Construction of Community Biophilia Rehabilitation Network for the Disabled Elderly*

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Abstract

We enforced the construction of a community rehabilitation network for the autonomous rehabilitation of the disabled elderly by the official grant. We distributed the prepared manual and devices developed for subjects in order to perform the rehabilitation exercises. 47 disabled elderly 13 Aftereffect of cerebrovascular accident, (9 hemiplegia left, 3 hemiplegia left and one another), 8 knee osteoarthritis, 7 lumbar spinal stenosis and 19 others were involved as subjects. The change of a body situation depended on the Long-Term Care Insurance Survey (LTCIS) including the Degree of Independent Living for the Disabled Elderly (DILDE) was analyzed with changes in the level of care. As a result, the sitting ability with both feet on Ground has improved significantly (P<0.05). From these research findings, it is thought that the possibility of enforcement of the autonomous rehabilitation and home implementation of it has been specified for the disabled elderly.

Keyword: motivative exercise, effect evaluation, home rehabilitation, prevention, care level

1. Introduction

We are continuing the pursuit of the autonomous rehabilitation method named the Takizawa method1), which obtains the significantly effective result on gait items by obtaining the public research grant. The international society was also organized in recent years, and it was reported greatly2), and international evaluations have been obtained. The Takizawa method is characterized by the motivative exercise that is available for a disabled person to perform autonomously for a functional disturbance of an extremity while receiving assistance of a device with driving own healthy side extremity.

We implemented the construction of the community rehabilitation network by disabled elderly self based on these facts with the help of grant of the Japanese Welfare and Medical Service Agency3).

The construction trial was done for aiming following;

i. The independence of walking and movement of the age disabled elderly improve and activities of daily living advanced are attained.

ii. The rehabilitation method which can improve a physical action and activities of daily living is become common.

iii. Construction of a safe and simple community rehabilitation network is available to do in the whole country.

iv. Since the level of Care level approved, reduction of social security payment is attained.

Since the network of a core organization and home rehabilitation within linkage was built, it enabled us to raise volition of the disabled elderly and they carried out the Biophilia Rehabilitation by themselves simultaneously. Change of training situation and a body situation is reported.

2. Implementation of research

2.1. The process of the community rehabilitation network construction

The study about the network construction started to distribute the flier throughout Bungo Ono-shi in Kyusyu in Japan in order to look for the voluntary participants including the executive organization in June, 2005. Any candidate who wants to join the study was enabled to do so in the case with consent of the executive organization concerned with the long-term care insurance for oneself. The lecture meeting for collection was held on July 2, 2005 at the City Community Hall in Bungo Ono City. We held the committee of the participant correction on August 5 and found that there were no voluntary participants. We cooperated with the Mie-cho Home Care

Received 22 June 2010
Support Center of the Okamoto Hospital which has participated in research applications. We asked both the center and the users of it to join the Community Rehabilitation Network which did not have any break between being home and being institutionalized. The subjects who got consent weren’t given any medical treatment by other rehabilitation techniques.

2.2. Devices distribution

The knee Flexion and extension MOTIVATIVE exercise device (Fig. 1_1), the Dorsi-Plantar and Flexion MOTIVATIVE exercise device (Fig. 1_2), the weight for leg muscular power strengthening training (Fig. 1_3), and the upper-limbs training device (Fig. 1_4) were distributed to 49 participants for training. A walker with sled (Fig. 1_5) for the needing subject, and the seating position maintenance cushion (Fig. 1_6) to those who cannot take a seating position posture using the cushion were prepared, since the seating position posture was secured to perform the MOTIVATIVE exercise.

2.3. Takizawa Method rehabilitation

Takizawa Method rehabilitation is rehabilitation by exercise which is mainly concerned with MOTIVATIVE exercise. It aimed at the acquisition of walking and independent living as an end goal. It is performed according to the condition and capability at the time of training with a seating position posture without performing hard training to the patient or home care support center user in chronic phase. The test for the home care support center user in chronic phase was carried out using the device which was distributed for the MOTIVATIVE exercise.

The contents of Takizawa Method rehabilitation which they perform by themselves are shown as follows from (1) to (4);

(1) Using the knee Flexion and extension training device and the Dorsi-Plantar Flexion training device, the affected side of the leg is trained bilateral and symmetrical pattern to an unaffected side leg by using the muscular power of it that named Motivative exercise.

(2) Leg Weight training that is the leg muscular power strengthening training by swinging the leg with the weight belt of 0.5 or 1 kg is attached to ankles.

(3) Upper-limbs training of the usual pulley use

(4) Trunk training “KONNICHIWA which is Japanese bow movement.”

