



Research report

Association of marital status with the incidence of suicide: A population-based Cohort Study in Japan (Miyagi cohort study)



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ABSTRACT

Background: Marital status is one of the most frequently replicated predictors of suicide. The purpose of this study was to examine the effect of marital status on the risk of suicide by gender, using a large population-based cohort in Japan.

Methods: The Miyagi cohort study was a population-based, prospective cohort study of Japanese adults aged between 40 and 64 years. Between June and August 1990, 47,604 participants residing in 14 municipalities of Miyagi Prefecture, Japan, completed a questionnaire on various health-related lifestyles, including marital status. During 18 years of follow-up, 146 of the participants committed suicide. We used the Cox proportional hazards regression model to estimate the hazard ratios (HRs) and 95% confidence intervals (95% CIs) for suicide mortality according to marital status with adjustment for potential confounders.

Results: A total of 106 and 40 deaths from suicide were recorded during 344,813 and 365,524 person-years of follow-up among 20,671 men and 21,076 women, respectively. We found that marital status was significantly associated with the risk of completing suicide only in men. Among men, after multivariate adjustment, HRs in reference to married were as follows: widowed or divorced, 2.84 (95% CI: 1.37–5.90); unmarried, 1.56 (95% CI: 0.67–3.64). A significantly increased risk of suicidal death was observed among widowed or divorced men, whereas no such trend was evident for women.

Conclusions: Our results suggest that men who are widowed or divorced, or unmarried, are at increased risk of suicide, whereas no such risk is evident for women.

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1. Introduction

Suicide is one of the major causes of death at all ages. Every year, one million people die through suicide, the global suicide mortality rate being 16 per 100,000 people (World Health Organization (WHO), 2011). Over the last 45 years, the rate of suicide has gradually increased by 60% worldwide (World Health Organization (WHO), 2011). In Japan, the annual number of suicides has continued to increase; in 2011 there were 30,651 suicide deaths (23.9 per 100,000 people) (Statistics and Information Department Minister's Secretariat Ministry of Health Labour and Welfare, 2011). The World Health Organization has reported that the suicide mortality rate in Japan is higher than in any other developed country (France, 16.3 per 100,000

in 2007; Germany, 12.3 per 100,000 in 2010; Canada, 11.3 per 100,000 in 2004; USA, 11.5 per 100,000 in 2005; UK, 6.9 per 100,000 in 2009; Italy, 6.5 per 100,000 in 2008) (World Health Organization (WHO), 2013). It has been emphasized that the Asian Financial Crisis of 1997–1998 had a great impact on the economy of Japan, leading to a sharp rise in the suicide rate in 1997. Since then, the suicide rate has not improved, even after the macroeconomic recovery, and the annual number of suicide deaths has remained at approximately 30,000 since 1998 (Chang et al., 2009). In order to develop effective strategies for suicide prevention in Japan, there is an urgent need to investigate the factors associated with an increased risk of suicide.

Previous studies have identified various sociodemographic and clinical variables as risk factors of suicide, and among these factors gender, marital status and living arrangements appear to be the most important factors (Hirschfeld and Russell, 1997). So far, six studies have examined the association between marital status and suicide risk, using a population-based study design (Ross

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et al., 1990; Qin et al., 2000; Kposowa, 2000; Fujino et al., 2005; Seppo et al., 2007; Denney et al., 2009). All of these studies found that individuals who were divorced or unmarried were at higher risk of suicide (Ross et al., 1990; Qin et al., 2000; Kposowa, 2000; Fujino et al., 2005; Seppo et al., 2007; Denney et al., 2009). Four of these studies revealed that individuals who lived alone had a higher suicide risk than individuals who lived with someone, and three of these four studies showed that men were more likely to commit suicide than women living under the same conditions (Kposowa, 2000; Fujino et al., 2005; Seppo et al., 2007; Denney et al., 2009).

In Japan, there has been a gradual change in family structure, with a shift toward nuclear families consisting of only parents and children (Ministry of Public Management, 2010). At the same time, there has been a tendency for the marriage rate to decrease gradually, together with an increase in the divorce rate. National figures for Japan have shown an increase in the divorce rate from 1.22% to 1.99% and a decrease in the marriage rate from 6.7% to 5.5%, resulting in an increase in the number of people who are living alone from 19.8% to 32.4% between 1980 and 2010 (Ministry of Public Management, 2010). In 2010, the proportion of elderly people more than 60 years old living alone accounted for 11.9% of men and 18.3% of women (Ministry of Internal Affairs and Communications, 2010). These data indicate that the proportion of individuals who are widowed, divorced, or unmarried is increasing, and it seems that this trend will continue in the future. Living alone is associated with a high risk of social isolation, and this in turn may lead to suicide.

