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RESEARCH, INNOVATIONS AND
QUALITY OF LIFE FOR THE NEW MILLENNIUM

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1. *Masako Fujii*, PhD
2. *Yoko Matsuoka*, Division of Nursing,
Hamamatsu, Japan
3. *Haruko Shikimori*, PhD,

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Efficacy of Attention Training performed in severe traumatic Brain Injury (TBI) Subjects

Masako Fujii, PhD, TBI Rehabilitation Research Center, 4-10-10, Ikenohata, Taitoku, Tokyo, 110-0008 Japan

Yoko Matsuoka, University Hospital, Hamamatsu University, 3600, Handa, Hamamatsu, 431-3192 Japan

Haruko Shikimori, PhD, Professor, Faculty of Health Sciences, Tokai University, Isehara City, 259-1193 Japan

Introduction

Attention is the first cognitive appearance in infant and introduces many mental experiences. Furthermore, concentrating abilities expressing sustained attention are considered to promote learning in their future developmental stages and their school life. Following severe traumatic brain injury which is usually caused by traffic accidents we find often that these individuals with TBI show poor attentions and concentrations to their various kinds of their environments. This deficit caused several problems for adaptation of everyday life and also their social life. Then, as first attempts of the cognitive rehabilitation program at home we begin to train three severe persons with TBI using attentional training book, for regaining and optimizing their cognitive attentional functions.

Overview of the subjects

Subject 1, M. a 41-year-old man, had right frontal cortex damage with facial bone fracture. Day of the TBI by traffic accident was 8-22-'79, 21 years and 7 months passed after his injury. At that time coma was lasted for about 40 days. Duration of his PTA is uncertain. Introduction to the training was English translation. After that attention training is performed usually in the daytime by himself. Recently he began to work at the daycare center for the elderly. No physical disorders but his posttraumatic epilepsy are treated by medication.

Overview of the subjects

Subject 2, H. a 59-year-old house wife, had bilateral damages of parietofrontal parts located just parietal center of the cerebral cortex, at the same time accompanying with physical disorders including fractures of costal and tibial bones. Day of the TBI by traffic accident was 8-12-'99, 8 months and one year passed after her injury. At that time coma was lasted for about 30 hours and posttraumatic amnesia (PTA) for 4 days. I.Q. performed at the hospital by WAIS-R, Japanese Version, was total 77. Every day she does training by her attention workbook and dictation cassette tape sometimes with her husband's aids.

Overview of the subjects

Subject 3, F. a 30-year-old men, had the most severe TBI in three subjects. Day of the TBI by traffic accident was 4-10-'95, 6 years passed after his injury including most part of the left temporal lobe with partial frontal opercular damage (contralateral damage) and right posterior part of the temporal lobe (initial damage). Coma was lasted for 1 month. Cognitive impairments are his main problem. I.Q. assessed by WAIS-R, Japanese Version, was 48. Every day after returning from a daycare center for mentally disabled persons, he does his training workbook and 10 minutes dictation by himself.

Assessment

As the assessment tool we employed Test of Every Attention (TEA), Thames Valley Test Company. This test is considered to be able to assess various aspects of attentional deficits and tool of the subtest are used many familiar everyday materials, not the elemental ones. Efficacy of this test compared with the other attentional test commonly used is going to report elsewhere. The test results before and after the attentional training informed us the efficacy of the training performances.

To assess the efficacy of the training TEA were performed using Version A in both before and after the training. As the training term is relatively long and the practice effect was considered to be negligible. Furthermore, 2 persons of the three have also memory deficits although one of them, Subject 1, the deficit was not prominent.

Training methods

As the attentional training we employed Attention Workbook in Brainwave-R series and a dictation tools made by us. For administration of the Attention Workbook we made cassette tape instructing the administration methods with Japanese explanation. This makes possible to do Workbook at home by themselves and 6 exercise of 34 items were eliminated because they need face to face examiner. Everyday excises were planed to be completed within 90 minutes. The excises were performed every days a week and the same Workbook was performed three times for three weeks.

Original Wookbooks made for 4 weeks. Revised Wookbobbk for 4 weeks were then used for 12 weeks. After first week's training each of these three persons and their families were interviewed to discuss about the performance of the training and about their everyday life.

For administration of the dictation we also used cassett tape in which 5 sets of story was recorded. For subject 3 the story of the dictation was composed of 300 words for 10 minutes writing and for subject 2 that was composed of 500 words for 10 minutes writing. Detail of this method was reported at 3th World Congree on Brain Injury.

