

Fukushima Daiichi Nuclear Power Plant Accident Effect on Health Leads to Diabetes

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In the present study, we observed that the prevalence of diabetes significantly increased among evacuees after the Great East Japan Earthquake and the Fukushima Daiichi nuclear disaster. All metabolic factors (BMI, blood pressure, glucose metabolism, lipid metabolism, and liver function) were significantly exacerbated in the normal and borderline glucose groups. In contrast, HbA1c levels in the normal-high glucose group improved significantly after the disaster, while the other metabolic factors (except glucose metabolism) were significantly exacerbated. In addition, the increase in HbA1c levels was significantly greater among evacuees than among non-evacuees in the normal glucose group.

Furthermore, the present study revealed that evacuation was significantly associated with the incidence of diabetes and that the incidence of diabetes was significantly higher among evacuees than among non-evacuees. These findings suggest that chronic metabolic health issues such as obesity, type 2 diabetes, hypertension, and dyslipidemia should be carefully monitored and treated after disaster.

Previous studies have reported that natural disasters (e.g., the Great Hanshin-Awaji earthquake) negatively impact glycemic control in diabetic patients [1]. An association between chronic life-threatening stress and reduced metabolic control among diabetic patients has also been suggested. Similar effects have been reported for hypertension, with ambulatory blood pressure indicating that sympathetic activation results in increased blood pressure after life-threatening events, which may subsequently trigger myocardial infarction [2]. The daily life of evacuees is known to increase stress due to changes in privacy, food availability, work assignments, income, and health and an increase in patient stress is known to aggravate diabetes. Although reduced glycemic control during disasters might be caused by a number of factors (e.g., change in diet, reduced physical stress, and psychological stress), no studies have determined whether evacuation itself might have independent effects on glycemic control. Therefore, our data are the first to indicate that the negative effects of the disaster on metabolic factors were greater among the evacuees than among the non-evacuees.

Interestingly, changes in lifestyle are strongly associated with the prevalence of diabetes. The Diabetes Prevention Program (a multicenter, randomized placebo-controlled trial) examined the effects of two interventions on the prevention or delay of onset of type 2 diabetes in high-risk individuals and found that the risk of developing type 2 diabetes was reduced by 58% and 31% in the intensive lifestyle and metformin-treated groups, respectively, compared with the placebo-treated group [3]. Intensive lifestyle intervention was more

effective than medication in slowing the progression to diabetes, partially due to the fact that lifestyle modifications provide greater improvements in insulin sensitivity and β -cell functions [4]. Changes in physical activity and diet predicted patients' weight loss, which was also, associated with a reduced risk of developing type 2 diabetes mellitus. Thus, lifestyle interventions can be an effective tool in preventing or treating insulin resistance and type 2 diabetes, given their close relationship with the incidence of type 2 diabetes.

In our normal-high glucose group, HbA1c levels improved significantly after the disaster, while BMI increased significantly. Obesity is a major risk factor for the development of insulin resistance, which can lead to type 2 diabetes, hypertension, and cardiovascular diseases [5]. Thus, subjects in the normal-high glucose group may develop type 2 diabetes in the future, although long-term studies are required to evaluate this outcome.

The United Kingdom Prospective Study recently reported that, among patients with type 2 diabetes, post interventional microvascular benefits and the emergence of macrovascular risk reduction are associated with earlier improved glycemic control during a 10-year follow-up. The Steno-2 Study also reported a similar outcome during a 5.5-year evaluation of earlier multifactorial risk reduction among patients with type 2 diabetes [6]. In both trials, enhanced risk reduction was observed, despite the loss of intra atrial differences in glucose levels. In addition, the Steno-2 Study revealed diminished differences in blood pressure and lipid levels, suggesting the persistent effects of earlier improved metabolic management. Thus, we suggest that periodic health check-ups and lifestyle guidance are critical to improving the long-term health of evacuees.

In conclusion, ours is first study to demonstrate that evacuation is associated with the incidence of diabetes. This information could be used during periodic health check-ups in the future to make important lifestyle recommendations to evacuees [7].

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Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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