3. Enforcement of research

3.1. Subjects

49 of the advanced aged disabled elderly using the Mie-cho Home Care Support Center in Bungo Ono-shi, Oita Prefecture Japan agreed and participated in research (2 dropouts). The participants, consisting of 15 men and 32 women without 2 dropouts, and age were an average of 76.4 years old in 56 years old to 88 years old of oldest. All the subjects who participated carried out programmed rehabilitation training. The Care level of the subjects were 5 “Support required”, 29 “Care level 1”, 8 “Care level 2”, 3 “Care level 5”, 2 “Care level 4” and 1 “Care level 5”. The main portions of the primary disease were numbered as 13 post effects of cerebrovascular accident subjects (paralyses of the left; 9, paralyses of the right; 3, one another), 8 knee osteoarthritis, 7 lumbar spinal stenosis. Advanced age disabled elderly have many aftereffects of disease combined. The primary diseases shown in the first-in-a-roll items mentioned at the time of a use application of the facility are shown in Table 1.

| Disease                                      | numbers |
|----------------------------------------------|---------|
| Aftereffect of cerebrovascular accident      | 13      |
| Knee osteoarthritis                         | 8       |
| Lumbar spinal stenosis                      | 7       |
| Femoral neck fracture                       | 4       |
| Lumbar spondylosis deforming                | 3       |
| Spondylosis deformans                       | 3       |
| Rheumatoid arthritis                        | 3       |
| Others;                                     |         |
| Parkinson disease, After amputation of right | 6       |
| upper extremity, round back, caries, cervical |
| myelopathy, spinocerebellar ataxia           |         |
| Sum total                                   | 47      |
3.2. The exercise situation as the intervention

47 subjects did home use of the MOTIVATIVE exercise devices for the knee flexion and extension (Fig. 1_1) and the dorsi-plantar and flexion (Fig. 1_2), the weight for leg muscular power strengthening training and the upper-limbs training device. The training memorandum was considered as the above-mentioned use exercise and trunk training. These subjects were not performing other exercise therapy or physiotherapy.

3.3. Days of the MOTIVATIVE exercise upper and lower limbs

The subjects performed exercises according to Takizawa method rehabilitation, as for the number of times of it to the respective subjects, from 20 to 50 times and 1 to 6 times as 1 day to six days for every week with being home and the facility during the period of the test. The distribution of the times in a week to perform is shown in Fig. 2.

The state of implementation of exercises classified by disease is shown in Table 2. The subjects in the number-of-times entry blank of exercises made the using days’ number the exercises number at the time of analysis. More specifically, four persons of one time use of the facility were counted participants once per week. Three persons of 2 time use of the facility were counted as participants 2 times per week. 4 subjects reduced the number of times of enforcement of muscular power strengthening by using weight and trunk exercises. The days of participation were only 1 day a week, respectively.

3.4. Evaluation

Evaluation performed by the physiotherapist and an occupational therapist twice to 47 persons using the LTCIS. Evaluation items are shown in Table 3. The first time evaluation carried out at the time of an experiment start (January, 2006) and the last time evaluation did three months after (April, 2006). We classified and examined the level of “Support required” into “6” and “Care level 5” into “1” as a numerical classification. The new classification as "Transitional Care level" between “Support required” and “Care level 1” was set to “6” also at the last time evaluation. 5 subjects were included "Transitional Care level".

SPSS Ver15 was used for the analysis. The official assay was the Wilcoxon signed rank test and made less than 5% significant.
4. Result

4.1. Items to check effect for using **DLIDE**, independent living was set to "9", and C2 of the minimum level was replaced and evaluated to "1" in order of J1, J2, A1, A2, B1, B2, C1, and C2 as a numerical classification. The first time evaluation carried out at the time of an experiment start (January, 2006) and the last time evaluation completed three months after (April, 2006).

1 person of independent living by the first time evaluation value increased in number with 6 persons by the last time evaluation value. The subject’s number of J2 came in lower numbers as shown in Fig. 3, and they improved to independent living and J1, and the Degree of independent has improved significantly (P=0.017). Evaluation of "2-3 sitting with both feet on Ground" has also improved significantly (P=0.044).

4.2. Item that effect was not confirmed statistically.

Related to "contractures of joints ", 14 subjects were evaluated "nothing" at the first time evaluation and 22 subjects were done at the last time evaluation. Six subjects improved among 47 subjects. Related to "paralysis", 25 subjects became 26 in nothing. Although the statistical improvement of contracture was not found, the change of the existence of contracture for every joint was summarized in Fig. 4. 17 members, 36% of the subjects who had contracture by first time evaluation of a shoulder joint decreased to 10 members, 21% of them, and 7 members, 15% of the subjects who had contracture by first time evaluation of a leg joint decreased to 2 members, 4% of them. The tendency of improvement of a shoulder joint (P=0.070) and a leg joint (P=0.096) were confirmed. The statuses of care level at the first time–last time evaluation for the subjects were summarized in Table 3. The statistical improvement to the Care level was not found.

