Psychological adaptation to stress in elderly using sentence completion

Yui Mukaiyama[#1], Mariko Inoue[#1], Ami Takahashi[#2], Nichika Sumitomo[#2], Taizou Nagahama[#3], Harunobu Shima[#3], Takao Mitsui [#2 #4]

#1 Shikoku Nerve and Muscle Center, Tokushima National Hospital, National Hospital Organization, 1354 Shikiji, Kamojima, Yoshinogawa, Tokushima 776-0031, Japan
#2 Department of Clinical Research, Tokushima National Hospital, National Hospital Organization, 1354 Shikiji, Kamojima, Yoshinogawa, Tokushima 776-0031, Japan
#3 Department of Human Welfare Faculty of Health and Welfare, Tokushima Bunri University, 180 Nishihamaboji, Yamashiro, Tokushima, Tokushima 770-8514, Japan
#4 Department of Neurology, Tokushima National Hospital, National Hospital Organization, 1354 Shikiji, Kamojima, Yoshinogawa, Tokushima 776-0031 Japan

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Abstract

In a mature society, the incidence of age-related diseases is steadily increasing as the number of elderly people increases. The clinical utility of the Sentence Completion Test (SCT) was investigated in various aspects to assess psychological adjustment in the elderly. We selected patients with subacute myelo-optico-neuropathy (SMON) as elderly people who experienced the trauma of phytotoxicity. The results of cluster analysis and multiple comparisons showed that “Disease” was associated with negative emotions or trauma along with “Anxiety / Concern” and “Health”. In contrast, "Friend" and "My past" formed a cluster in which positive emotions predominated. The present results indicate that SCT can be a useful tool in extracting the stressor and its healer.

Keywords: Psychological adaptation, Resiliency, Subacute myelo-optico-neuropathy, SMON, Sentence Completion Test, SCT

Introduction

According to the World Health Organization (WHO) report, "Mental health of older adults", The world's population is aging rapidly and the percentage of older adults will increase from about 12% to 22% between 2015 and 2050. Older people face special physical and mental health problems, i.e., approximately 15% of adults aged 60 and over suffer from a mental disorder. Specifically, the prevalence of anxiety and sub-threshold anxiety in community samples of older adults ranges from 15-52.3% [1]. As individuals get older, the risk of developing mood disorders, especially anxiety disorders, increases with each passing year [8]. This increase appears to be related to mental stress [28]. Unexpectedly, however, several findings suggest that older populations, although less healthy and less productive in general, may be more satisfied with their lives, and experience less stress, worry, and anger than do middle-aged people [25]. Our psychological state is made up of a balance between vulnerability and resiliency. Combination of psychosocial environment, genetics and early life stress largely determine vulnerability to major depression and anxiety disorders. In contrast, the strategy to improve positive emotions, cognitive flexibility, optimism and active coping leads to promote stress resilience [2]. This means that psychological adjustment is well underway in the elderly. Therefore, the understanding their psychological adjustment will contribute to the realization

Correspondence: Yui Mukaiyama., Shikoku Nerve and Muscle Center, Tokushima National Hospital, National Hospital Organization, 1354 Shikiji, Kamojima, Yoshinogawa, Tokushima 776-8585 Japan
Phone: +81-883-24-2161 Fax : +81-883-24-8661 e-mail: mukaiyama.yui.cr@mail.hosp.go.jp

of well-being for people of all ages, not just the elderly. Since psychological resiliency is composed of positive emotions, socio-environmental factors, cognitive flexibility active coping style, and exercise [2], it is not easy to analyze the resiliency of elderly people who lead a general social life. Veterans are a good target for studying mental disorders and psychological adjustments in the elderly because they have experienced definite trauma [2,15].

