September 1, 2015
Tohoku Medical Megabank Organization
Tohoku University

Psychological Consequences Remain Profound Among Coastal Communities Devastated by the Great East Japan Earthquake

Key Points of Presentation

The Tohoku Medical Megabank Project Community-Based Cohort Study[*1] has aggregated the data of approximately 7,000 participating residents who were recruited at specific health checkup sites established by municipalities in Miyagi Prefecture in 2013.

- The survey results showed that 28% of the residents had high levels of depressive symptoms (CES-D[*2] score of 16 and above). The proportion of the depressed population was relatively higher in coastal areas than in inland areas with a significantly higher odds ratio of 1.4 after adjusting for gender and age.

- The survey results showed that 4% of the residents felt difficulty in daily life due to Posttraumatic Stress Reaction (PTSR). The proportion of residents affected by PTSR was relatively higher in coastal areas than in inland areas with a significantly higher odds ratio of 2.4 after adjusting for gender and age.

- On the other hand, in the same communities affected by the Great East Japan Earthquake, there was no significant difference between coastal and inland areas in the ratio of residents who showed indicators for somatic problems - including Helicobacter pylori infection, which can cause various gastric problems - and raised NT-proBNP levels used as a marker for potential heart failure.

- Staff psychologists from the Tohoku Medical Megabank Organization, have provided support in more than 600 cases of face-to-face or telephone-based consultations for participants who showed severe psychological problems in the survey.

Background

Tohoku Medical Megabank Organization (ToMMo) was established at Tohoku University for the execution of the Tohoku Medical Megabank Project, which aims to help resolve the health concerns of residents living in areas devastated by the Great East Japan Earthquake.

The project is being implemented by Tohoku University in Miyagi Prefecture and by Iwate Medical University in Iwate Prefecture. Both organizations are currently conducting long-term health studies and recruiting 150,000 residents from Miyagi and Iwate Prefectures. (Community-Based Cohort Study: 80,000 residents; Birth and Three-Generation Cohort Study: 70,000 residents).

ToMMo began the Community-Based Cohort Study in May 2013. As of June 2015, a total of 36,858 residents have participated in this study. The study findings of residents who received specific health checkups in 2013 have now been aggregated. These aggregate findings do not include the results of genome analysis from blood samples.

Iwate Medical University is conducting the Community-Based Cohort Study through the newly established Iwate Tohoku Medical Megabank Organization in Iwate Prefecture.

Main Findings

- **Aggregate findings from the questionnaire and examinations of blood and urine samples of 7,462 residents**

This report is based on data collected at venues for specific health checkups in the Tohoku Medical Megabank Project Community-Based Cohort Study. Blood and urine samples were taken from the participants, who were then given a questionnaire to take home. Participants were asked to fill it in and return it by post within two weeks. This report presents the aggregate findings from the above cohort study conducted in 10 cities and towns in 2013. (Consequently, these aggregate findings do not include the findings of study conducted from 2014

onwards.) The findings are from a total of 7,462 residents; however, the number of residents for each study item is different due to the partial loss of data, etc.

Municipalities involved in the study:

(Coastal areas): Kesennuma City; Minamisanriku Town; Ishinomaki City; Higashi Matsushima City; Shichigahama Town; Tagajo City; Yamamoto Town

(Inland areas): Wakuya Town; Osaki City; Marumori Town

Study Period: May 20, 2013 – March 1, 2014

The findings from the questionnaire regarding mental health, and the findings from the questionnaire on lifestyle and physiological issues, were analyzed separately as follows.

■ Aggregate Findings from the Questionnaire Regarding Mental Health

Mental health was studied on the basis of the aggregate findings of the questionnaire, which utilized internationally accepted indicators, such as CES-D (Center for Epidemiologic Studies Depression Scale), as an indicator for levels of depression symptoms. The survey asked participants about their earthquake and tsunami experiences, and their loss of relatives.

The results found that 28% of the 7, 285 residents with valid responses had symptoms of depression (CES-D: score of 16 and above). The prevalence rate of symptoms was relatively higher[*3] in coastal areas than in inland areas, and the odds ratio adjusted for gender and age (95% confidence interval) was 1.4 (1.2-1.6).

Similarly, the proportion of residents with a score of 13 or above for K6, which assesses psychological health status including depression and anxiety, was higher in coastal areas than in inland areas (odds ratio 1.4: 95% confidence interval, 1.1-1.8).

