The effect of preventing transition from mild cognitive impairment to early dementia by hand care treatment in the environment of horticultural therapy garden

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Abstract

Nearly 47.5 million people worldwide have dementia in the world in 2015. In Japan, the challenge to families and health and social services is substantial. In this study, we examined whether hand care treatment (HCT) was effective in preventing transition from MCI (mild cognitive impairment) to early dementia. In addition, if the operation environment for hand care treatment was a horticultural garden, we also examined whether there was a difference in the transition prevention effect from MCI to initial dementia. Clients were elderly persons using an elderly person facility of social welfare corporation Knaji-kai, an elderly person with MMSE (mini-mental state) 24-27 points or Moca-J 25 points or less as MCI in advance evaluation, and an elderly person 70 years or older not applicable as the normal elderly (placebo groups). In the pre-evaluation, the pre-evaluation, people with an MMSE score of 24-27 and those with an MMSE score of 28 or more and a Moca-J (The Japanese version of Montreal Cognitive Assessment) score of 25 or less were considered MCI. As a result, In the MMSE assessment 9 months after at the start of HCT, in the indoor HCT subjects and the HT Garden HCT subjects, there was no transition from MCI to dementia, and 3 of 12 MCI on placebo subjects who received usual care transitioned. Changes over time in some evaluations after 9 months were compared with those at the start. The indoor HCT subjects and the HT Garden HCT subjects tended to improve from the maintenance score of MMSE and Moca-J cognitive evaluation. The placebo subjects tended to decline from maintenance.

Keywords: dementia protect, horticultural therapy, sensory stimulation, emotional health

INTRODUCTION

The benefits of active and passive horticultural therapy (as follow, HT) have been demonstrated to have overall positive effects on the emotional health of elderly persons and care staff (Koura et al., 2010). HT has been conducted based on the philosophy that the activities carried out it will be stimulating to the senses (Matsuo, 1998; Koura, et al., 2002, 2006). As many nursing homes in Japan are designed to offer a climatically controlled environment to their residents, they have limited opportunities to use their senses either consciously or unconsciously.

The conditioning effects of autonomic nervous system were expected to the surgical operation persons or all relational persons of the hand care treatment (as follow, HCT) for passive HT too. The hand care that used natural herb oil demonstrated effectiveness for elderly people and showed that it had many good influences on the psychological condition of the side that performs hand care. We want to clarify some mental or psychological effects of HCT (Kunikata et al., 2012; Kawahara et al., 2009), and it was intended to exhibit the subjective and objective reaction of HCT. As combining passive HT with active HT and utilizing, the benefits of horticultural activities had been demonstrated to have overall positive effects on the emotional health of elderly persons and care staff (Koura et al., 2018).

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Dementia should work on one of the high-risk symptoms that a variety of researchers of the whole world work on. Dementia was regarded as one of the lifestyle-related diseases and it was thought that the horticultural therapy was effective in the prevention. Nearly 47.5 million people worldwide have dementia in 2015 (WHO, 2015; Corriveau et al., 2016). In Japan, the challenge to families and health and social services is substantial. As an action to stabilize the present emotion for people with dementia, validation therapy, reminiscences, psychiatry, occupational therapy, and humanitude are adopted in many countries of the world. HT has potential to improve upon the effect of all therapies and activities when it adopts a way of thinking of people relationships. It is possible that not only active HT techniques but also passive promote the activation of past long-term memory and future hope to live for (Koura and Ikeda, 2016). We believe that some treatments for the elderly should be based on the idea that the activity being performed also stimulates the senses.

In this study, we examined whether hand care treatment was effective in preventing transition from mild cognitive impairment (as follow, MCI) to early dementia. In addition, if the operation environment for hand care treatment was a horticultural garden, we also examined whether there was a difference in the transition prevention effect from MCI to initial dementia.

