

## Changes in the condition of psychiatric inpatients after the complex Fukushima disaster

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[Original Article]

## CHANGES IN THE CONDITION OF PSYCHIATRIC INPATIENTS AFTER THE COMPLEX FUKUSHIMA DISASTER

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**Abstract :** After the high magnitude earthquake and the subsequent tsunami in Japan on March 11, 2011, the residents of Fukushima Prefecture suffered not only from tremendous physical injury caused by the earthquake and tsunami but also from the effects of radiation contamination after a hydrogen explosion at the Fukushima Daiichi nuclear power plant on March 12, 2011. The complex Fukushima disaster is characterized by additional stress due to the fear of continued exposure to invisible radiation. We investigated whether there were any changes in the clinical mental state of patients in the inpatient ward of Fukushima Medical University Hospital, Japan, 7 days after the earthquake. There was no obvious change in the condition of two-thirds of the patients. Whereas one-third of patients had any change in their condition, several cases showed dramatic symptomatic improvement after the earthquake. Anxiety levels in the patients who originally showed coexisting anxiety disorders became exaggerated. The depressive state was improved after the earthquake in one patient with depression. One patient with restrictive-type anorexia nervosa resumed food consumption. These findings suggest that caregivers should be attentive to any symptomatic changes among patients with psychiatric disorders after sudden disasters.

**Key words :** Fukushima nuclear disaster, radiation contamination, earthquake, psychiatric symptoms, anxiety

### INTRODUCTION

Our institution, Fukushima Medical University Hospital, is the central hospital in Fukushima Prefecture. The hospital is located in the prefectural capital, Fukushima city, approximately 50 km from the Fukushima Daiichi nuclear power plant. Our hospital has 30 clinical departments and 778 beds, including 49 psychiatric beds. After the high magnitude earthquake and the subsequent tsunami in Japan on March 11, 2011, the residents of Fukushima Prefecture suffered not only from tremendous physical injury caused by the earthquake and tsunami but also from the effects of radiation contamination after a hydrogen explosion at the Fukushima Daiichi nuclear power plant on March 12, 2011. Kario *et al.* has previously reported an increase in “white coat” hypertension in response to stress due

to the Hanshin-Awaji earthquake that occurred in 1995.<sup>1,2)</sup> However, compared to the Hanshin-Awaji earthquake, the complex Fukushima disaster is characterized by additional stress due to the fear of continued exposure to invisible radiation.

Apart from the atomic bombings of Hiroshima and Nagasaki, the only major accidents in the past wherein human residential areas were exposed to radiation were the Three Mile Island accident in the United States and the Chernobyl nuclear power plant disaster in the former Soviet Union. To the best of our knowledge, no reports regarding comparative changes in the condition of patients with psychiatric disorders before and after radiation exposure in these two major accidents have been published. Although post-traumatic stress disorder has received considerable attention as the most prevalent psychiatric problem after a disaster,<sup>3,4)</sup> the

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dynamic states of patients with other types of psychiatric disorders who are facing disasters need to be studied.

Therefore, in this paper, we report the changes observed among inpatients in our psychiatric ward after the complex Fukushima disaster that included a nuclear power plant accident. We aimed to determine the various issues that should be considered in patients with psychiatric disorders after any sudden disaster.

### MATERIALS AND METHODS

We obtained approval for this study from the ethics committee of Fukushima Medical University (approval No. 1313). We investigated whether there were any changes in the clinical mental state of

patients in the inpatient ward of Fukushima Medical University Hospital 7 days after the earthquake. We obtained these data from patients' case records.

### RESULTS

Table 1 shows the age, sex, and diagnosis of the patients in our inpatient ward on the day of the earthquake as well as the changes in the patients' clinical states 7 days after the earthquake. The time period of 7 days was selected because it is thought to be the period during which acute reactions to serious events occur.<sup>5)</sup> During the survey period, the dosages and types of psychotropic drugs administered to the patients remained basically unchanged. However, psychotherapy or psychosocial therapy could not be administered due to the

Table 1. Patients in the psychiatric ward of Fukushima Medical University Hospital at the time of the Fukushima complex disaster.

