 周和治疗 12 周随访时差异均有统计学意义 (4 周随访  $t=-3.69, p<0.001$ ;  $t=-3.67, p<0.001$ ; 12 周随访  $t=-3.55, p=0.001$ ;  $t=-3.34, p<0.001$ ), 自身前后比较差异也有统计学意义 (阳性量表试验组  $F=13.76, p<0.001$ ; 对照组  $F=5.12, p=0.02$ ; 一般精神病理量表试验组  $F=156.40, p<0.001$ ; 对照组  $F=56.72, p<0.001$ )。两组之间阴性量表得分在治疗 12 周末时差异有统计学意义 ( $t=-2.76, p=0.007$ ), 自身前后比较差异均有统计学意义 (试验组  $F=103.94, p<0.001$ ; 对照组  $F=34.03, p<0.001$ )。

**结论:** 药物治疗可改善慢性精神分裂症住院患者的症状, 但药物治疗合并园艺治疗的效果更加明显; 其中对于阳性症状、阴性症状均有改善。

**关键词:** 园艺治疗, 精神分裂症, 随机, 对照

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