

## Study on the Effects of the Presence of Plants for Relieving Anxiety of Children with Illness

Fusayo ASANO<sup>1</sup>, Mami FUJIOKA<sup>1-2</sup>, Asami TSUCHIDA<sup>1-3</sup>, Mai SHINODA<sup>4</sup>, and Masako UCHIDA<sup>5</sup>

<sup>1</sup>*Faculty of Agriculture, Tokyo University of Agriculture*

<sup>4</sup>*Leaf Progress, inc.*, <sup>5</sup>*Graduate School of Agriculture, Tokyo University of Agriculture*

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### Abstract

Not many service providers provide total care to children with infant chronic diseases in the acute, convalescent, and life phases. We conducted two surveys of children with malignant tumors. One survey is for the children who were hospitalized for treatment in the acute and convalescence phases; we had them grow plants in the front garden of the hospital. As a result, we found it was indicated that growing plants plays a role in exposing their various anxieties. The other survey was a psychological examination of children in the life phase before and after a 4-day-camp in outdoor setting. As a result the numerical values of anxieties such as social anxiety and unarticulated anxiety were significantly reduced. These results indicate that outdoor activities during the treatment process for children with chronic diseases have a certain therapeutic efficacy to relieve their anxieties.

### 1. Introduction

Due to the medical insurance policy in Japan, the recent trend of rehabilitation is to seek the early ambulation and early discharge. This means that more medical institutions encourage acute phase patient proceed from hospital to convalescing at home in early stage by intensive rehabilitations. This trend applies to infant cases as well. There is almost no infant medical institution which provides comprehensive care to ensure the quality of life in each phase (Wakano, 2012).

We carry out horticultural therapy by growing plants program as treatment for elderly people, physically disabled, infants, and people with mental illness at the various medical institutions and welfare facilities. This paper is targeted for children with malignant tumors and will try to prove the hypothesis that the experience of growing plants in the gardens of medical facilities or short-stay nature camp in outdoor setting will relieve the anxieties of the patients.

### 2. Problems and Objectives

When a child suffers from a serious illness, infant-specific intractable disease, or recuperates while receiving medical treatment requires the infant rehabilitation in parallel.

To grow with the illness or the disabled means the daily activities such as, exercise, meals, and other activities by themselves are positioned as rehabilitations. The physician, the occupational therapist, the speech pathologist, the registered nurse, the nursery teacher, the clinical psychologist, and the social worker need to make a team to conduct such rehabilitation (Kurihara, 2010).

Children grows mentally through recreation (Yamane and others, 1999). Today, rehabilitation program through recreation and growth observation through studying are taken charge by Ill Children Support Programs and Special Support Education; however, due to shorten hospitalization period policy and more priority for care at home, special support education only offer temporary educational support during the hospitalization period. Almost no support exists for the infant patients in life phase for reducing various anxieties such as anxiety to face with the illness, anxiety to return to the community and/or anxiety for the school life (Tanigawa and others, 2004).

We carried out two surveys of children with severe tumor. The first survey was of children making garden at the top of highly advanced medical institutional facility in a city, we monitored the daily lives of the hospitalized children. The second survey was about the effects of a nature camp experience of 3 nights and 4 days on ill children, checked them

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before and after the camp.

### 3. Details of the Survey

#### 1) The First Survey

The targeted facility of research was a highly advanced medical institution located in a city with integral research function for malignant tumors. The children's wards were located on the 12<sup>th</sup> floor and the roof garden could be seen from the dining hall. Most children had been suffered from malignant bone tumors and many of them had been transferred from other hospitals in other prefectures. Because the onset age of malignant bone tumors is in the growth period, many of the children were older than those in the upper grades of elementary school.

We developed a field in the roof garden and planted vegetables and flowers through the year. We targeted 3 children, one girl and two boys, all in the 4<sup>th</sup> grade of elementary school. They engaged in growing plants mainly through their class and after the class activities of the sick children support classes within the medical institution. However, due to the frequent entering and leaving of the hospital for the purpose of examinations, surgery, and chemotherapy, the child who participated most took part in 18 programs out of total 26 programs during the year and the other two participated in 12 programs.

