



Preliminary communication

Delayed recovery of caregivers from social dysfunction and psychological distress after the Great East Japan Earthquake



Minoru Sawa^{a,b,*}, Yoneatsu Osaki^b, Hiraki Koishikawa^a

^a Department of Psychiatry, Kameda Medical Center, Japan

^b Division of Environmental and Preventive Medicine, Department of Social Medicine, Faculty of Medicine, Tottori University, Japan

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ABSTRACT

Background: In April 2011, two hundred and eighty residents who were suffering from intellectual disabilities and their eighty caregivers at nine facilities in Fukushima were evacuated and moved to Chiba, Japan after the Great East Japan Earthquake. We investigated the impact of the evacuation after the earthquake on the caregiver burden.

Method: There were 41 participants from Chiba as a reference group and 32 participants from Fukushima as a case group included. Data were collected regarding their demographics and the General Health Questionnaires 12 (GHQ-12) score for both groups in two different points.

Results: The evacuation was linked to a follow-up GHQ-12 global score ≥ 3 (RR=4.52, 95%CI: 1.32–15.47). There was no significant improvement of the GHQ-12 global score in the case group from Fukushima for the follow-up data compared to the baseline data. Social dysfunction had continued in the case group from the baseline data ($p < 0.01$) during the follow-up period ($p < 0.001$). A statistically significant difference was noted for the case group from Fukushima regarding psychological distress in the follow-up data ($p < 0.01$), which was not found in the baseline data ($p = 0.07$).

Limitations: The sample size was limited to a non-randomized and unmasked sample of 73 patients. No causal relationship could be determined due to the cross-sectional nature of the study.

Conclusions: The caregivers from Fukushima exhibited more psychiatric morbidity, which persisted for the duration of their evacuation after the earthquake. It is important to provide long-term support for such caregivers who have been evacuated after a major disaster.

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1. Introduction

The Great East Japan Earthquake occurred on March 11, 2011. The magnitude was 9.0, which made it the most powerful earthquake on record in Japan. The source zone boundary extended 450 km north and south, and 200 km east and west. The height of the tsunami produced due to this earthquake was more than 10 m, and in some cases was over 40 m high. The earthquake and the tsunami resulted in immense damage in the Tohoku and Kanto areas, and also led to widespread radiation contamination due to the accident at the Fukushima-Daiichi nuclear plant. According to the report from the National Police Agency, there were 15,866 confirmed deaths, 2946 people missing, and 6108 injured as of June 25, 2012. The earthquake and the following tsunami had also inflicted enormous structural damages on houses, businesses and other buildings. The extent of the damage is still uncertain because

some areas have remained submerged due to the tsunami. The National Police Agency confirmed on June 25, 2012 that there had been 130,436 complete building collapses (20,659 in Fukushima) and 262,975 partial collapses (69,104 in Fukushima). Due to this damage and the subsequent accident at the Fukushima-Daiichi nuclear plant, many people had to leave their original houses and had to evacuate to other places. Because of this damage, 280 residents who were suffering from mental retardation and their 80 caregivers at nine facilities in Fukushima were evacuated and moved to Kamogawa, Chiba, Japan in April 2011. There were about 14,636 mentally retarded patients (1168 patients in Soso area where there was the major area of the nuclear evacuation zone) and 46 facilities (seven facilities in Soso area) for those patients in Fukushima in total before the earthquake. A total of approximately 1300 caregivers (about 130 caregivers in Soso area) for those patients with mental retardation originally worked in Fukushima. Kamogawa is located about 300 km away from the Fukushima-Daiichi nuclear plant. The residents and caregivers were moved to a facility which was originally intended for youth in Kamogawa, Chiba. At the beginning of February 2012, they were still staying in Kamogawa because it was difficult to find a suitable facility in

* Corresponding author at: Department of Psychiatry, Kameda Medical Center 929 Higashicho Kamogawa, Chiba 296-8602, Japan. Tel.: +81 4 7092 2211; fax: +81 4 7099 1198.

E-mail address: msawa@kameda.jp (M. Sawa).

Fukushima. The caregivers were under high stress due to the lack of a plan for the future and the continuing separation from their families.

We performed a cross-sectional study regarding the caregiver burden after the earthquake. According to the previous study, there was a statistically significant difference regarding the psychiatric morbidity for the caregivers from Fukushima due to evacuation. In this study, we sent out questionnaires to the caregivers from Fukushima, as well as to caregivers who were originally working at an equivalent facility in Chiba to perform a case-reference study. We herein report our investigation of the differences in the presence of psychiatric morbidity between the baseline data and the follow-up data in the caregivers who had been evacuated. We also discuss that long-term support should be provided for both the caregivers for disabled residents, as well as the residents themselves, in case such a disaster should occur in the future.

