Female suicides: Psychosocial and psychiatric characteristics identified by a psychological autopsy study in Japan

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Abstract

Background: Although the female suicide rate in Japan is one of the highest among OECD countries, little has been done to assess the psychosocial and psychiatric characteristics of Japanese female suicide completers. This study aimed to examine sex differences in psychosocial and psychiatric characteristics of suicide completers using a psychological autopsy study method, and identify female suicide factors and intervention points to prevent female suicides.

Methods: A semi-structured interview was conducted with close family members of adult suicide completers. The interview included questions regarding socio-demographic factors, suicide characteristics, previous suicidal behaviors and a family history of suicidal behaviors, financial problems, and physical/psychiatric problems. The Fisher's exact test and Student's t-test were used to explore sex differences in these survey items, and individual descriptive information of female suicide cases was also examined.

Results: Of the 92 suicide completers, 28 were female and 64 were male. Females had a significantly higher prevalence of a history of

self-harm/suicide attempts (P<0.001). The prevalence of eating disorders was significantly higher among females than males (P<0.01).

Conclusions: The findings of this study highlight the importance of providing psychological and social support to caregivers of those who repeatedly attempt suicide and express suicidal thoughts, and suggest the need to improve community care systems to be aware of suicide risk factors among female suicide attempters.

Keywords: suicide, female, sex difference, psychological autopsy, suicide prevention

I. Background

Approximately 800,000 people globally die by suicide every year [1]. Japan developed a comprehensive national strategy for suicide prevention after a steep increase in the number of suicides in 1998, and its innovative efforts have successfully decreased the number of suicide deaths. Japan's suicide rate is still high compared to other high-income countries, and continuous research on factors related to suicide and evidence-based interventions are important for further suicide prevention.

Males are at higher risk of suicide than females [2], and suicide rates tend to be higher among males compared to females worldwide [1]. The suicide rate among males is more than twice that of females in Japan (i.e., the age-adjusted suicide rate was 26.4 for males and 10.2 for females in 2012) [3]. Nevertheless, the female suicide rate in Japan is the second highest among the OECD countries after Korea [4]. Suicide was one of the top three causes of death among Japanese females for each five-year age group between the ages of 10 and 54 in 2012 [5]. Exploring suicide factors among Japanese females and identifying intervention points are thus an urgent public health issue.

Previous studies reported sex differences in the prevalence of suicide risk factors and psychosocial characteristics of suicide completers. Females are more likely to consult with mental health professionals [6] and use non-violent suicide means [7]. Eating disorders, which have a much higher prevalence among females than males, increase the risk of suicide [8,9]. Protective factors for female suicide include being pregnant [10] and having children [11,12]. A study that analyzed data obtained by the Tokyo Medical Examiner's Office between 1996 and 2005 found that "health problems" were a notable cause of female suicide deaths, particularly mental health issues among younger females and physical diseases among older females [13].

As mentioned earlier, female suicide rates tend to be higher in Japan than in Western countries [4]. Underlying factors and processes leading to female suicide might be culturally influenced. Most studies aiming to identify features relevant to female suicide have been conducted in European countries, Australia, and North America, with only a few having been carried out in Asian countries, including Japan [14]. Against this backdrop, this study aimed to examine sex differences in psychosocial

and psychiatric characteristics of suicide cases, and identify female suicide factors and intervention points to prevent female suicides in Japan.

II. Methods

1. Psychological autopsy research project

This study was conducted as part of the "Basic Research for Preventing Suicide and Supporting Survivors" [15,16,17], a large-scale psychological autopsy research project in Japan, with the aim of examining the suicide situation in Japan specifically concerning suicide completers' life stages, sexes, and social factors, clarifying clinical types of suicides, and exploring suicide risk factors and intervention points for each type.

1-1. Participants

The research project was conducted at 54 Mental Health Welfare Centers of municipalities and government-designated cities that consented to participate since December 2007. Prospective suicide cases for examination were suicide completers whose bereaved family members contacted the Mental Health Welfare Centers either for individual

consultation or survivor meetings. We finally chose suicide cases for which bereaved family members were mentally stable and provided written consent to participate in the survey.