A study conducted in Japan to investigate the association between marital status and suicide found that among 15,597 individuals over a 14-year period, 48 suicide deaths (29 men and 19 women) occurred (Fujino et al., 2005). Among the study subjects, men who were living alone, widowed or divorced had a higher risk of suicide than women living under the same conditions. The multivariate relative risk (RR) for living alone was 4.7 (95% CI: 1.4–15.9) among men, whereas that for widowed or divorced men was 2.9 (95% CI: 0.9–10.0). However, this previous study did not have a large sample size and did not account for potential confounding factors, such as alcohol consumption, smoking status, education level, and job status. Therefore, we tried to examine the association between marital status and the risk of completing suicide in a large population-based cohort study in Japan which has the highest suicidal rate. More specifically, we investigated whether differences in marital status, such as being divorced, widowed, or unmarried, had an impact on suicide risk.

2. Methods

2.1. Study population and design

This study was based on a prospective cohort study conducted in Miyagi Prefecture, northeastern Japan, details of which have been reported previously (Fukao et al., 1995). In brief, between June and August, 1990, we delivered a self-administered questionnaire on various health habits to all residents aged 40–64 years ($n=51,921$ comprising 25,279 men and 26,642 women) living in 14 municipalities of Miyagi Prefecture. The questionnaires were delivered to and collected from individuals' residences by each municipal government, and 47,604 of them were confirmed to be eligible as participants (response rate: 91.7%; 22,835 men and 24,769 women). Because all residents in the study area had been entered as cohort subjects and because the rate of response to the questionnaires was very high, we considered our subjects to be sufficiently representative of the area. The study protocol was approved by the Institutional Review Board of Tohoku University

School of Medicine. We also considered that the return of administered questionnaires signed by the participants implied their consent to participate in the study.

For the present analysis, we excluded individuals who had entered incomplete responses for marital status ($n=5857$, comprising 2165 men and 3693 women), and also eliminated one participant who had moved from the study area when we started the prospective data collection. With these exceptions, 41,747 participants (20,671 men and 21,076 women) remained eligible for our analysis.

2.2. Exposure assessment

Baseline data for all participants were collected using a questionnaire that included items inquiring about marital status, consumption of alcohol and tobacco, body weight and height, job status, level of education, time spent walking per day, self-reported stress, sleep duration, and medical history. With regard to current marital status, each participant was asked "What is your marital status?" The response choices were "married", "widowed or divorced", and "unmarried."

2.3. Follow-up and identification of suicide

In order to follow-up the participants for mortality and migration, we established a Follow-up Committee (Tsuji et al., 2004), which consisted of the Miyagi Cancer Society, the Community Health Divisions of all 14 municipalities, the Department of Health and Welfare of Miyagi Prefectural Government, the Division of Epidemiology, and Tohoku University Graduate School of Medicine. The Committee periodically reviewed the Residential Registration Record of each municipality. Through this review, we identified participants who had either died or emigrated during the follow-up period and discontinued follow-up of those who had emigrated from the study area because the Committee were unable to review the Residential Registration Record outside the study area.

For decedents, we investigated the causes of death by reviewing the death certificates with permission from the Ministry of Health, Labour and Welfare, Japan. The end point was suicide mortality. The cause of death was classified according to the International Classification of Diseases (ICD), 9th revision, between June 1, 1990 and December 31, 1998 (World Health Organization (WHO), 1992), and 10th revision, between January 1, 1999 and December 31, 2008 (World Health Organization (WHO), 1977). Death by suicide was identified as ICD-9: E950–E959, or ICD-10: X60–X84.

Because of the fact that registration of deaths is required under the Family Registration Law and that death certificates must be completed by a licensed physician in Japan, death certificates confirmed all deaths that occurred in the study area. The verdict of suicide is based on the results of the medico-legal examination by a licensed physician and police examination as required by Japanese law. Thus, the data are considered to be reliable in terms of quality and completeness.

2.4. Statistical analyses

We calculated the person-years of follow-up for each participant from beginning of the follow-up until the date of death, the date of emigration from the study districts, or the end of the follow-up period, whichever occurred first. We performed the Cox proportional hazard regression analysis to estimate the hazard ratios (HRs) and 95% confidence intervals (95% CIs) for suicide incidence according to marital status as the reference group, after adjustment for potential confounders. All statistical analyses were

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