The research was evaluated by the Problem Oriented System (POS). POS means to focus on Problems and try to find the solution for each problem. Every session was recorded by the Subjective Data Objective Data Assessment Plan (SOAP) (Okamura, 2012), focusing on the anxiety of the children. The same person recorded SOAP for 26 programs to minimize the blurring of the evaluation. The relief of anxiety was numerically scored based on the words and behavior (Table 1). A session where anxiety or tension were strongly expressed was scored as -2 while a session where anxiety or tension were not seen and cheerfulness was observed in the words and behavior was scored as +2, the maximum number of points. Permissions for conducting the survey was obtained from their parents. An ethical code of the hospital was kept observed.

Table 1. Anxiety scale

Score	-2	-1	0	1	2
Appearances	Strong tension and anxiety are appeared in words and action.	Anxiety is appeared in either words and action.	Cannot say	Neither anxiety nor tension is not appeared in either words or action.	Very cheerful

Normally it is difficult for ill children under medical treatment to participate in outdoor activities. This is because to control symptom and medication, it is difficult. In the USA, there is a special camp system to operate a safe camp has been

established for such children where the medical facilities are accommodated, and also the physicians and the nurses are regularly present. In Japan, demand for such a camp rises to introduce similar facilities and services. This research was conducted at such camp of testing stage in Japan. In the US, these types of camps implement Therapeutic Recreation (TR) which is not often seen from regular camps. American Therapeutic Recreation Association specifies the purpose of therapeutic recreation as "Restore, remediate or rehabilitate in order to improve functioning and independence, as well as reduce or eliminate the effects of illness or disability" (Gerald and Marcia, 1997). The camp we researched emphasize the concept of creation of group consciousness and "Challenge by Choice" program (Association of Hole in the wall Camps, 2004). Challenge by Choice program, basic principle used at Serious Fun Children's Network, asks participants to challenge themselves and participate fully in each experience. In this program, the importance is how much person chooses to push himself or herself. We conducted the survey three times, one week prior to the camp, one week after the camp, and one month after the camp. In order to understand the anxiety level, we utilized the Japanese version of Revised Children's Manifest Anxiety Scale 2nd Edition (RCMAS-2) parallel to the English one. The outline of the camp programs is shown in Table 2.

Table 2. Camp programs

Date	Time	Program	Contents
Day 1	Evening	Orientation	Orientation (Greeting, Schedule, How to use the facilities, Rules at camp)
Day 2	Morning	Become friends	Relieve the tension by physical games
	Lunch	Cook and Eat	Making lunch
	Afternoon	Crafts	Make something using plants
Day 3	Morning	Harvesting	Experience harvesting at a farm
	Afternoon	Making dinner	Gathering firewood + Producing fire + Cooking rice outside
	Evening	Evening programs	Campfire
Last Day	Early Morning	Farewell party	Taking commemorative photos, Looking back at the meetings over the camp

The research objects were 12 children ages 6 to 12, 9.16 ±1.77 years old on average, with malignant tumors in life or remission phases. The explanation of the objective of this research was provided to their parents in advance and agreed on. An ethical code of the educational institution was kept observed.

#### 4. Results

##### 1) The First Survey

It was observed that the feelings of all three children were unstable. Child A showed a cheerful facial expression only 6 times out of 12, Child B 5 times out of 18, and Child C 2 times out of 12.

Child A, a boy, had repeatedly entering and leaving hospital. When the first session was participated, it had been 2 years since outbreak of an illness and he was still repeatedly hospitalized. He was at home when he was not participating

in the session. He showed no stress or anxiety 2 times out of 12, but made a tomb for plants which had died during the session showed his concern for death by both words and action. On the other hand, he showed satisfactory expression when he found the plants planted by himself started to bloom on the 21<sup>st</sup> day of the session (Fig.1).