1-2. Procedures

In general, psychological autopsy studies involve interviewing bereaved family members and/or significant others of suicide completers to collect information about suicide completers' life histories, living/health conditions, and behaviors just prior to suicide. We conducted a semi-structured interview using an assessment instrument developed for the research project. Pairs of local investigators including one psychiatrist and another mental health professional, such as a public health nurse or a social worker, conducted the interviews. One investigator in each pair had to complete a three-day training program organized by the research team, composed of lectures about care for bereaved family members, interview methods, and role-playing exercises for the interview. The other investigator of the team was required to at least complete training regarding care for bereaved family members. Informants were family members who had close relationships and lived with or had the same level

of contact with the one who died by suicide. If two or more close family members were available, the highest selection priority was given to a spouse, followed by a parent, and then by a child at least 20 years of age.

The study protocol was approved by the Ethics Committee of the National Center of Neurology and Psychiatry. The participants provided written consent to participate in the study. We also confirmed the availability of continuous care for bereaved family members who participated in the research project at the Mental Health Welfare Centers.

1-3. Assessment instrument

The assessment instrument was based on one created by the Beijing Suicide Research and Prevention Center in China [18]. Our project team modified the instrument and conducted a preliminary psychological autopsy study in Japan. The instrument included questions about socio-demographic background, life events, life history, previous suicidal behaviors, suicide characteristics, job characteristics, financial problems, quality of life, physical health, mental health issues, and help-seeking behaviors. Psychiatric diagnoses osf each suicide completer were made by

143 the psychiatrist of each interview pair based on information collected
144 through interviewing a bereaved family member, in conformity with the
145 DSM-IV [19].
146
147 2. Methods of this study
148 2-1. Participants
149 The present study used data from 92 (aged ≥20 years) of 97 suicide
150 cases that were collected for the research project from December 2007
151 through July 2013, excluding five cases involving individuals aged <20
152 years. The 92 cases were reported from various areas of Japan including:
153 Hokkaido and Tohoku (n=12;13.0%), Kanto-Shinetsu (n=40; 43.5%),
154 Tokai-Hokuriku and Kinki (n=24; 26.1%), Chugoku and Shikoku (n=8;
155 8.7%), and Kyushu and Okinawa (n=8; 8.7%). The annual rates of female
156 and male suicide deaths remained at approximately 30% and 70%
157 respectively from 2007 to 2013 [20]. No significant regional differences were
158 observed for these rates [20].
159
160 2-2. Data analysis

We analyzed sex differences in psychosocial and psychiatric characteristics of suicide completers using information collected for the study. Variables included for data analysis were: (1) socio-demographic and social background factors (age, marital status, employment status, financial issues); (2) suicide-related characteristics (suicide means, psychoactive substance use at the time of suicide, verbalizing own death prior to suicide, leaving suicide notes); (3) previous suicidal behaviors and family history of suicidal behaviors (history of self-harm/suicide attempts, history of medical care due to self-harm/suicide attempts, history of suicide completion/attempts among family members/friends); and (4) medical problems (sleep disturbances, history of life-threatening physical diseases, mental disorders (DSM-IV), help-seeking behaviors, history of psychiatric/psychosomatic consultation).

In addition to the above analyses, we qualitatively examined psychosocial and psychiatric characteristics of female suicide completers, referring to individual descriptive information, such as life timeline charts. To present descriptive data of suicide cases in this paper, we stripped all personal identifiers and abstracted them to the extent that their essential

features would not be lost.

Data analyses were performed using IBM SPSS Statistics ver.19 (IBM, Armonk, NY, USA). The Fisher's exact test was used to explore associations between sex and other categorical variables. The Student's t-test was used to assess whether the mean age of females and males were significantly different. $P<0.05$ (two-tailed) was considered statistically significant.

III. Results

1. Sex differences in psychosocial and psychiatric characteristics of suicide completers

Table 1 shows the psychosocial and psychiatric characteristics of 28 female and 64 male suicide cases.