Subacute myelo-optico-neuropathy (SMON) is a neurological disorder leading to abdominal symptoms, paraesthesia, muscle weakness of the lower extremities, visual impairment [1,8], and is caused by clioquinol. The agent was widely and frequently used in Japan as a gastrointestinal drug, resulting in an explosion of SMON only in Japan. The Ministry of Health, Labor and Welfare has identified SMON as a pollution and accepted the responsibility for maintaining the physical and mental health of patients throughout their lives. The incidence of patients peaked around 1960, and the outbreaks have declined dramatically since the drug was banned in 1970 [10,13]. The annual reports have demonstrated that various comorbid symptoms such as hearing loss and dementia are increasing, contrasting the reduction of acute neurological symptoms [21]. Additionally, they frequently suffer from anxiety, depression and apathy compared with healthy individuals [12,18]. This may be related to the trauma caused by SMON more than 40 years ago. Patients suffering from an unexplained illness were desperate to become victims of pollution after the cause was discovered. In other words, the stress of SMON patients consists of the trauma of being a victim due to government negligence and the inconvenience of daily life caused by the ongoing neuropathy of SMON. Currently surviving patients have some SMON-related disorders in addition to age-related disorders.

We targeted SMON patients for psychological analysis as elderly people who experienced the trauma of phytotoxicity. We planned to elucidate how the mental states of patients who experienced SMON are balanced and what are the resources to heal stress using the sentence completion test (SCT) along with other evaluation indicators.

Patients and Methods

Patients

The potential study participants were patients, who had received SMON certification from the national government, lived in Tokushima Prefecture in Japan, and participated in the annual mass health checkup conducted at the prefecture's health center. We took the sufficient time to explain the purpose of the study to the patients and their caregivers using an easy-to-understand document. Patients who were willing to participate in the study were asked to sign a consent form. We recruited from 13 patients who participated in the SMON screening in Tokushima Prefecture in 2019.

SMON symptoms

Information on SUMON in individual patients was obtained from the individual survey form prepared by the Research Group on SMON by the Health and Labor Sciences Research Grants for research on intractable diseases from Ministry of Health, Labor and Welfare of Japan. The walking function was evaluated by a walking time of 10 m in a straight line. Worst-stage visual impairment was evaluated by WHO ICD-10 classification and Functional Ambulation Categories (FAC)[5], respectively.

Barthel index (BI)

The Barthel Index (BI) consists of 10 items that measure a person’s daily functioning, particularly the activities of daily living (ADL) and mobility. The items include feeding, transfers from bed to wheelchair, grooming, walking on a level surface, going up and down stairs, dressing, and excretion. The BI can be used to determine a baseline level of functioning and can be used to monitor improvements in activities of daily living [20]. 10 activities are scored, and the values are added to give a total score from 0 (totally dependent) to 100 (completely

independent).

Instrumental activities of daily living (IADL)

Instrumental activities of daily living (IADL) are those activities that allow an individual to live independently in a community. The major domains of IADLs include 13 daily activities: (1) cut toenails, (2) go out by oneself,(3) take a bus or train, (4) shop for necessities, (5) transfer money, (6) look up a telephone number,(7) vacuum, (8) manage money, (9) control medications, (10) manage a house key, (11) cook, (12) use a microwave, and (13) use a gas stove. Participants reported their ability to conduct each of the 13 activities independently over the past month, using a simple dichotomous rating (yes/no). The score was calculated by summing the number of yes responses (0–13), with higher scores indicating higher ability in IADL. Occupational therapists commonly assess IADLs to determine the level of an individual's need for assistance and cognitive function [11,16].

Satisfaction scale

In Japan, the Cabinet Office conducted the National Survey of Lifestyle Preferences from 1996 to 2012. In the survey, the degree of satisfaction in daily life was scored on a scale of 1 (very satisfied) to 5 (very dissatisfied)[26].

General Health Questionnaire12 (GHQ12)

The GHQ is a screening test useful in understanding, evaluating, and screening psychological distress [3,4]. There are 60 items in the original GHQ and various shorter items in modified versions [3,4]. In this study, we employed a 12-item version of the GHQ, which is easy to test and is widely used in various fields such as medical care, public sector and welfare [4]. The GHQ scoring method of 0-0-1-1 was utilized, yielding one total score for GHQ12. (ranging from 0-12, with higher scores indicating lower measures of mental health) [3].