MATERIALS AND METHODS

Clients selected the elderly who used the facilities for the elderly at the social welfare corporation association and who were not diagnosed with dementia. There were 7 indoor HCT groups (82.9±8.9 years), 7 garden HCT groups (81.8±3.3 years) and 16 placebo subjects receiving usual care services (84.1±4.3 years). At the time of the first evaluation before the start of HCT, elderly people assigned to MCI by MMSE are 4 out of 7 indoor HCT subjects 4 out of 7 HT garden HCT subjects, 12 out of 17 placebo subjects. We strictly observed the Helsinki Declaration of 2015 (revised in 2013), and explained the purpose and outline of this study to them and obtained informed consent from them beforehand.

The elderly people with MMSE (mini-mental state examination) screening tool score of 24-27 or MoCa-J screening tool (The Japanese version of Montreal Cognitive Assessment) score 25 or less in the pre-evaluation was designated as MCI, 7 out of 7 in indoor HCT group. Seven out of 7 in Garden HCT group, 15 out of 17 in the placebos subjects it corresponded to MCI (Folstein et al., 1975; Ganguli et al., 1990; Espino et al., 2004; Nasreddine et al., 2005; Morales et al., 2006; Guerrero-Berroa et al., 2009).

The timing of the evaluation was HCT initiation, 3 or 6 months later, 9 months later and the transition from MCI to dementia was judged by MMSE evaluation. In addition to MMSE and Moca-J evaluations, ADL evaluations and evaluations of depression tendency were also conducted, and the transition of the evaluation points was also confirmed. Changes over time in the various evaluations after nine months were compared with those at the start. MMSE and MoCa-J score showed cognitive evaluation. Tokyo Metropolitan Institute of Gerontology (TMIG-index) of Competence (Koyano et al., 1991), which was ADL evaluation and geriatric depression scale 15 (GDS15) were used too.

All hand care treatments were handled by hand care therapists certified by the Japan Society of Phyto-therapy. Also, all evaluations were performed by occupational therapists.

MMSE screening tool

MMSE was the most commonly used instrument for the assessment of cognitive function in both clinical and research settings. It was usually used as a screening test for dementia and cognitive impairment or as a brief cognitive assessment that takes about 10 min to complete. In Table 1, instructions for administration and scoring of the MMSE were orientation (10 points), registration (3 points), attention and calculation (5 points), recall (3 points), and language and praxis (9 points).

Table 1. Description of the mini-mental state examination.

Category	Possible points	Description
Orientation to time	5	From broadest to most narrow. Orientation to time has been correlated with future decline
Orientation to place	5	From broadest to most narrow. This is sometimes narrowed down to streets, and sometimes to floor
Registration	3	Repeating named prompts
Attention and calculation	5	Serial sevens, or spelling "world" backward. It has been suggested that serial sevens may be more appropriate in a population where English is not the first language
Recall	3	Registration recall
Language	2	Naming a pencil and a watch
Repetition	1	Speaking back a phrase
Complex commands	6	Varies. Can involve drawing figure shown

MoCa-J screening tool

The MoCA test was validated in the setting of mild cognitive impairment (MCI), and has been subsequently adopted in numerous clinical settings. The sensivity of the MoCA for detecting MCI is 90%, compared to 18% for other leading cognitive screening tools, such as the MMSE. The MoCA assesses were short-term memory, visuospatial abilities, executive functions, attention, concentration and working memory, language, and orientation to time and place. Read list of words, subject must repeat them. Do 2 trials. Do a recall after 5 min.

TMIG-index of competence

Elderly populations are evaluated on their ability to perform instrumental activities of daily living (IADL) using one of three subscales in the TMIG index of competence, while the basic checklist – a tool developed to screen for frailty – is designed to measure actual task performance.

GDS15

Diagnosing depression in the elderly poses a serious problem because of the aging process and various diseases that influence and mask symptoms of depressed mood. For instance, depression is often confused with dementia. It is therefore crucial to use a diagnostic tool that takes these problems into account. Symptoms of depression were assessed using the 15-item geriatric depression scale (GDS-15) and demonstrated validity among ambulatory elderly.

We strictly observed the Helsinki Declaration and explained the purpose and outline of this study to them and obtained informed consent from them beforehand.

RESULTS AND DISCUSSION

For statistical processing, Steel's multiple test was used, and a 5% level difference was confirmed with First evaluation (before HCT) as a baseline. As a result, for average value of MMSE, MoCa-J, TMIG, and GDS, there was no significant difference between first evaluation (before HCT) and second or third.