1-1. Socio-demographic and social background factors

Females were significantly younger than males ($P<0.001$). There were significantly fewer females who had ever been married ($P<0.001$). No significant sex difference was observed regarding the prevalence of divorce.

At the time of death, 73.4% of males and 32.1% of females were employed ($P<0.001$). Significantly fewer females had financial worries ($P<0.01$) and debts ($P<0.001$).

1-2. Suicide-related characteristics

There were no significant sex differences in suicide means and substance use at the time of suicide. More than 50% of female and male cases chose to hang themselves as the means of suicide. Approximately 40% of suicide completers were using some type of psychoactive substance at the time of suicide. Those substances included analgesics and antipyretics, psychotropics, alcohol, pesticides, and other hazardous substances, but excluded psychotropic medications properly taken for treatment purposes. Females tended to verbalize their own death to significant others ($P=0.06$).

The prevalence of a history of self-harm/suicide attempts was significantly higher among females than males ($P<0.001$). There was no significant sex difference in the prevalence of a history of inpatient/outpatient treatment at a medical facility due to suicidal behavior or in a family history of suicidal behavior.

215

216 1-3. Medical problems

217 There were no significant sex differences in the prevalence of sleep
218 disturbances and history of life-threatening physical diseases. There was
219 also no significant sex difference in the prevalence of mental disorders, with
220 90.2% of suicide completers diagnosed with some type of metal disorder.

221 Regarding psychiatric diagnoses, the prevalence of both
222 substance-related disorders and the sub-category alcohol-related disorders
223 was significantly higher among males than females ($P<0.05$ and $P<0.01$,
224 respectively). More females than males fit the diagnostic criteria for eating
225 disorders ($P<0.01$). All four female suicide completers with eating disorders
226 (two with anorexia nervosa, one with bulimia nervosa, and one with both)
227 had a history of self-harm/suicide attempts and other comorbid psychiatric
228 disorders. There was no significant sex difference in the prevalence of other
229 mental disorders.

230 The prevalence of consultation or treatment by physicians or other
231 professionals for mental health issues (help-seeking behaviors) was higher
232 among females than males ($P<0.05$). More females than males had a history

of psychiatric/psychosomatic consultation ($P<0.01$).

2. Description of female suicide cases

The following two case examples were identified as having distinctive characteristics associated with female suicides.

2-1. Case 1: Ms. A (age: late 20s; psychiatric diagnoses: eating disorder and major depressive disorder)

Ms. A was devoted to club activities during her junior and high school years, and had a lot of friends. Her friendships had continued long after graduation from both schools. She went on to college to become a professional. After graduation from college, however, she started working part-time and changed jobs frequently for several years until a year before her suicide. In her early 20s, eating disorder (anorexia and bulimia) symptoms began to appear. She started seeing a psychiatrist due to depression and insomnia. Since quitting the last part-time job six months before her suicide, she was socially withdrawn and had repeated self-harm/suicide attempts by means of wrist cut or overdose. She was

brought into emergency rooms a number of times due to self-harm/suicide attempts. Although continuously receiving psychiatric outpatient treatment, she never used other community mental health care services. Through the interview for this psychological autopsy study, we determined that Ms. A had also suffered from major depressive disorder. She and her family had no financial problems. She had good relationships with her family members, communicating often with her mother.

2-2. Case 2: Ms. B (age: early 50's; diagnosis: major depressive disorder)

Ms. B had no problems during her school years. She started her career after graduating from a junior college, then quit the job when she married. She had two children, and had no financial problems with her husband's salary. She proactively engaged in community activities and was trusted by neighbors. She consulted with a psychiatrist for sleep disturbances and unidentified symptoms that appeared a few years before her suicide. Although she regularly saw the psychiatrist, she sometimes went off the medication of her own will. She had no history of self-harm/suicide attempts. Her son got married and her grandchild was

born the year of her death. Around the same time, her daughter graduated from a university and found work. Ms. B seemed sad after her children left home. In addition, she had a poor relationship with her daughter-in-law and had little contact with her son's family members. When Ms. B had concerns, her husband listened to her until she was satisfied. He took days off from work to accompany her when she did not feel well. Just before her suicide, she told him about her wish to die.