Sentence completion test for the aged (SCT)

A sentence completion test (SCT) is a psychological test where subjects use their own words to provide a continuation of incomplete sentences. In this test, we guard against self-conscious and defensive attitudes by advising subjects to respond with their first thought [9]. SCT responses are analyzed in terms of structure, content, or both [17]. For our study, we adapted the modified SCT for the aged, which included 33 items [22], to rather include 18 items. We set a total of nine "Major areas" (Table 1). The responses were divided to the SCT into their categories, scoring as: 1) positive emotion (2 points), 2) ambivalent emotion (1 point), and 3) negative emotion (0 points), according to the previous report [23]. The CST consists of nine items, each of which is made up of two sub-items. Therefore, a positive thinking pattern on all sub-items will result in a total SCT score of 36 points. Individual SCT sub-scores are considered a measure of positive mental health.

Statistical analysis

To check the quantitative nature of the total SCT score, a stepwise multiple regression analysis was performed on the relationship between the total scores of the SCT and individual components including BI, IADL, Walking time, Satisfaction scale, and GHQ12. The scores of the 9 major areas were screened by the Friedman test, and then the 9 areas were cluster-analyzed. The extracted clusters were subjected to Kruskal-Wallis test and Steel-Dwass test for multiple comparisons. Results were considered statistically significant at $p < 0.05$. Analyses were performed using the SPSS version 25.

Statement of Ethics

We conducted the study in accordance with the International Conference on

Table 1. Modified Sentence Completion Test for the aged (SCT) per item.

Major area	Item	Probe
Family	1	My home is more than most homes
	2	My family members treat me as
Friend	3	Friendship is for me
	4	People who like me well
Health	5	My body
	6	Get old
My past	7	When I was young
	8	I often remember
My present	9	My life now
	10	My pleasure is
My future	11	From now on
	12	Someday, I will
Anxiety/concern	13	My concern with daily life is
	14	What I'm worried about
Value	15	To live is to
	16	My life is
Disease	17	SMON is
	18	SMON is for me

Harmonization Guidelines on Good Clinical Practice and the Declaration of Helsinki. The study was approved by the Tokushima National Hospital Ethical Review Board (2020-31-2). All participants provided written informed consent for inclusion in the study after a full explanation of the study procedures.

Results

Of the 13 patients who participated in the 2019 Tokushima SMON screening, written consent was obtained from 11 patients. Two patients did not give their consent and of the remaining 11 patients, 3 were excluded: 1 patient had difficulty communicating due to severe hearing loss, and 2 others could not understand the questions (Figure 1). Hence, the analytical data were obtained from eight patients (3 males, 5 females). The age of the patients was 81.9 ± 5.14 years (mean±SD).

Table 2 shows the summary of patients, including age of onset of SMON, visual acuity and ambulatory function in the extreme phase of SMON, plus current BI, IADL, walking time, satisfaction scale, GHQ12 and SCT scores. The results of multiple regression analysis with total SCT score as the dependent variable eliminated variables other than GHQ, including BI, IADL, walking time, and satisfaction scale. The remaining GHQ significantly correlated with the total SCT score (p= 0.006)(Figure 3).

In the SCT, 125 available responses were obtained from 144 probes. Of these, 105 had an emotional component and 20 did not. Emotional content was classified into three categories; 1) positive (n=34), 2) ambivalent (n=22), and 3) negative (n=48). The average SCT score (95%CI) was 11.25 (16.54-5.96). The area with the highest positive emotion was “family”, with an average score of 2.25. Conversely, the area with the lowest positive emotion was “health” and “disease”, with an average score of 0.50. The Friedman test for the nine major areas showed significant differences between them (P=0.010). The major areas were then clustered and analyzed into four clusters as shown in Figure 2A. The results of Kruskal-Wallis test demonstrated that significant differences were found in the SCT scores of the four clusters (P=0.016). According to the Steel-Dwass' test, there was a significant difference between cluster 1 and cluster 4 (Figure 2B)(P<0.01).

No adverse effects were observed during the study.