Also, around 4% of the study participants responded that they still experience distress and difficulty in daily life due to recollection of events during the Great East Japan Earthquake, and are considered to be affected by considerable

posttraumatic stress Reaction (PTSR). The proportion of residents who showed considerable PTSR was also significantly higher in coastal areas than inland areas, with an odds ratio of 2.4 (95% confidence interval, 1.6-3.7). These findings endorse needs for sustainable mental health support in coastal areas devastated by the disaster.

The subjects of this study were relatively health-conscious individuals who agreed to cooperate with the ToMMo study and received the specific health checkups. Hence, taking the characteristics of the sample population into consideration, the actual proportion of residents who show depression and PTSR may even be higher than the ToMMo study indicated.

ToMMo offers psychological support to residents that the study finds to have severe symptoms of depression or difficulty in daily life due to PTSR. Psychologists who have been trained to deal with psychological problems in post-disaster settings contact these residents by phone to find out the details of their situation, and then provide ongoing support to residents in need, through either telephone-based or face-to-face counseling. Residents who experience severe mental health problems are referred to clinics or other medical or health organizations to receive mental health support as required. Support is also available for any participant who wishes to receive psychological counseling. As of April 2015, ToMMo psychologists have facilitated more than 600 consultations.

Moving forward, ToMMo endeavors to disseminate information on key points and create more communication opportunities to help promote better mental health throughout the communities.

■ Aggregate Findings from Lifestyle and Physiological Tests

The main study findings were as follows:

(1) There was no notable elevation in the markers for heart failure[*5], contrary to concerns among local health workers in disaster-affected areas.
(2) More than 40% of the 7,462 study participants included in the aggregate findings were at risk of developing gastric cancer.
(3) Approximately 10% of the 7,451 study participants with complete data were at the high stage of chronic kidney disease.

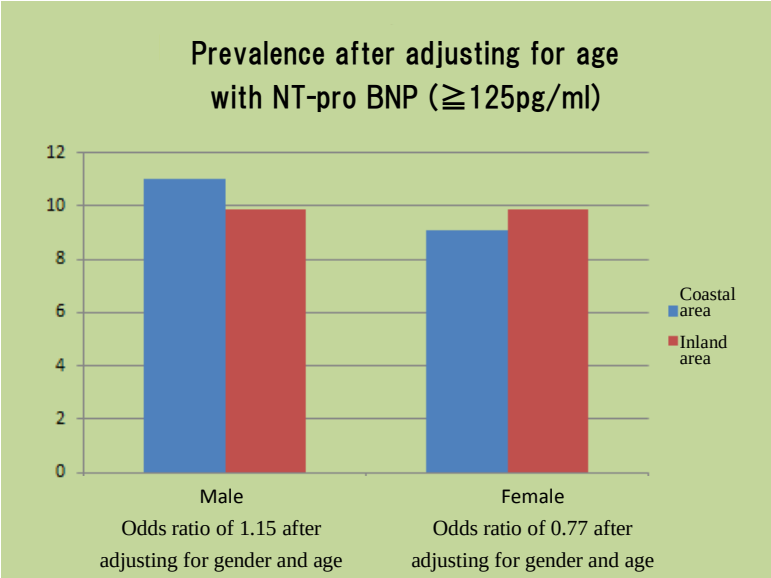
This study utilized NT-proBNP[*6] as an indicator of heart failure, and a combination of estimated glomerular filtration rate (eGFR) and urine albumin-to-creatinine ratio as indicators of kidney function.

In this study, a combination of Helicobacter pylori bacteria antibodies and the serum pepsinogen test method for screening participants at risk of developing gastric cancer were used.

There was no significant difference in the prevalence of these conditions, as indicated by the markers, compared to those of preceding studies in Japan. Also, there was no significant difference in the prevalence of these conditions between coastal and inland areas.

One of the considerable confounding factors of this study is that participants of this study were recruited from residents who received the specific health checkups offered by municipalities as healthy subjects and who volunteered to cooperate with the study conducted by ToMMo. Due to that factor, it may not be appropriate to make comparisons of percentages between this study and other studies conducted in different ways.

It should also be taken into consideration that the sample of this study consisted of relatively health-conscious individuals. For those participants with noted abnormal issues, ToMMo returned the test results with a recommendation that they consult their primary care doctor.