IV. Discussion

This study examined sex differences in psychosocial and psychiatric characteristics of suicide completers based on data collected for a larger research project using the psychological autopsy method, and explored those factors and intervention points for female suicides.

Approximately 90% of suicide completers in our study could be diagnosed with some type of metal disorder. This finding was consistent with those of previous studies [21,22], which revealed mental disorders (such as major depressive disorder [23,24]) as an important suicide risk factor. While we found no significant sex difference in the prevalence of

major depressive disorder, a previous meta-analysis reported that the prevalence of depressive disorders was higher among female suicide completers than their male counterparts [21]. While females included in the studies reviewed in the meta-analysis were older than males [21], the females in our present study were younger than the males. The difference in age structure between the studies may explain these inconsistencies.

The most notable sex difference in psychiatric characteristics among suicide completers was that males were more likely to be diagnosed with alcohol problems and females with eating disorders. Alcohol problems are a known suicide risk factor [25]. Based on other results from our psychological autopsy study, we highlighted the importance of educational activities for raising awareness that harmful alcohol use could be a suicide risk factor as well as the importance of improving and expanding treatment/care systems for alcohol-related issues, especially those targeting middle-aged males [15].

The prevalence of eating disorders was significantly higher in females than males. The lifetime prevalence of anorexia nervosa among females is approximately 0.5% and bulimia nervosa 1-3%, and more than 90% of those with eating disorders are females [26]. Eating disorders

reportedly increase the risk of suicide [27], and the results of the present study confirm that eating disorders are a suicide risk factor. It is also noteworthy that all four suicide completers diagnosed with eating disorders ranged in age from 27 to 33. This is consistent with a report that suicide among those with eating disorders could occur between ages 25 and 35, or even older, and after a fairly long period of time following the first medical consultation [28]. Case 1 (Ms. A) showed typical characteristics of a female suicide completer with an eating disorder. Ms. A's eating disorder symptoms appeared in her early 20s, and she died by suicide in her late 20s. Clinicians, service providers, and significant others of those with eating disorders may need to pay close attention to suicide risk even after having a prolonged course of the disorder.

Mood disorders, substance dependence disorders, anxiety disorders, and personality disorders are frequent comorbid psychiatric disorders with eating disorders [29], and those with comorbid depression and personality disorders specifically tend to have a poor prognosis [30,31,32]. All four suicide completers with eating disorders in this study had comorbid psychiatric disorders, such as major depressive disorder, psychotic disorders,

substance dependence disorders, adjustment disorders, and anxiety disorders. They all (including Case 1) had a history of suicide attempts. In summary, females with eating disorders, especially those with psychiatric comorbidities and a history of suicide attempts, have a higher risk of suicide and should receive clinical attention, even if there is a long interval from their first medical visit for the eating disorder.

We did not observe any sex difference in the prevalence of suicide means selected by suicide completers. More than half of both sexes hanged themselves. This result was inconsistent with a report that females tend to select less lethal means of suicide compared to males [7]. One explanation is that firearms are selected much less frequently as a means of suicide in Asian countries, including Japan, compared to the United States [33], where firearms were chosen more commonly among males (16.0%) than females (1.6%), and are the most lethal means for suicide [7]. This explanation, however, has limitations. McGirr and colleagues [7] found that hanging was also more frequently selected by males (53.1%) than females (38.1%).

In the same study by McGirr and colleagues [7], more females

(41.3%) than males (4.9%) died by overdose. Our study revealed that even though more females compared to males had a history of suicide attempts, some of which were carried out by means of overdose, there were only a few cases (male and female) of death by overdose. In Japan, psychotropic medications are most likely to be chosen for overdose [34,35], while in Western countries, for example in England, the most commonly used medications for self-poisoning are analgesics and antipyretics, such as Paracetamol [36]. Analgesic and antipyretics can inflict greater physical damage, such as renal problems, than psychotropics. Although overdose could be considered a less violent means of suicide than the use of firearms or hanging, females in Western countries appear to choose more lethal medications for suicide than Japanese females.