Discussion

Table 2. Summary of patients

Patient	Gender	Age	SMON			Status quo					
			Age at onset	Visual impairment[#1]	Walking ability[#2]	Barthel index	IADL[#3]	Walking time[#4]	Satisfaction scale	GHQ12[#5]	SCT[#6]
1	Man	73	28	3 Blindness	2	85	5	30	3	11	11
2	Man	80	33	1 Low Vision	2	80	8	16.4	2	12	0
3	Man	81	32	1 Low Vision	1	50	6	22	5	11	4
4	Woman	89	37	3 Blindness	2	60	2	14.1	1	7	11
5	Woman	87	37	3 Blindness	3	70	3	58.3	3	5	6
6	Woman	85	26	0 Mild/normal	3	75	6	51.3	3	1	19
7	Woman	78	32	1 Low Vision	4	65	5	47.2	1	1	21
8	Woman	82	23	1 Low Vision	2	95	10	12.5	2	2	18

#1 WHO ICD-10 classification; #2 Functional Ambulation Categories (FAC); #3 IADL, Instrumental activities of daily living; #4 The time to walk 10 meters in seconds; #5GHQ12, General health questionnaire 12; #6 SCT, Sentence completion test

Figure 1

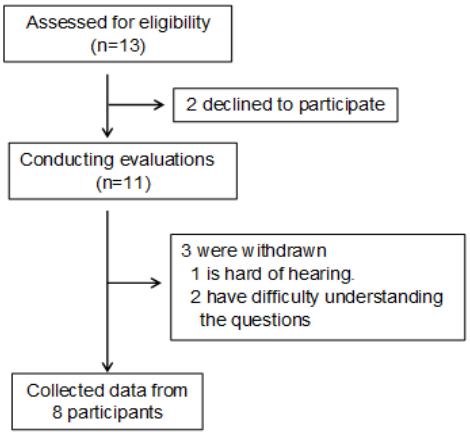
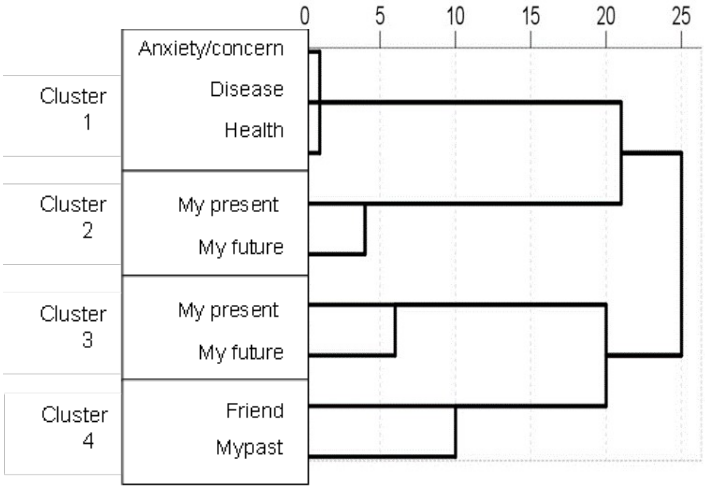


Figure 2A



Clioquinol began to be used internally in the 1920s for intestinal disinfection. In Japan, it was used frequently under the government's approval. Eventually, about 11,000 people were certified as SMON. In 1979, the government institutionalized investigation of the cause of SMON and permanent measures for patients [10,13]. The annual reports described that there were 484 patients with SMON with an average age of 81.2 years in 2020. For almost 50 years, patients have been suffering from the various complications of SMON as well as the trauma of being a victim of pollution. We planned to find out what kind of psychological state the survivors have or how they maintain their mental equilibrium in their daily lives. However, the age-related cognitive impairment, visual impairment, and hearing loss make it difficult to perform the conventional psychological tests on patients with SMON. For these patients, less time-consuming psychological tests that allow the patient to answer all questions are desirable. The SCT was occasionally used as a personality assessment in the 1980s. In particular, the SCT has been performed on children or the elderly, who often have confused emotions and contradictions [9,24]. Researchers can gain valuable information from subjects, reflecting their mental state