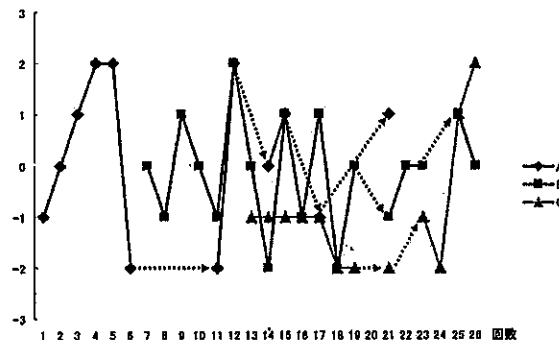


Fig. 1. Psychological changes

Table 3. Programs and behaviors of the ill children

	Date	Programs	Behaviors of Child A (Boy)	Behaviors of child B (Boy)	Behaviors of child C (Girl)
1	Sep 29	Sowing small radish seeds	Cover seeds with soil gently saying, "Come, come buds quickly." "I won't be here when you comes out..."(-1)		
2	Oct 7	Sowing radish seeds	"I like watering the		
3	Oct 28	Thinning out radish buds	"Rough-edged leaves, Why?"(1)		
4	Nov 19	Sketch the bulbs	When I cut the bulb, I said "I feel sorry"(2)		
5	Dec 9	Harvest the radish	"This is so big"(2)		
6	Jan 21	Planting tulips	"Die, die""Tomb for bulbs"(-2)		
7	Mar 9	Making plant name		Nervous, No conversation(0)	
8	Apr 14	Planting potatoes		"Have you come back to life?"(-1)	
9	Apr 21	Making pressed flowers		Showed smile, "I felt good""I might be alive if the harvesting is in August."(1)	
10	May 10	Planting kidney beans		Digging out the root, "I found a fossil"(0)	
11	May 31	Planting okras	Buries died konnyaku and set up a cross, "This is a tomb""I don't want to go there yet."(-2)	Unsatisfactory as he/she couldn't get outside.(-1)	
12	Jun 9	Observation	Watering "Let's make a river""Let's expand it."(2)	Enjoyed watering saying "I make a river", (2)	
13	Jun 16	Observation		"I will let it fly" play with maple seeds(0)	"They will fly to inherit descent"(-1)
14	Jun 23	Harvest the potatoes	Cut potatoes in small pieces without talking (0)	Scrambled for potatoes with another child (-2)	"I was looking forward to today's harvesting", after then fight with another child. (-1)
15	Jun 30	Harvest kidney beans	"I want to plant green peppers"(1)	"I want green peppers, too."(1)	"Look, like a bird nest" showing her fallen hair (-1)
16	Jul 7	Tanabata Festival		"I want to travel""Message to God"(-1)	"Please let me get well soon"(-1)
17	Jul 14	Planting of green peppers	Complained "How long should I wait for watering"(-1)	"My pepper will grow big"(1)	"How long should I wait" for watering (-1)
18	Aug 23	Plant dyeing		Topics about the parents put him in a bad mood(-2)	Gave a shout before the work. "Good to relieve the stress" and left in a bad mood (-2)
19	Aug 24	Plant dyeing		"Now during the experiment"(0)	Nausea by side effect. Answered "I'm O.K."(-2)
20	Sep 9	Harvest water melons			
21	Sep 16	Harvest vegetables	"My konnyaku has revived"(1)	Looking at green peppers said "I will harvest these." Quarreled with another child about watering (-1)	Left when asked by other child "Why don't you have hair?"(-2)
22	Oct 4	Make bouquet		Uses crutches, walking appears hard (0)	
23	Oct 11	Harvest konnyaku potato		"I want to dig, too"(0)	"I like the rainbow flower garden." "I am tired but will do my best" bad mood (-1)
24	Oct 18	Make dried flowers			Worked ignoring other children (-2)
25	Oct 25	Make konnyaku		"I will weigh it." Compared the weight between potatoes	"I would like to do that too." "This is the konnyaku. I
26	Nov 11	Presentation on learning		"These are radish and konnyaku I made""I won't eat them."(0)	"Please have my radish and konnyaku"(2)

Child B, a boy, participated in the session many times. He had chronically suffered pain of the joints, physical weariness, and losing hair due to chemotherapy. Depending upon the immune strength condition, he sometimes could not leave building (Day 8, 11). The only time when he was marked as +2 was at the session of watering the plants with Child A. Other than that, he appeared to comparatively enjoy the time of germination of the cones (Day 9), harvesting kidney beans (Day 15), taking care of sweet peppers (Day 17) and making "Konnyaku" from konnyaku potatoes (Day 25). He wrote "I want to travel" as a message to God on the Tanzaku slip of paper at the Tanabata Festival.