MMSE and MoCa-J

Changes over time in the various evaluations after 9 months were compared with those at the first evaluation (before HCT). In Figures 1 and 2 the indoor HCT group and the HT Garden HCT group tended to improve from the maintenance score of MMSE and MoCa-J cognitive evaluation. The placebo group tended to decline from maintenance.

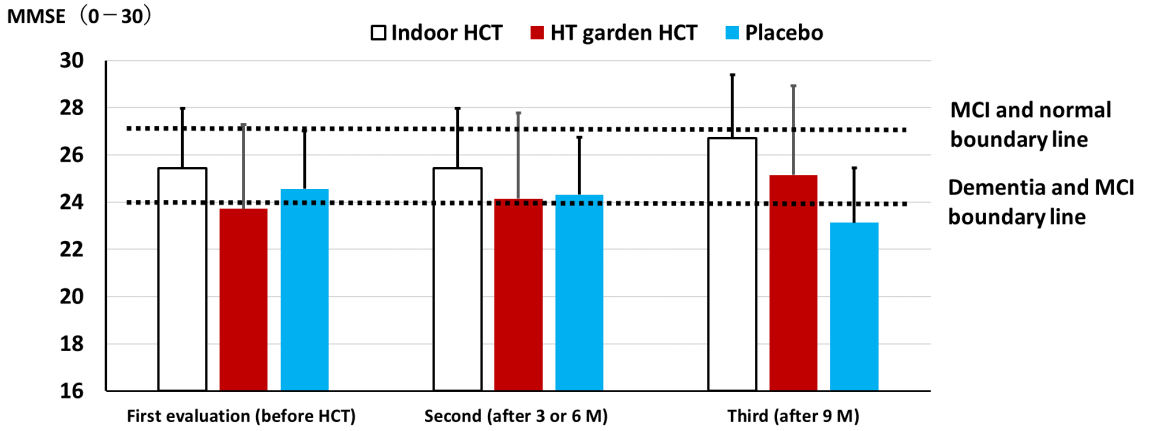

Figure 1. Time coarse changes in MMSE rating of indoor HCT, HT garden HCT, and placebo subjects (7 indoor HCT group; 82.9±8.9 years, 7 garden HCT group; 81.8±3.3 years and 16 placebo groups receiving usual care services; 84.1±4.3 years).

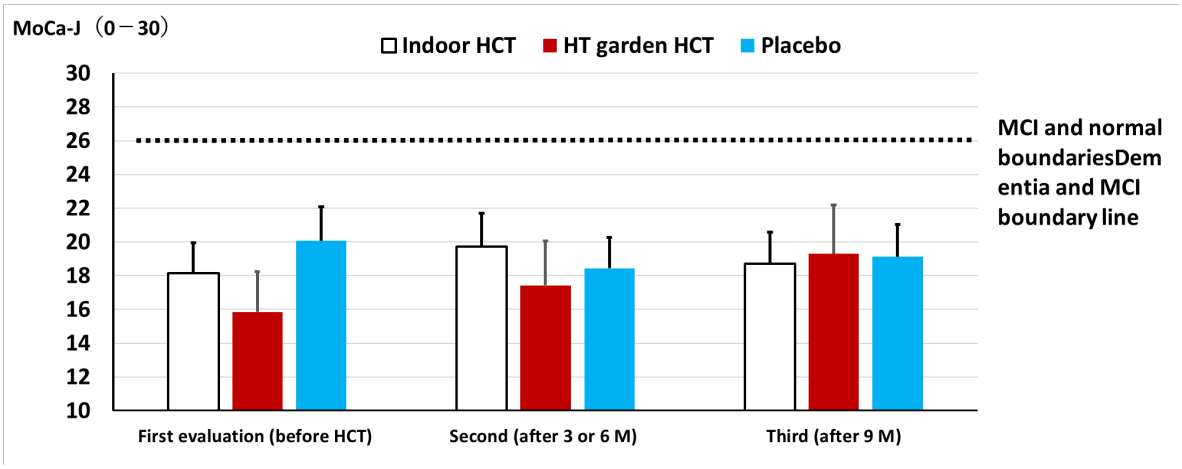

Figure 2. Time course changes in MoCa-J rating of indoor HCT, HT garden HCT, and placebo subjects (7 indoor HCT group; 82.9±8.9 years, 7 garden HCT group; 81.8±3.3 years and 16 placebo groups receiving usual care services; 84.1±4.3 years).

