Current status on other health effects: Changes in Cardiovascular Risk Factors after the Great East Japan Earthquake

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Today’s topics

- Changes in cardiovascular disease (CVD) risk factors before and after the disaster
- Comparison of psychological stress between an evacuation area and non-evacuation areas in other prefectures
- Changes in CVD risk factors between 2011-2012 and 2013-2014
Background

- Since the day of the disaster, more than 160,000 residents in the Fukushima prefecture were forced to evacuate their homes owing to a nuclear accident.
- Many evacuees were forced to change particular aspects of their lifestyles, such as their diet, physical exercise, and other personal habits.
Purpose

- To examine the association between the evacuation and changes in cardiovascular disease (CVD) risk factors before and after the disaster
- To examine the association between the evacuation and incidence of CVD risk factors among residents in the evacuation area
Methods

- A longitudinal study examined data collected from 41,633 Japanese participants aged 40-90 years sourced from general health checkups conducted in 13 communities in Fukushima between 2008 and 2010.

- Follow-up examinations were conducted from June 2011 through March 2013.
Methods

General health checkups

2008  2009  2010

41,633 participants (18,745 men and 22,888 women; mean age, 67 years)

The Great East Japan Earthquake

2011  2012

27,486 participants (12,432 men and 15,054 women; follow-up proportion, 66%)

The nearest data from the Earthquake were used for analysis if the participants received the checkups more than two times, and an average follow-up duration was 1.6 years.
The participants were divided into two groups: evacuees ($n=9,671$) and non-evacuees ($n=17,815$)
### Changes in Body Weight

<table>
<thead>
<tr>
<th></th>
<th>Evacuees</th>
<th>Non-evacuees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight (kg)</td>
<td>1.2</td>
<td>0.3</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>0.60</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Mean body weight and BMI significantly increased among both evacuee and non-evacuee groups after the disaster. 

Changes in Body Weight

Stratified by age and sex group

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-49</td>
<td>1.8</td>
<td>1.0</td>
</tr>
<tr>
<td>50-59</td>
<td>2.1</td>
<td>1.1</td>
</tr>
<tr>
<td>60-69</td>
<td>1.9</td>
<td>0.8</td>
</tr>
<tr>
<td>70-79</td>
<td>1.5</td>
<td>0.6</td>
</tr>
<tr>
<td>80+</td>
<td>1.4</td>
<td>0.9</td>
</tr>
</tbody>
</table>
Proportion of Overweight

Evacuees

<table>
<thead>
<tr>
<th>Year</th>
<th>&lt;18.5</th>
<th>18.5-25</th>
<th>25-30</th>
<th>30=&lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-2010</td>
<td>4</td>
<td>64</td>
<td>28</td>
<td>4</td>
</tr>
<tr>
<td>2011-2012</td>
<td>3</td>
<td>58</td>
<td>34</td>
<td>5</td>
</tr>
</tbody>
</table>

Non-Evacuees

<table>
<thead>
<tr>
<th>Year</th>
<th>&lt;18.5</th>
<th>18.5-25</th>
<th>25-30</th>
<th>30=&lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-2010</td>
<td>5</td>
<td>67</td>
<td>25</td>
<td>3</td>
</tr>
<tr>
<td>2011-2012</td>
<td>5</td>
<td>65</td>
<td>27</td>
<td>4</td>
</tr>
</tbody>
</table>

BMI: body mass index (kg/m²)

Changes in Proportion of Overweight
National data from 2004 to 2013

National Survey for Health and Nutrition, 2013
Prevalence of Hypertension

Prevalence of Diabetes Mellitus


Evacuees

<table>
<thead>
<tr>
<th>Year</th>
<th>Diabetes(-)</th>
<th>Diabetes(+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-2010</td>
<td>90.0</td>
<td>10.0</td>
</tr>
<tr>
<td>2011-2012</td>
<td>87.8</td>
<td>12.2</td>
</tr>
</tbody>
</table>

P<0.001
Prevalence of Dyslipidemia

Evacuees

<table>
<thead>
<tr>
<th>Year</th>
<th>Dyslipidemia(-)</th>
<th>Dyslipidemia(+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-2010</td>
<td>57</td>
<td>43</td>
</tr>
<tr>
<td>2011-2012</td>
<td>45</td>
<td>55</td>
</tr>
</tbody>
</table>