Child C, a girl, received femur operative amputation at this hospitalization. She had suffered physical weariness and losing hair from chemotherapy before the operation. Before the operation (Day 20), dedication to the program was observed (Day 13, 16, 17) such as waterings, planting, and observation. On the other day she showed her hair, keep losing due to a therapy, to us with putting together them on her palm and said, "It looks like a bird nest." (Day 15) (Table 3).

## 2) The Second Survey

The RCMAS-2 for a child consists of 49 questions. The answers are assessed by 6 kinds of scales: (i) Inconsistent Responding Index (INC), (ii) Defensiveness (DEF), (iii) Total Anxiety (TOT), (iv) Physiological Anxiety (PHY), (v) Worry (WOR), and (vi) Social Anxiety (SOC). INC is to confirm the credibility of the 4 anxiety scales.

- i) INC measures the credibility through inconsistency of answers.
- ii) DEF scores are
  - Being naive in not accepting social imperfection.
  - Tend to shows off for better characteristics.
  - Having a sense of aversion from divulge oneself.
  - Lack of capability to observe oneself.
 These are related to the daily problems and stresses.
- iii) TOT is used to assess "The degree of the integrated anxieties of the rest of three anxieties.
- iv) PHY means "the anxieties that exist physically", such as headache and/or nausea.
- v) WOR is "mental anxiety such as obsession, loneliness or others"
- vi) SOC means "anxiety related to oneself vs. others, and shows have low self-evaluation".

We averaged the raw data on 12 campers who answered RCMAS-2 all 3 times, and utilized t-test (0.05/2) for the change in ①~③ (① Before camp, ② 1 week after camp, ③ 1 month after camp).

For INC measurement, All participants showed consistency of their answers and we considered the

result has enough credibility.

Out of 5 items, the DEF increased one month after the camp compared from before the camp (①3.9→②3.9→③4.3). But the other items showed a decline. (TOT: ①9.2→②7.2→③4.4, PHY: ①3.3→②3.2→③2.6, WOR: ①3.3→②2.1→③0.9, SOC: ①2.7→②1.9→③0.9)

TOT, WOR, and SOC out of 4 items showed significant decrease in one month after the camp (p value<0.1). Inconsistent Responding Index: INC for 12 children showed less than 6 for all 3 tests, therefore, the results for these tests were accepted as the effective results. WOR, SOC, and TOT decreased significantly (Fig. 2.3).

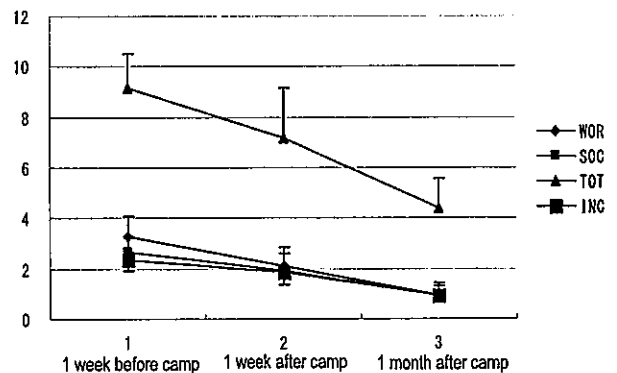


Fig. 2. Result RCMAS-2 (N=12)