TMIG-index of competence

TMIG-index of competence was IADL evaluation. In Figure 3, IADL was maintained or improved in the indoor HCT group and HT garden HCT group, but the placebo groups showed a decrease tendency from maintenance. However, no significant change in IADL was found in the evaluations.

GDS 15

As for GDS 15 (geriatric depression scale 15) to evaluate the depressive tendency. In Figure 4, the indoor HCT group and the HT Garden HCT group reduce the depressive tendency, but the placebo groups became more depressive or maintenance.

From the point of view of the evaluation of dementia and depression tendency, the study period is short in 9 months, so it is necessary to continue the examination.

Although the subjects were selected from the elderly who were not diagnosed with dementia, there are also elderly who can be classified as dementia by MMSE, and by the evaluation of MoCa-J (a screening tool of MCI), more than half the elderly. It was distributed to MCI. Generally, the transition from MCI to dementia is about 10% per year.

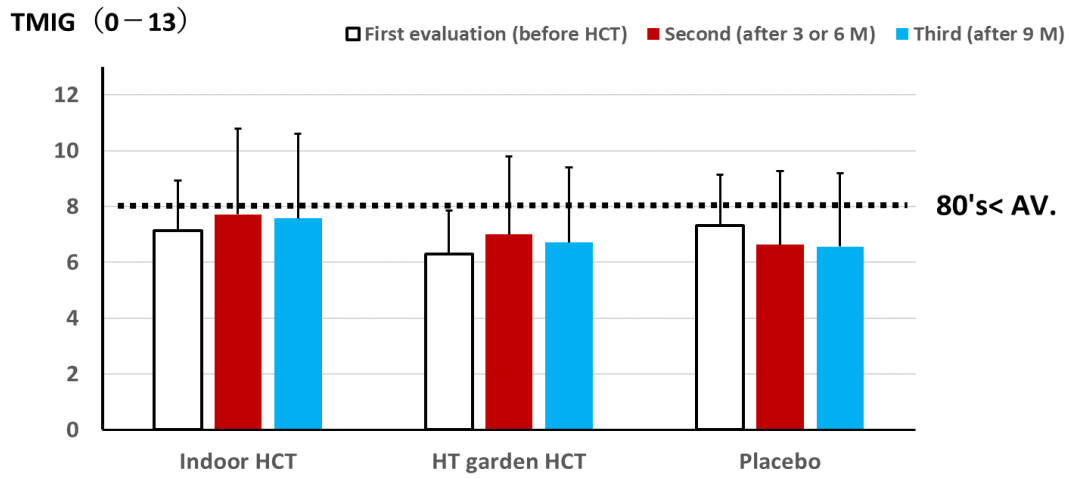

Figure 3. Time course changes in IADL evaluation by TMIG rating averaging of indoor HCT, HT garden HCT, and placebo subjects (7 indoor HCT group; 82.9±8.9 years, 7 garden HCT group; 81.8±3.3 years and 16 placebo groups receiving usual care services; 84.1±4.3 years).