Results

Fig. 1 and Table 1 show the changes after 12 weeks training of the Wookbook of revised Brain Wave-R and dictation. The Brain Wave-R was constantly performed in these three persons with TBI. However, dictation was not performed in Subject 1. and in Subject 2 it was sporadically and supplimentally done. As the former training was about 90 minutes and the latter was 10 minutes. Present results are then mainly caused by the Brain Wave-R training.

Compared with before and after the training of 12 weeks, as in Fig. 1, Subject 1 showed improved scores in 5 items, the same scores in 3 items and reversed scores in 1 item. In Subject 2, improved cores were observed in 4 items, the same scores in 2 items and reversed scores in 3 items. In Subject 3, improved scores were in 3 items, the same scores in 4 items and reversed scores in 2 items. Abnormal scores under 5 points are all decreased, namely, 4 to 1 in Subject 1, 2 to 1 in Subject 2, 9 to 7 in Subject 3. Total scores shown in Table 1 were all increased.

Compared with the visual and auditory items significant differences could not be observed. Various changes were complex except for Lottery scores which were increased in all three person's trials, though positive score in Subject 2. was minimum. 1 point increase.

Discussion

From our results of three TBI person's training during 12 weeks at home positive results could be obtained and some attentional functions were suggested to be improved in these three individuals. However, it was difficult for us to detect what kind of attention has been improved. Improved items were different between these three patients and some items were shown reverse negative results as notice in Fig. 1 (Subject 1, VE1; Subject 2, VE1, TS, TSC; Subject 3, MS1,MS2). Among these results lottery scores which are considered to show the sustained attention increased in all three patients. This may be expressed one direction of improvement in attentional behavior which can be continuously doing task. Together with decreasing abnormal items these results may be revealed some positive changes in three TBI persons.

Twelve weeks are minimum term for training of this kind. Results of longer training terms will be expected more pronounced effect in these trainers.

In conclusion, from present results on attention trainings at home it was suggested that TEA assessment and Brain Wave-R Attention Workbook are effective tools for assessment and improvement of attentional impairments in TBI individuals. Perhaps the improvement is not a special attentional function but may be improvement of general attentional nature.

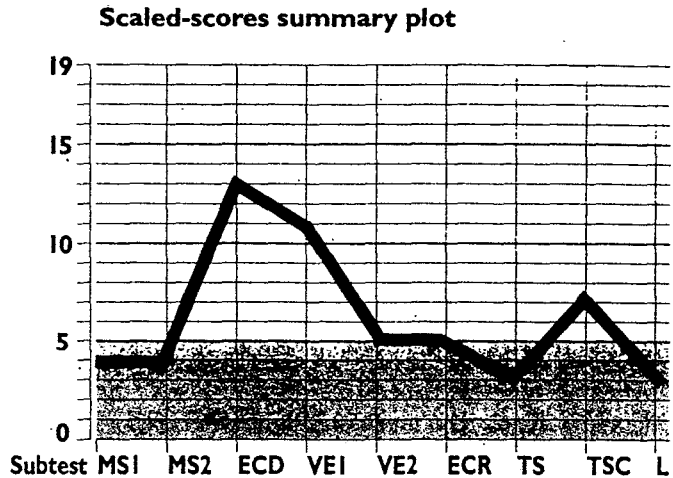
Abbreviations: MS1, Subtest 1:Map Search 1; MS2, Map Search 2;ECD, Elevator Counting with distraction; VE1, Visual Elevator 1;VE2, Visual Elevator 2;ECR, Elevator Counting with Reversal; S,Telephone Search; TSC, Telephone Search While Counting; L, Lottery.

Fig. 1. Results of attentional trainings in 3 TBI persons. Scaled-scores summary plots show TEA scaled-scores before training and lower figures show TEA scaled-scores after attentional trainings. Each date in left of figure shows the day of each testing. Subtest point 10 shows standard, under point 5 abnormal.