This study found that more females than males had consulted mental health professionals, including psychiatrists, which was consistent with a previous report [6]. Females also tended to have verbalized their own death to their significant others. As reported previously [37,38], females tend to actively seek help. In Cases 1 and 2, both female suicide completers expressed their suicidal thoughts to their family members, and those family

members provided care to the deceased in life. Close family members who see the potential for suicide can play an important role by referring suicidal individuals to professionals. At the same time, family members of suicidal individuals can experience a great amount of psychological and societal burden [39]. As a suicidal female repeats suicide attempts or verbalizes suicidal thoughts, the burden on and negative emotions among family members can increase, leading them to overlook the growing risk of suicide over a long period. Therefore, health professionals should provide such family members with the help and care they need, including psychoeducation and psychological support. Isometsä and colleagues [40] reported that only about 20% of suicide completers who regularly saw health professionals expressed suicidal thoughts at the last medical consultation before suicide. Enhancement of a community care system that is vigilant about the growing risk of suicide on a routine basis could be crucial to prevent female suicides, especially among those who repeatedly attempt suicide or express suicidal ideation.

Finally, “empty nest syndrome” after children leave home or family conflicts, such as with Case 2, may be significant risk factors for female

depression and suicide. Chinese elderly people who could be categorized in an empty-nest group were significantly more likely to have depressive symptoms [41] and to feel loneliness [42] than those in the non-empty nest group. Loneliness is a risk factor for elderly suicide [43]. Rubenowitz and colleagues [43] pointed out that family discordance increases elderly suicide risk. The relationship between suicide and loneliness caused by life events in Japanese elderly females remains speculative at this point, and we did not evaluate their interpersonal or family relationships well enough to draw a conclusion. Future studies will need to explore the relationships among specific life events, loneliness, depression, and suicide to more clearly identify factors associated with suicide among elderly women.

There are three major limitations to this study. First, the sampling may have been biased. Moreover, informants were limited to survivors who contacted the Mental Health Welfare Centers to receive support and consented to participate in the study. Those who did not contact the Mental Health Welfare Centers were not included in the study at all. We did not know if bereaved families who sought help were significantly different from those who did not. Also, suicide completers who had lived alone were

395 excluded. Therefore, generalization of the outcomes as characteristics of
396 Japanese female suicide completers is somewhat limited. Second, family
397 members of deceased individuals were sources of information. There is a
398 limit to the extent of information they had and their memories could have
399 been biased. Suicide risk tends to be high among females who experienced
400 sexual/physical abuse in childhood or domestic violence [14]. There may be
401 information that family members cannot disclose, such as family conflicts or
402 violence. Indeed, family members of suicide completers who experienced
403 violence within the family might refuse to participate in a psychological
404 autopsy study. Furthermore, the questionnaire we used for the
405 semi-structured interview included very few questions about family
406 relationships. A future study should add survey items relating to family
407 matters and devise effective ways of collecting such information. Finally,
408 this study examined only sex differences in characteristics of suicide
409 completers. A case-control study that collects data from age- and residential
410 municipality-matched living females should be also conducted to further
411 explore characteristics of female suicide.
412

V. Conclusions

This study found that Japanese female suicide completers were significantly more likely to have eating disorders. Females with such disorders, especially those with psychiatric comorbidities and a history of self-harm/suicide attempts, could be at greater risk of suicide even after a long period of time following the first medical consultation for the eating disorder. Since female suicide completers were more likely to have a history of self-harm/suicide attempts, it may be important to provide their caregivers with appropriate psychological and social support, and to enhance community care systems to be sensitive to suicide risks of female suicide attempters.

This study is significant in that it identified psychiatric and psychosocial characteristics of Japanese females who died by suicide, despite the limitations mentioned above. In the future, more family members of middle-aged and older female suicide completers should be recruited in order to further explore both risk and protective factors of suicide through a case-control study.

Competing interests

The authors declare that they have no conflict of interest.