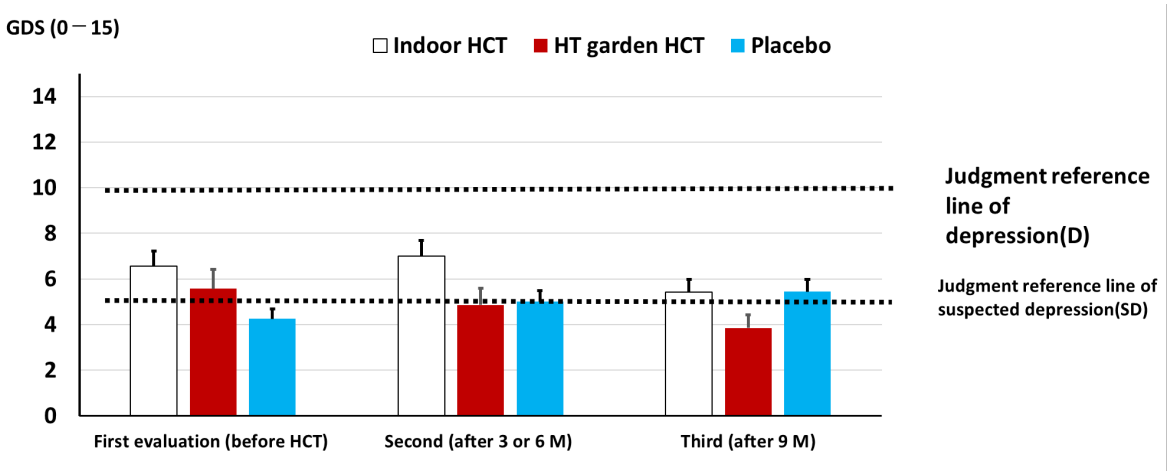

Figure 4. Time coarse changes in depression and depression tendency by GDS rating averaging of indoor HCT, HT garden HCT, and placebo subjects (7 indoor HCT group; 82.9±8.9 years, 7 garden HCT group; 81.8±3.3 years and 16 placebo group receiving usual care services; 84.1±4.3 years).

There were 8 subjects out of 14 who had MCI before HCT based on MMSE evaluation, and no subjects had transitioned from MCI to dementia after 9 months; while, 3 out of 12 placebo subjects recognized it. Although long-term evaluation is necessary, HCT is considered to be expected to have a preventive effect on the transition from MCI to dementia. In addition, although there was no significant difference, the HCT subjects were shown to have an improvement effect on IADL and a reduction effect on depression tendency, and it was expected that HCT subjects in HT garden had higher effects. These results suggest that HCT tactile stimulation may have a good influence on the brain function of elderly people with MCI, and it is more effective depending on the conversation, deep communication and comfortable working environment at the time of HCT treatment. It was thought that it could be expected.

In Japan, there are many people who test in “forgettable outpatients” after becoming severe, so many people cannot expect the effects of treatment and progression prevention. One of the reasons was many people felt that they needed a lot of money for treatment and

prevention, and they did not receive appropriate advice (Ito et al., 2018). HT garden and HCT are expected to be a trigger for prevention and treatment of cognitive impairment, as they are also likely to be of interest to those who are concerned about cognitive impairment. In addition, the combination of the attractiveness of HT garden and the technology of HCT and the combination with other therapies, such as music therapy and animal therapy are also good, so future flexible development in the field of dementia prevention is expected.

Limitation

This study contributes to the much-needed research on dementia protect by HT and HCT; however, its limitations should be noted. Small sample size makes this more of these studies limited in scope. Another limitation was the homogeneous make up participants, limiting the generalizability of the findings to other populations outside the scope of this study. Even such environmental condition a few of the participant had difficulty understanding what was being asked due to the wording of some statements on the measures. These dementia preventive effects will be because horticulture and the plants are concerned with a human life. We judged that building of the horticultural technology by which sustainable continuation is possible was indispensable for everyone to share this effect. Since Japan has four seasons, it is necessary to consider whether similar results can be obtained in all seasons.

CONCLUSIONS

In the MMSE assessment 9-month after at the HCT start, in the indoor HCT subjects and the HT garden HCT subjects, there was no transition from MCI to dementia, and 3 of 12 MCI on placebo subjects who received usual care transitioned. Changes over time in some evaluations after 9 months were compared with those at the start. TMIG-index of competence evaluation, which is IADL evaluation, showed that IADL was maintained or improved in the indoor HCT subjects and HT garden HCT subjects, but the placebo subjects showed a decrease from maintenance. As for GDS 15 to evaluate the depressive tendency, the indoor HCT group and the HT garden HCT subjects reduce the depressive tendency, but the placebo subjects became more depressive or maintenance. Using the environment of horticultural therapy garden to prevent progression of cognitive impairment was effective in creating a trigger for the target person to move with their own intentions, so the utility of promoting stimulation of aerobic exercise and five senses were fully expected. Therefore, it is necessary to continue for further study in the future.

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