■ Implementation of the Tohoku Medical Megabank Project Community-Based Cohort Study

ToMMo commenced the Tohoku Medical Megabank Project Community-Based Cohort Study on May 20, 2013.

This study seeks the cooperation of community residents through two methods: (1) ToMMo's staff go to the venues of the specific health checkups implemented by municipalities in Miyagi Prefecture (25 cities, towns and villages as of early June,

2015); and (2) Community residents visit one of the seven Community Support Centers in Miyagi Prefecture.

As of June, 2015, a total of 36,858 people are registered as community-based cohorts. This consists of 26,223 study participants registered at the venues of specific health checkups, and 10,635 study participants registered at the Community Support Centers.

Similar to Miyagi Prefecture, Iwate Medical University also recruits study participants at the venues of the specific health checkups implemented by municipalities in Iwate Prefecture. In addition, the university is establishing so-called satellite facilities in various areas of Iwate Prefecture and conducting the study using the same method as Tohoku University.

< Way Forward >

Study
ToMMo will aggregate the findings of the participants who have taken part in the study from 2014 onwards, and carry out analyses of the trends, and where necessary, suggest action.

Measures
ToMMo makes the effort to reach out to each and every resident. For example, we send the findings of the study to individual study participants. We also hold informational sessions in each region regarding the findings and encourage participation. In the case that any individual study participant has particularly abnormal test values, we recommend that they receive care at a local medical institution. If the values suggest any critical problems, we contact the individual directly without waiting to aggregate the findings and strongly recommend that he or she receive prompt care. We will share our findings from each area with the respective municipality, and in such ways, we hope our findings will be useful.

For those people whom we have found to be particularly distressed, ToMMo's clinical psychologists have provided telephone and face-to-face counselling. We expect that further analyses will shed more light on the physical, psychological and social factors affecting the mental health of residents in the wake of the disaster.

Regarding the characteristics of those people suffering from major problems, we plan to examine how the problems differ among the different demographic groups, so that we can provide useful information that would benefit the entire community.

< Explanation of the Terms >

*1: **Cohort study** is a study in which groups of people with certain characteristics are followed over time to determine the relationship between diseases and factors such as the environment, lifestyle and genetic makeup.

*2: **CES-D** (the Center for Epidemiologic Studies Depression Scale) is a screening test for depression symptoms, comprising 20 questions developed by the National Institute of Mental Health (NIMH) in the U.S. It is a highly versatile test that is used worldwide.

*3: **Prevalence rate** is a marker used in epidemiology to indicate the ratio of disease etc., within a sample or group. It is expressed using the following formula:
Prevalence rate = Prevalence of a disease / Size of the observed population
The rate expressed is the actual ratio.

In this paper, "Prevalence" refers to a condition in which the values and other data indicating physical or mental disorders of participants in this cohort study are at or above a certain level. It is different from the condition where an individual has been examined by a doctor and is deemed to have contracted a disease.

*4: **K6** (the Kessler 6-item Screening Scale for Psychological Distress) is a scale for easily measuring the degree of psychological problems, including mental stress, which is widely used around the world. K6 was developed by the American Psychologist R.C. Kessler and his colleagues. It is designed to screen for mental disorders including depression and anxiety. K6 is widely used in studies to survey the general population.

*5: **Hospitalization for heart failure**, which has rapidly risen since the Great East Japan Earthquake: In August 2012, the research group of Professor Hioraki Shimokawa of Tohoku University's School of Medicine reported an increase in people suffering from cardiovascular disease due to the Great East Japan Earthquake. The Tohoku University School of Medicine presented the details of this study on the news on August 28, 2012.

*6: **NT-proBNP** is N-terminal pro-brain natriuretic peptide. Substance that is generated and secreted from the heart. As it rises in response to myocardial stress, it is used to screen for heart failure. It is expected that the findings of this study will lead to the early detection of latent heart failure, which the individual is often unaware of having.

*7: **Biobank** is a system of collecting and storing biological specimens and providing them for research purposes. The Tohoku Medical Megabank Project's biobank collects biological specimens, such as blood and urine samples, from the participants of the cohort studies.

Links:
Tohoku Medical Megabank Organization, Tohoku University

http://www.megabank.tohoku.ac.jp/english/

Contact

Fuji Nagami

Tohoku Medical Megabank Organization
Tohoku University
Tel: 022-717-7908
Fax: 022-717-7923
E-mail: f-nagami@med.tohoku.ac.jp