Figure 2B

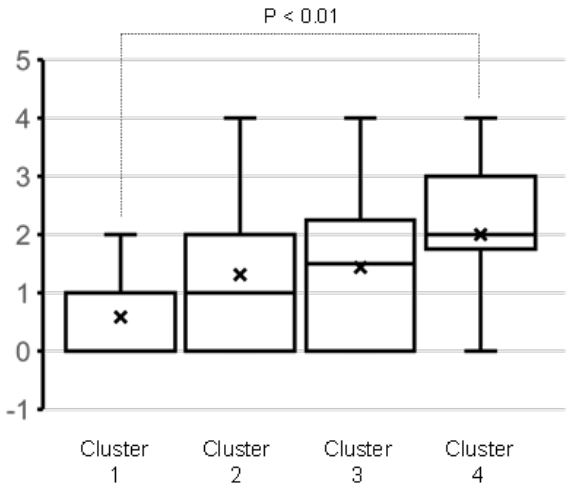
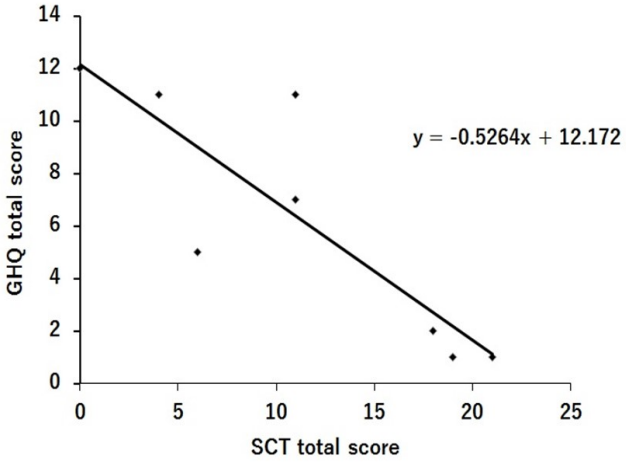


Figure 3



from their verbal responses. The SCT can be useful for more accurate psychological evaluation than conventional tests if flexible methods are properly set. Furthermore, the SCT has a particular advantage when testing the children and the elderly, as their confused mental states are logically arranged by their own spontaneous language [14,24].

In this study, a significant negative correlation was obtained between that the scores of SCT and GHQ12. The results are reasonable because GHQ12 scores are expected to correspond to negative mental states and SCT scores to positive mental states. The GHQ12 has been used in public health settings for people living in social settings because it can easily and quantitatively evaluate mental health [6,27]. It has been reported that GHQ12 scores gradually and generally worsen with age in community-dwelling elderly (65 years and older) [9]. In patients with SMON, the average GHQ12 score of 6.25, was markedly higher compared with that of the age-matched general population (2.2 between 75-84 years) [7], indicating prominent mental illness of the patients. Since the present results showed that the SCT score is useful for quantitative assessment, individual regions within the SCT were analyzed. The results of cluster analysis and multiple comparisons showed that “Disease” was associated with negative emotions or trauma along with “Anxiety / concern” and “Health”. Therefore, "Friends" and "my past" are in opposite positions and seem to constitute a psychological resiliency that heals trauma. It should be noted here that the idea of “My past” is the opposite of negative emotions. Many patients had fun memories of their past, not the sadness of being a victim of SMON. In other words, the current survivors may have unconsciously acquired a psychological pattern that stimulates positive emotions. These factors are key words in the care of the mental health of the participants. In recent years, the neurological mechanisms of social support have been clarified. Social support may moderate genetic and environmental vulnerabilities and confer resilience to stress, possibly via its effects on the hypothalamic-pituitary-adrenocortical system, the noradrenergic system, and central oxytocin pathways [19]. The social/environmental resources, including socioemotional support, potentially aid veterans in successfully navigating Later-Adulthood Trauma Reengagement (LATR)[15]. Taken together, the present approach in SCT can be expected to highlight the target of social support for the elderly.

There are several limitations to the present study. First, the small subject number indicates a statistically low reliability. Second, while the SCT has a very flexible method, it is quantitatively less reliable than other established psychological tests. Therefore, it

is desirable to carry out this in combination with other quantitative evaluation batteries.

Conclusion

Our psychological state consists of an equilibrium between vulnerability and resilience to stress, which defines the state of our mental health. Although there are various difficulties in identifying each element in aged people, the information should provide important clues for their care, caregiving, and social support. The "sentence completion" approach adopted in this study is useful in elucidating the target of mental stress and the factors that mitigate it.

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