Authors' contributions

TM and TT developed the original idea for the study. MK, TM, TY, MT, NS, and TT participated in its design and coordination. MK performed the statistical analysis. MK and TM drafted the manuscript. All authors read and approved the final manuscript.

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Table 1. Psychosocial and psychiatric characteristics of suicide completers

		Female (N=28)	Male (N=64)			
		Mean (SD)	Mean (SD)	t	P	
Age (years)	(a)	34.54 (14.292)	46.83 (13.935)	3.86	0.000	***
		n (%)	n (%)	χ^2	P	
Married		12 (42.9)	49 (76.6)	9.90	0.002	**
Divorced		1 (3.6)	6 (9.4)	0.93	0.671	
Employed		9 (32.1)	47 (73.4)	13.95	0.000	***
Financial issues	General	3 (10.7)	27 (42.2)	8.78	0.003	**
	Debts	1 (3.6)	43 (67.2)	32.51	0.000	***
	Difficult debt covenants (b)	0 (0)	20 (47.6)	0.89	1.000	
Means of suicide	Hanging	16 (57.1)	35 (54.7)	0.05	1.000	
	Jumping	5 (17.9)	8 (12.5)	0.46	0.525	
	Drowning	1 (3.6)	2 (3.1)	0.01	1.000	
	Poisoning (drugs/chemicals)	6 (21.4)	14 (21.9)	0.00	1.000	

	Inhaling gas		2 (7.1)	12 (18.8)	2.03	0.213	
	Burning		1 (3.6)	0 (0)	2.31	0.304	
	Cutting		1 (3.6)	1 (1.6)	0.37	0.518	
	Others		0 (0)	1 (1.6)	0.44	1.000	
	Unknown		0 (0)	1 (1.6)	0.44	1.000	
Use of psychoactive substances at the time of suicide	(c)		11 (39.3)	27 (42.2)	0.83	0.660	
Verbalizing own death prior to suicide	(c)		21 (75.0)	35 (54.7)	5.62	0.060	
Leaving suicide notes	(c)		16 (57.1)	32 (50.0)	1.53	0.465	
History of self-harm/suicide attempts	(c)		19 (67.9)	16 (25.0)	15.42	0.000	***
History of medical	(c)	(d)	11 (57.9)	6 (37.5)	2.12	0.346	

treatment due to self-harm/suicide attempts						
Family history of suicide attempts /self-harm	(c)	17 (60.7)	38 (59.4)	1.89	0.389	
Sleep disturbances	(c)	24 (85.7)	50 (78.1)	0.73	0.694	
History of life-threatening physical diseases		3 (10.7)	18 (28.1)	3.35	0.104	
Mental disorders (DSM-IV)	Any mental disorder	27 (96.4)	56 (87.5)	1.76	0.267	
	Major depressive disorders	15 (53.6)	35 (54.7)	0.01	1.000	
	Bipolar disorders	2 (7.1)	2 (3.1)	0.76	0.582	
	Schizophrenia	5 (17.9)	4 (6.3)	2.97	0.125	
	Substance-related disorders	1 (3.6)	16 (25.0)	5.94	0.018	*
	Alcohol-related disorders	0 (0)	15 (23.4)	7.84	0.004	**

	Personality disorders	2 (7.1)	5 (7.8)	0.01	1.000	
	Anxiety disorders	5 (17.9)	8 (12.5)	0.46	0.525	
	Adjustment disorders	2 (7.1)	4 (6.3)	0.03	1.000	
	Eating disorders	4 (14.3)	0 (0)	9.56	0.007	**
Help-seeking behaviors		21(75.0)	33(51.6)	4.41	0.041	*
Psychiatric/ psychosomatic consultation		21(75.0)	28(43.8)	7.64	0.007	**

* P<0.05; ** P<0.01; *** P<0.001

Fisher's exact test

(a) Student's

t-test

(b) The analysis was only applicable to those withdebts (1 female and 43

males).

(c) Since there were some unknown cases, asymptoticP-values were adopted.

(d) The analysis was only applicable to those witha history of suicide attempts/self-harm (19

females and 16 males).