2. Methods

The participant caregivers were all over the age of 20. As described above, there were nine facilities from Fukushima which we defined as the case group. We chose three facilities in Chiba as the reference group, which several psychiatrists independently determined equivalent level facilities for disabled persons with regard to the severity of mental retardation, social function and staff assignments in the facilities.

2.1. Data collection

This was a case-reference follow-up study, in which the baseline data for the case group Fukushima were collected in August 2011, and the reference baseline data were collected by January 2012. We sent out the General Health Questionnaires 12 (GHQ-12), as well as additional questions about the participants' gender, age, and years of employment (Jacob et al., 1997; Kilic et al., 1997; Hankins, 2008) to both groups through February 2012. The study participants were divided into two groups: the caregivers originally from Fukushima (the case group) and those originally from Chiba, defined as the reference group. Item scores were coded according to the GHQ method (all items coded 0-0-1-1) (Goldberg and Williams, 1988). The data were collected by the main researcher, who was a psychiatrist, and by co-researchers, who were psychiatrists and a nurse. A statistical analysis was performed with the assistance of a co-researcher who was an expert in clinical epidemiology.

There were 46 participants from both groups. The response rate to the baseline questionnaires was 83% for the case group from Fukushima and 77% for the reference group from Chiba. Of these initial respondents, five participants dropped out from the reference group, and fourteen from the case group. Therefore, there were 41 remaining participants (24 males and 17 females) from the reference group from Chiba and 32 participants (17 males and 15 females) from the case group originally from Fukushima. The mean age was 39.68 in the reference group and 45.00 in the case group. The demographic characteristics of the participants are presented in Table 1. The study protocol was approved by the Kameda General Hospital Institutional Review Board (approval number; 11-062) and Tottori University Ethics Committee (approval number: 1879). Written informed consent was obtained from each participant after a complete description of the study was provided.

2.2. Statistical analysis

Before analyzing the data in the present study, we performed a Mann-Whitney *U* test to confirm that there was no impact of the participants dropping out on the baseline data regarding the distribution of the GHQ-12 scores, which we used as the outcome of this study. All data were screened for normality, homogeneity of variance, and outliers. Categorical variables were compared using a chi-square test and Fisher's exact test, and Student's *t* test was used for continuous variables. We confirmed that the baseline GHQ-12 global score, follow-up GHQ-12 global score and the years of employment were not normally distributed. We performed a Mann-Whitney *U* test to examine the groups for differences in the GHQ-12 global scores, as well as the years of employment. We thereafter performed a Wilcoxon signed rank test to examine the differences between the baseline data and the follow-up data for both groups. Correlation coefficients were calculated for demographic variables (gender, age) and relevant clinical variables (the presence of evacuation, years of employment, the presence of a score ≥ 3 for the baseline GHQ-12 global score, a score ≥ 3 for the follow-up GHQ-12 global score, and a score ≥ 8 for the follow-up GHQ-12 global score). Variables with an absolute value ≥ 0.5 that exhibited a significant relationship between the various variables were considered to have a strong correlation. A strong correlation was observed in the baseline GHQ-12 global score and the follow-up GHQ-12 global score in this case. According to the previous study performed in Japan, we used 2/3 as the cut-off for the GHQ-12 global score and a score ≥ 3 was considered to indicate psychiatric morbidity (Takusari et al., 2011). Furthermore, based on the recent study performed by Russ

Table 1

The distribution of the demographic and clinical characteristics of the participants from the reference (Chiba) and case (Fukushima) groups.

Demographic and clinical characteristics	Reference group (N=41)		Case group (N=32)		p value
	N	%	N	%	
Gender	24	58.5	17	53.1	p=0.64
Male					
Female	17	41.5	15	46.9	
Age (years)	Mean	SD	Mean	SD	
	39.68	12.44	45.00	11.67	p=0.07
Baseline GHQ global score	3.49	3.39	6.28	4.45	p < 0.01
Follow-up GHQ global score	3.32	3.03	6.75	3.82	p < 0.001
Years of employment (years)	9.90	7.19	17.13	12.94	p=0.04
Comparison of the baseline GHQ-12 global score with the follow-up GHQ-12 global score	p=0.72		p=0.59		
Follow-up GHQ-12 global score ≥ 8	3	7.3	16	50.0	

Gender; Chi-square value=0.21, degree of freedom=1. Age; two-sample *t* test. Baseline GHQ global score, follow-up GHQ global score, and years of employment; Mann-Whitney *U* test. Comparison of the baseline GHQ-12 global score with the follow-up GHQ-12 global score; Wilcoxon signed rank test.

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