P < 0.001

Prevalence of Liver Dysfunction

Prevalence of Atrial Fibrillation

Evacuees

2008-2010

98.1

1.9

2011-2012

97.6

2.4

P<0.001

AF (-)
AF (+)

Multivariable-adjusted Hazard Ratios of Overweight, Hypertension, Dyslipidemia, and Diabetes Mellitus for Evacuation

<table>
<thead>
<tr>
<th>Condition</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overweight</td>
<td>1.82</td>
<td>1.53</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1.24</td>
<td>1.05</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>1.41</td>
<td>1.35</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.40</td>
<td>1.40</td>
</tr>
</tbody>
</table>

*HR was calculated by using combined data of men and women for diabetes.

Mechanisms

- The proportion of current drinkers unchanged and the proportion of current smokers decreased after the disaster.
- More than half of evacuees did not exercise regularly.
- The proportion of evacuees with sufficient sleep decreased after the disaster from 75.8% to 67.5% for men and from 69.9% to 57.4% for women.
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- Changes in CVD risk factors between 2011-2012 and 2013-2014
Methods

Psychological factors, assessed by questionnaire, were compared between a town in the evacuation area (n=1,020, mean 62.1 years) and communities in Osaka and Akita (n=3,150, mean 62.8 years) in 2013.
Perceived Stress

Evacuation area

- Always: 13
- Often: 27
- Sometimes: 51
- Rarely: 9

Akita, Osaka

- Always: 4
- Often: 12
- Sometimes: 59
- Rarely: 25

0% 20% 40% 60% 80% 100%

- Always
- Often
- Sometimes
- Rarely
Depressive Symptoms

Evacuation area

Akita, Osaka
Insomnia

Evacuation area

- Insomnia (+): 39
- Insomnia (-): 61

Akita, Osaka

- Insomnia (+): 13
- Insomnia (-): 87
Happiness

Evacuation are

Akita, Osaka

Unhappy | Happy
---|---
23 | 21

0% 20% 40% 60% 80% 100%

1-4 5-72 8-10
Hopelessness

Evacuation area

- 24 Hopelessness(+)  
- 76 Hopelessness(-)

Akita, Osaka

- 5 Hopelessness(+)  
- 95 Hopelessness(-)
Prevalence of obesity, hypertension, dyslipidemia, diabetes mellitus, liver dysfunction, and atrial fibrillation were increased among evacuees after the disaster.

Changes in lifestyles and psychological stress may be effected.

Cardiovascular diseases, such as stroke and myocardial infarction, may increase among evacuees in the future.
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Methods

The Great East Japan Earthquake

General health checkups, A City

2011 2012

4,686 participants (2,174 men and 2,512 women, mean 62.5 years)

2013 2014

3,470 participants (1,596 men and 1,874 women, follow-up proportion, 74%)

Average follow-up duration was 1.9 years.
Changes in Blood Pressures

- SBP: P<0.0001 from 128.8 to 126.3
- DBP: P<0.0001 from 77.5 to 74.2

Year Comparison:
- 2011/2012年: SBP 128.8, DBP 77.5
- 2013/2014年: SBP 126.3, DBP 74.2
Prevalence of Hypertension

2011·2012年
- HT(-) without medication: 48.7%
- HT(+): 13.6%
- HT(+) with medication: 37.7%

2013·2014年
- HT(-) without medication: 48.1%
- HT(+): 8.7%
- HT(+) with medication: 43.2%
Prevalence of Diabetes Mellitus

2011-2012年
DM(-): 91.1%
DM(+): 7.0%
DM(+): 1.9%

2013-2014年
DM(-): 88.7%
DM(+): 3%
DM(+): 8.3%
Prevalence of Dyslipidemia

2011-2012年
- Dyslipidemia(-): 53.8%
- Dyslipidemia(+): 28.7%
- Dyslipidemia(+) with medication: 17.5%

2013-2014年
- Dyslipidemia(-): 52.1%
- Dyslipidemia(+): 26.3%
- Dyslipidemia(+) with medication: 21.6%
Summary

- Prevalence of obesity, hypertension, were dyslipidemia unchanged among residents in the evacuation area after the disaster
- Prevalence of diabetes mellitus increased among residents in the evacuation area after the disaster
- Surveillance of cardiovascular diseases should be needed in Fukushima