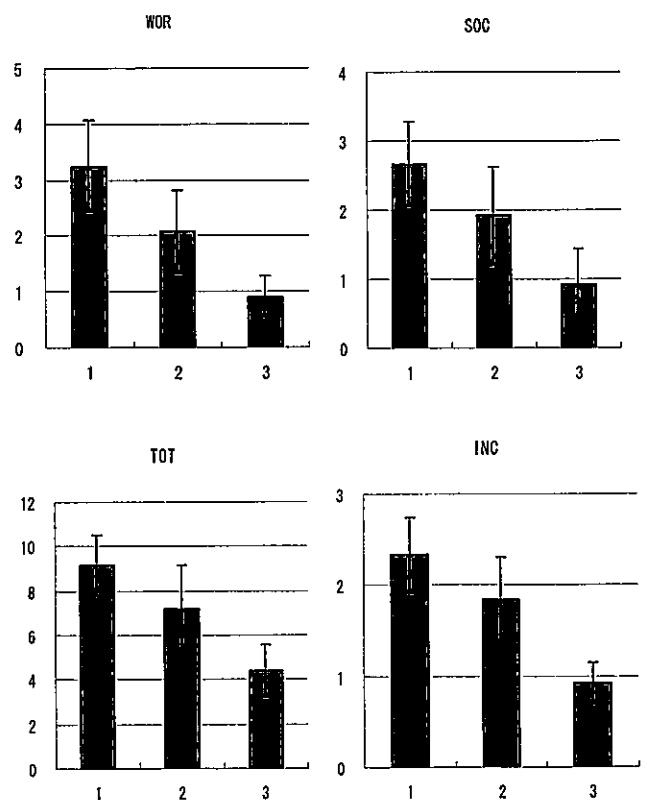


Fig. 3. Result RCMAS-3 (N=12)

## 5. Considerations

Children in the acute phase fight with the various anxieties such as the anxiety about returning school, anxieties about the treatment and/or the hospital environment in addition to the anxiety about separation from their mothers, occurring due to hospitalization (Taniguchi, 2009). Kierkegaard stated "Anxiety is the psychological situation where one cannot grasp the concrete objects" (2003).

The questionnaire survey conducted by Wakano (2012) for the teachers of special support schools states that children in long-term hospitalization lose a keen sense of the season and the temperature; therefore, the experience of growing plants in the open air brings out a interest for the nature of things, encourage a feeling of achievement, refresh a sense of freedom and stabilize the mind. Stimulation by nature accelerates to get into high spirits and provides delight to ill children. Also states most of the stress caused by an anxiety, a fear and a self-generated mess had been relieved by nature and concludes that to learn the meaning and the brightness of life through growing plants is remarkably important.

One of the roots of anxiety of ill children is the treatment of the illness and the forced transfer from home to the hospital as the treating space; therefore, we tend to think the anxiety of children will be mostly relieved when the illness is cured, leave from hospital and returns to school. Hosoya (2008) states that "Because the child suffers bigger stress than the mentality of a child can tolerate during the treatment period, all the anxiety will not be gone even after the illness is cured but will change to new anxieties". This is what is called "late effects in life phase". Children who return to the community have anxiety about recurrence, alienation from friends, or finding a job and/or marriage. Although there are opportunities for regular check-ups or regular rehabilitation at the hospital, they cannot relieve from several anxieties nor become mental rehabilitation in the life phase to support self-fulfillment. Common late effects of after leaving the hospital are retained in three different fields (Children's Cancer Association of Japan, 2008).

They are "physical anxiety" and "future time anxiety", such as recurrence and being behind in studies, and "social anxiety", such as sense of distance from or alienation from friend, or overprotective by them.

Furthermore, Hosoya (2008) states that besides the physical late effects of chemotherapy there are other causes of: PTSD, psychic trauma due to harsh treatment; Hyper Arousal, over-responding to slight stimulation; and Avoidance, obliteration from one's self-experience.

In other words, ill children carry two types of anxieties "the anxiety in the treating space" at the acute phase and "the anxiety of the late effects at home" in the life phase.