Case	Age	Sex	Diagnosis	Changes before and after earthquake
1	70	F	Schizophrenia	No change
2	17	F	Schizophrenia	No change
3	63	F	Schizophrenia	No change
4	60	M	Schizophrenia	No change
5	18	M	Schizophrenia	Slight improvement
6	40	F	Schizophrenia	No change
7	40	M	Bipolar Disorder (manic state)	No change
8	69	M	Bipolar Disorder (manic state)	No change
9	75	F	Depression, Anxiety Disorder	Increased anxiety
10	53	M	Depression, Anxiety Disorder	Increased anxiety
11	49	F	Depression	No change
12	54	M	Depression	Increased volition, tended to improve
13	50	M	Depression	No change
14	20	M	Depression	No change
15	61	M	Alzheimer-Type Dementia	No change
16	80	M	Alzheimer-Type Dementia	No change
17	54	F	Parkinson Disease	Increased anxiety
18	61	M	Parkinson Disease	No change
19	50	F	Anorexia Nervosa	No change
20	14	F	Anorexia Nervosa	Marked improvement
21	35	F	Anorexia Nervosa, Avoidant Personality Disorder	Increased anxiety
22	18	M	Asperger's Disorder	No change
23	28	M	Pervasive Developmental Disorder	No change
24	15	M	Asperger's Disorder	Worsening irritability
25	13	M	Vocal Tic Disorder	No change
26	35	F	Adjustment Disorder(Depressive state)	No change
27	37	F	Alcoholism,Borderline Personality Disorder	Increased anxiety
28	58	F	Mental Retardation	No change

emergency conditions prevailing at that time.

There was no obvious change in the condition of two-thirds of the patients. Whereas one-third of the patients had any change in condition, several cases showed dramatic symptomatic improvement after the earthquake. However, several issues were noteworthy, particularly in patients with depression and those with primary or coexisting anxiety disorders.

No remarkable changes were observed in the conditions of patients with schizophrenia (Cases 1-6) or dementia (Cases 15 and 16). Among the patients with developmental disorders, one patient (Case 24) who originally showed a high level of anxiety showed an increase in irritability. Among the patients with depression (Cases 9-14), those with coexisting anxiety disorders (Cases 9 and 10) showed an increase in anxiety levels. However, in the case of one patient with depression (Case 12), the patient's volition increased and he could control his thoughts without feeling hopeless and helpless. With regard to the patients with anorexia nervosa, one patient with restrictive-type anorexia nervosa (Case 20) showed a dramatic change, i.e., the patient resumed normal food consumption just after the earthquake. In contrast, in another patient with anorexia nervosa and a coexisting avoidant personality disorder (Case 21) who originally demonstrated severe anxiety, the anxiety levels intensified with increased overeating and vomiting and the patient's overall condition deteriorated.

In Case 20, the patient had a history of adjustment difficulties at school at 13 years of age, along with refusal to eat food, which led to her admission to our inpatient ward 26 days before the earthquake. On admission, her food intake was approximately 10-40% of the hospital meals served. She spoke few words and was thought to be alexithymic. However, starting on the day after the earthquake, she began to eat almost the entire meal and the flow of conversation with other people became smoother. In addition, she had pancytopenia on admission; however, this also improved by Day 17 after the earthquake. Interview records from 3 days after the earthquake revealed that the critical and chaotic situation—including the earthquake and the preventive use of iodine tablets against possible radiation contamination from the nuclear power plant accident—altered her prior defense mechanisms and internal conflicts, leading to self-realization of the meaning of life and the implications of improving her behavior and symptoms.

## DISCUSSION

The changes in the psychiatric conditions before and after the complex Fukushima disaster of patients who were hospitalized on the day of the earthquake can be summarized as follows:

1. There was no obvious change in the condition of two-thirds of the patients.
2. Anxiety levels in the patients who originally showed coexisting anxiety disorders became exaggerated.
3. The depressive state was improved after the earthquake in one patient with depression.
4. One patient with restrictive-type anorexia nervosa resumed food consumption immediately after the earthquake, with dramatic symptomatic improvements.

When the nuclear power plant accident occurred after the earthquake on March 11, 2011, people experienced fear of invisible radiation, because adequate information regarding how to deal with the situation was not available as a result of the sudden and unexpected nature of the disaster. In addition, it was impossible to predict when the situation would improve. Evacuation to locations away from the disaster area within a short time period was difficult for many people. Thus, many people experienced continuous fear of exposure to invisible radiation, which induced severe stress, particularly among patients with psychiatric disorders.

Therefore, even in patients who have been stable for many years, careful attention must be paid to any sign of worsening in the condition. If there is even a slight sign of worsening, a prompt increase in the doses of mood-stabilizing drugs, adequate psychotherapy, and increased social support on the basis of patients' consent should be considered.

In conclusion, we have reported here a brief summary of the effects of the complex Fukushima disaster on patients with psychiatric disorders. Increased anxiety levels in patients with primary or coexisting anxiety disorders were noted. In addition, the disaster triggered improvement in some patients with depression and anorexia nervosa. These findings suggest that caregivers should be mindful of slight symptomatic changes among patients with psychiatric disorders after sudden disasters.

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Fukushima disaster, which could have been written by any of our colleagues. Thus, the authors wish to express their sincere thanks to all of their colleagues whose devotion, professionalism, and dedication were essential in the battlefield-like conditions in the ward, but who are not listed as the authors of this manuscript.

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