4.3. The number of times of exercise and the effects

The number of times of exercise and the training effect were examined. Since the days for training were clear in the result, we tried to analyze a causal linkage between the improvement result and training days. The improvement result of the Degree of independent was summarized into Table 4 and the sum total marks of the improvement were displayed. The table 5 shows that who trained 2-4 days a week were large numbers of subjects and the large value of an improvement and 16 points, 89% is occupied by the sum total mark of the improvement. Moreover, although the evaluation of "2-3 sitting with both feet on ground" has also improved significantly, the result is obtained by the reason that 4 subjects evaluated “Possible to sit if one supports by ones hand” at the first evaluation changed to “Possible to sit without any difficulty”.

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### Table 3 Change of Care level

| Care level | first time evaluation | last time evaluation |
|------------|-----------------------|----------------------|
| Support required | 5 | 6 |
| Care level 1 | 28 | 26 |
| Care level 2 | 7 | 10 |
| Care level 3 | 3 | 2 |
| Care level 4 | 2 | 1 |
| Care level 5 | 1 | 1 |
| **Total** | **46** | **46** |

### Table 4 The change of degree of independent and the number of enforcing dates for one week.

| / Days | Improvement factor 3 | Improvement factor 2 | Improvement factor 1 | Aggravation factor -3 | Sum total | Improvement mark |
|--------|----------------------|----------------------|----------------------|----------------------|-----------|-----------------|
| 1      | 0 1 0 0 0 0 1        | 2 0 3 0 0 0 0 3     | 1 1 3 3 4 0 1 12    | 0 1 0 0 0 0 0 0 29 29 | 5 18 10 11 | 1 9 3 4 0 1 18 |
| 2      | 1 1 4 1 0 0 1        | 0 4 10 6 7 2 0 29   | 0 0 0 0 0 0 0 0 0 0 0| 0 1 0 0 0 0 0 0 0 0 0| 5 18 10 11 | 2 1 1 47         |
| 3      | -1 0 0 0 0 0 0        | -2 0 0 1 0 0 0 0 1  | -2 0 0 1 0 0 0 0 1  | -2 0 0 1 0 0 0 0 1  | 5 18 10 11 | 2 1 1 47         |
| 4      | 0 0 0 0 0 0 0 1       | 0 0 0 0 0 0 0 0 1   | 0 0 0 0 0 0 0 0 1   | 0 0 0 0 0 0 0 0 1   | 5 18 10 11 | 2 1 1 47         |
| 5      | 0 0 0 0 0 0 0 1       | 0 0 0 0 0 0 0 0 1   | 0 0 0 0 0 0 0 0 1   | 0 0 0 0 0 0 0 0 1   | 5 18 10 11 | 2 1 1 47         |
| 6      | 0 0 0 0 0 0 0 1       | 0 0 0 0 0 0 0 0 1   | 0 0 0 0 0 0 0 0 1   | 0 0 0 0 0 0 0 0 1   | 5 18 10 11 | 2 1 1 47         |
| **Total** | **5 18 10 11** | **2 1 1 47** | **5 18 10 11** | **2 1 1 47** | **5 18 10 11** | **2 1 1 47** |

### Table 5 Sitting abilities at the first evaluation and training days per week

| Days | Possible to sit keeping own hands | Possible to sit without any difficulty |
|------|-----------------------------------|----------------------------------------|
| 1    | 1 0 0 2 0 1                        | 4 18 10 9 2 0                         |
| 2    | 0 0 0 0 0 0                         | 4 18 10 9 2 0                         |
| 3    | 0 0 0 0 0 0                         | 4 18 10 9 2 0                         |
| 4    | 0 0 0 0 0 0                         | 4 18 10 9 2 0                         |
| 5    | 0 0 0 0 0 0                         | 4 18 10 9 2 0                         |
| 6    | 0 0 0 0 0 0                         | 4 18 10 9 2 0                         |
| **Total** | **4 18 10 9 2 0** | **4 18 10 9 2 0** |
without any difficulty” at the last evaluation as shown in Table 5. 2 subjects among 4 did training 4 days of week.
About the Ankle contracture total of Table 6_1, 5 subjects, 71% who trained 2-4 days week are occupied during 7 improvements in week. The total of contracture on Table 6_2, shows 20 subjects, 91% who trained 2-4 days week and demonstrated 22 improvements within one week.

4.4. Causal disease and effect
The causal disease and the effect were examined. Although there were many advanced age disabled elderly who have annexed aftereffects of many diseases, analysis were projected determining the degree of independence by making the first-in-a-roll items mentioned at the time of the application to use the facility into a causal disease. The improvement for every disease is shown in Table 7. The improvement of “sitting with both feet on ground” were 3 aftereffect of cerebrovascular disorder (paralyses of the left) and 1 neck injury (displayed others) as shown in Table 7.