It is not clear from the table whether growing plants in the

treating space relieved the anxiety of the ill children, however, the SOAP descriptive language and the behavior of the ill children, A, B, and C in table 4, could be considered that children expressed their anxieties. Child A dug the ground saying "Die! Die!" (Day 6) and made a tomb for the plants (Day 11). Child B said to a friend "Have you come back to life?" (Day 8) and regarded a tanzaku, a strip of paper to write wishes, at the Tanabata Festival as a message to God (Day 16). Child C showed a lump of her fallen hair, by therapy, found it as "a bird nest" (Day 15), said "They will fly to inherit descendent" when looking at the maple seeds (Day 16). We especially observed that he/she concentrated on the work after the surgery. Kubler-Ross (1997) states that "The children cannot deal with their mental confusion and use symbolic language or behavior unconsciously. Children under 12 years old express themselves through behavior at play when they cannot verbalize." Children A, B, and C exactly expressed the language which indicates "death" or "regeneration" during the process of growing plants. The common factor for the three children is "the flow of time". He/she asked himself/herself "Will I be here at that time?" when the plant they had grown will be harvested. They overlap the period which plants grow and the one which is required for the treatment and ask themselves "How long should I wait?" The hospital is an unusual space and furthermore the room is shared with 4 children. Children need a space such as a space where they can enjoy freedom, a space where they can be alone and a space to face the anxiety about death, and to think thoroughly about their anxieties. However, they are not guaranteed such a space or the opportunity. All three children liked watering the plants the best. They concentrated on watering and their backs looked as if "they were trying to talk to the plants and thought an answer about life".

In order for them to face the anxiety and seek for a way to relieve it, it is important to have a garden which they can access freely at the hospital, where they can feel nature, and grow plants. As Wakano (2012) states garden/field near the hospital room which the children can freely use will contribute to the reduction of stress such as anxiety, fear, and the conflicts of the children.

As mentioned earlier, the major anxiety of the children in the life phase is the social anxiety. According to the RCMAS-2 results before, just after, and one month after the camp, the DEF does not show the noticeable change between the before and after the camp while the PHY, WOR, and SOC are slightly reduced. But they were significantly reduced one month after the camp. Especially "the anxiety about what is obscure", such as the feeling of loneliness, was most relieved, and as a result the TOT was relieved. The reason why there was not significant relief between the "before" and the "just after" the

camp but there was after one month appears to be the children's excitement lingered just after the camp and their lives were unusual, but we think further investigation is required.

The parents of the campers had positively commented "The child still talks happily about the camp after more than one month since the camp". "The child says he/she wants to participate again". "The child appears happy to have friends". "The child seems to have self-confidence". "The child keeps a contact with the friends there". "We have become able to talk about the illness within the family since the camp". These comments are equivalent to the results of the RCMAS-2 data.

Outdoor activities provide many deep impressions from nature, but the participation in field activities for ill children is difficult. Since this research object camp was a therapeutic recreation program which aims to create friendship through experience in nature and to realize one's potential, with a collaboration with medical team, it contributed to relieving the children's anxieties. Through the experiences of excitement and time they shared with friends in nature, we think those experience evoked children's ability by communicate with children with similar illness, and they became more independent, more considerable for other person and more positive for their life.

## 6. Conclusions

Fujioka (2010) states that the space required for horticultural therapy change according to the therapy stages. At the acute stags, the space to protect the individuals which is free from several stimulations is needed, and as the treatment proceeds space gradually increase various stimulations is required.

We observed in the survey in the hospital for 3 children that there are two types of anxieties: anxiety about the treatment and anxiety about death. It was also important for children to express their anxiety in the hospital. We are going to continue more of research with a larger number of children to get more credibility for the analysis for children's anxiety.

The anxieties of children with illness in the life phase are ones about the relationships with friends and society. Children performed various therapeutic programs with other friends in nature where no TV access, no mobile phone nor video game exist. The activities such as planting and playing in nature with the others developed human relationships, provided successful experiences, and relived anxieties. We would like to continue studying the relief of anxieties in the acute phase by growing plants, and the relief of anxieties by nature after returning to the community as integrated therapy anticipating the growth of the child.

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