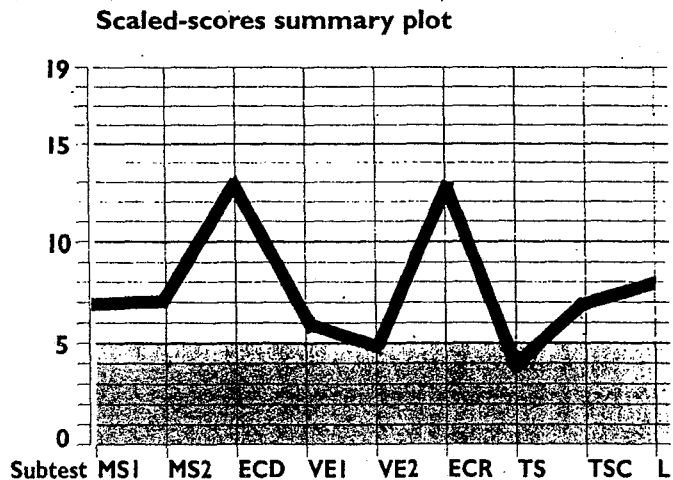
Table 1. Total TEA Scaled-scores before and after training

	before	after
Subject 1	55	70
Subject 2	58	62
Subject 3	17	25

*TEA scores in Subjects 1
Before the training
7-5-'00*

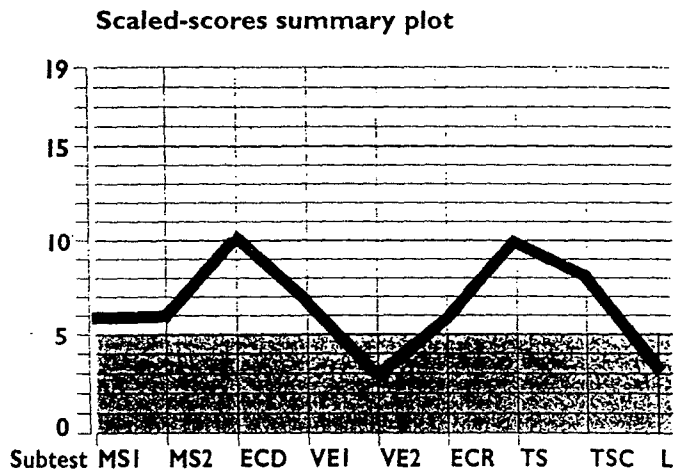


*TEA scores in Subjects 1
After the training of 12 weeks
12-13-'00*

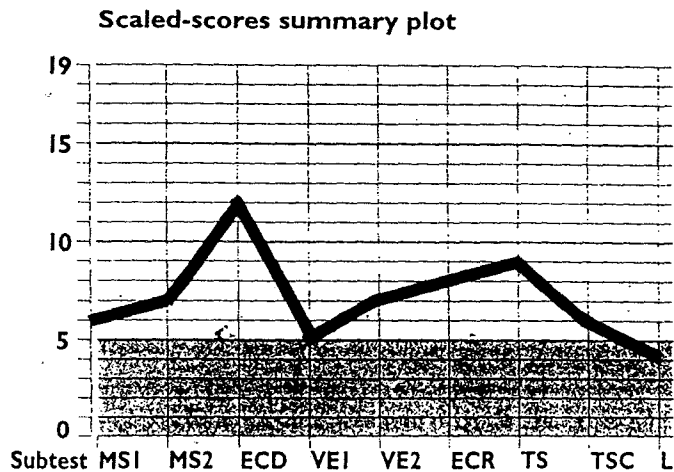


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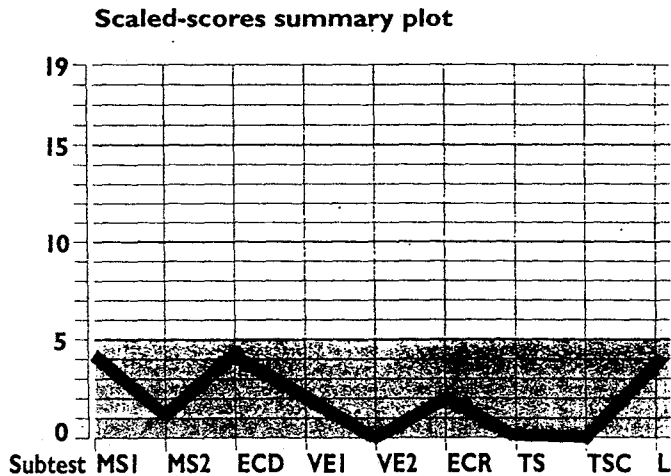
*TEA scores in Subjects 2
Before the training
10-24-'00*



*TEA scores in Subjects 2
After the training of 12 weeks
2-21-'01*



*TEA scores in Subjects 3
Before the training
6-12-'00*



*TEA scores in Subjects 3
After the training of 12 weeks
10-26-'00*