4.5. The Change Level of Care Level and Effect
The change of care level and an effect were collected and examined to Table 8.
The numbers of the improvement were 5 and the aggravation were 4 by the analysis of the numerical classification of Care level. Although the statistical improvement to the care level was not found as stated in “4.2.”, the improvement of 1 person was confirmed among 46 persons. It was shown that 2% decreased and that the disabled elderly who needed care became 98%.

5. Conclusion

We studied the new rehabilitation technique that 30 percent or more of the bedridden elderly re-acquired walk including walking in the parallel bar, and we confirmed the effect by the Grant of The Association for Technical Aids. It shows enabling for the disabled elderly living from care reliance to independence. That the disabled elderly might live independent not on care reliance leads also to preventing the collapse of the social system. In order for us to contribute to improvement in the life of the people and welfare and to enable for as much as the disabled elderly possible living from care reliance to independence, we carried out investigation of the Biophilia Rehabilitation Network construction, the trial and the effect survey.

The rehabilitation enforcement volition in a home life of the disabled elderly could rise. The effective rehabilitation network by a core organization and home rehabilitation which the disabled elderly carried out by themselves, could be built and tried. We consider below from the test.

(1) Since there was no participant joined arbitrarily in spite of large-scale collection activities, in order to advance the diffusion of the biophilia rehabilitation from now on, it turned out that introduction as the health, medical care and welfare policies is called for.

(2) The effect of biophilia rehabilitation that is the autonomous rehabilitation for the disabled elderly selves by Takizawa method was confirmed.

The degree of independent living for disabled elderly improved significantly (P<0.05 P=0.017). The degree of “2-3 sitting with both feet on ground” improved significantly (P<0.05 P=0.044). Although Takizawa, Ushizawa, Makita, Wada showed clearly that there were many re-acquired walking examples from bedridden among the rehabilitation patients of Takizawa method exercise, and that the rehabilitation effect was high. The rehabilitation effect became clear also from this result.

(4) Moreover, the point which the participant carried out easily could not be overlooked, so that the Takizawa’s report which was claimed that the method enforcement was easy has been confirmed. Although the statistical improvement was not found about change of the contracture, we analyzed for every joint and the tendency of the improvement was seen about the leg joint and the shoulder joint. It shows that the view of in the report of Fukui and others which were effective in the improvement of contracture has been reinforced.

(5) From change of the care level degree which became clear in this research, the prediction of good influence to the commonwealth and social economy was enabled. The Japanese elderly people aged 65 and over who were 25,550,000 in December, 2005 at the first time evaluation were increased to 25,870,000 people in April, 2006 at the last time evaluation. Moreover, the disabled elderly who needed care were increasing from 4,130,000 people to 4,190,000 people. Although the rate of the disabled elderly who needed care to the elderly people got worse 0.05 point with 16.22% at 16.17%, the rate of the subjects was improved 1 person among 47. The improvement was 2 point and the disabled elderly who needed care became 98% as shown in “4.5. The Change of Care Level and Effect”. The disabled elderly who needed care is increasing twice, 107% from 2000 in 2007 as stated in “1. Introduction.” In this condition, 2% of reduction has suggested the possibility of 80,000 people's Care level degree reduction in every one quarter, therefore it shows the possibility that diffusion of the biophilia rehabilitation can prevent the uptrend of the disabled elderly who needed care and also that a national economic burden is eased.

(6) The feature as rehabilitation exercise of autonomous rehabilitation by Takizawa Method has been checked. As shown in “4.3. The number of times of exercise and the effects”, it turned out that it is good enough to enforce the biophilia rehabilitation 2 to 4 days in week in order to the effect training, and that the effect also in some measure can be acquired not carrying out every day. It seems to suggest the number of times of proper enforcement of the Biophilia Rehabilitation that a definition of those who have a custom of exercise are persons who exercise twice or more per week, is included in “Healthy Japan 21”, the health production movement of Japanese. Furthermore, there is the feature which can be carried out easily at home if anyone becomes skilled in exercise by devices to use at the facility. Therefore, it can be said that the possibility of easy enforcement of the new rehabilitation method and home rehabilitation exercise has been specified.

(7) The brain functional improvement was reported by the both-sides repetitive exercises of the upper limbs. Furthermore, there is also progress of bilateral movements and work of neural stem cell. If these are considered, it can be thought that the study of the biophilia rehabilitation obtains the chance to prove the stroke patient's brain recovery. We are trying to prove our prediction that a brain functional improvement is realized by the Biophilia Rehabilitation.
Acknowledgement
This work was supported by the grant of the Japanese Welfare And Medical Service Agency in the 2005 fiscal year and KAKENHI, Grant-in-Aid for Scientific Research(A)(21249036).

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