A Study on Factors Affecting Suicidal Tendency of the Elderly Living Alone on Care Services

Hwoyeon Seo, MD,[1,2] Jee Hoon Sohn, PhD,[1] Sung Jun Cho, PhD,[3,4]
Su Jeong Sung, PhD,[5] Maeng Je Cho, PhD,[6] Seung Hee Ahn, MSW[2]

[1]*Seoul National University Hospital Public Health Medical Service, Seoul, Korea*
[2]*JongnoGu Community Mental Health Center, Seoul, Korea*
[3]*Department of Psychiatry, Seoul National University Hospital, Seoul, Korea*
[4]*Seoul Mental Health Center, Seoul, Korea*
[5]*Department of Psychiatry, Hallym University Kangdong Sacred Heart Hospital, Seoul, Korea*
[6]*Seoul National University, College of Medicine, Seoul, Korea*

Objectives   The high suicide rate has risen as a main concern in South Korea. Given the complexity of the mechanism resulting in complete suicide, studies targeting various populations are needed for broader understanding of its risk factors. This study aims to analyze the factors affecting the suicidal tendency in the population of the elderly living alone in Seoul depending on basic elderly-care services.

Methods   A total number of 415 people participated in the study. Home-visit interviews were administered by trained interviewers. Suicidal tendency was measured by the Korean version of mini international neuropsychiatric interview (K-MINI). Health-related quality of life was measured by a brief version of the World Health Organization Quality-of-life Scale (WHOQOL-BREF). Alcohol problem was assessed by the Korean version of the alcohol use disorders identification test (AUDIT-K). Among total subjects of 415 interviewees, the actual responses of 408 people were used for the final analysis.

Results   The result showed that the suicide risk was high in persons isolated from social support [odds ratio (OR) = 4.49], having depression (OR = 14.85), and having low quality of life (OR = 4.39).

Conclusions   We found that social support, depression and health-related quality of life are associated with suicidal tendency in the elderly living alone on basic services. Our evidence will contribute to suicide prevention policy for the elderly living alone on care services.

Key Words   The elderly living alone · Suicide · Depression · Social connectedness.

Introduction

Although South Korea has shown a dramatic development in economy, there is inevitable dark side of the successful story. The high suicide rate in South Korea has risen as a main concern not only in the public health sector, but in the society as a whole due to its magnitude and destructiveness. Despite the recent effort to reduce the rate, Korean suicide rate is still the highest in the western pacific area rating 32 people per 100000 and ranks third among all nations reporting the suicide rate, following Sri Lanka and Lithuania, 35.3 and 32.7, respectively.[1] The suicide rate for the elderly in Korea is even higher as it re-

cords 80.3 people per 100000, which is 3.8 times higher than the Organization for Economic Cooperation and Development (OECD) average of 20.9. It has been predicted that the rate will grow higher as the aging population increases.

Many researches have been carried out to explore the possible reasons for the higher suicide rates among the elderly people to date. Psychiatric illness including depression and alcoholism has been consistently reported to be related to suicides of the elderly through many studies.[2)3)] Other related factors are physical health and functioning and social factors such as stress and being solitary.[4)] Social connectedness in particular has caught interest in relation with suicide prevention, which

has been well reflected in the strategy to tackle the suicide problem published by centers for disease control and prevention (CDC).[5] Living alone has been considered as a factor that increased the possibility of suicide via depression-however, living alone doubled the risk of suicide directly, regardless of depression.[6][7]

From the perspective of public health, it is suggested that selective prevention is more effective than universal prevention as the former targets the high-risk population based on the risk factors rather than the whole population.[8] Consequently, in developing strategies to tackle the elderly suicide, the aged population living alone is considered to be central as the number exceeds 1.2 million, occupying 6.4% of all family types in Korea.[9]

Studies investigating the risk factors causing suicidal idea among Korean elderly living alone reported controversial results. Rim and colleagues reported that suicidal ideation in this population is caused by family types, physical health and daily life functioning.[10] Seo and Lee,[11] however, recently suggested that social support is not directly associated with suicidal ideation, but indirectly via depression. Given the complexity in the mechanism resulting in complete suicide, studies targeting various populations are needed for broader understanding of the risk factors. This study aims to analyze the factors affecting the suicidal tendency of the elderly living alone on basic elderly-care services in Seoul to prevent repeated suicide attempts and make productive suggestions to the clinical implication for social welfare system.

Methods

Participants

We collected participants from Jongno District, one of 25 districts in Seoul. We utilized the data of the elderly over 65 living alone in 2012, provided by the department of Elderly Welfare of Jongno District.

Subjects were 415 people out of 440 who gave the informed consent. Home-visit interviews were administered by trained interviewers. Among total subjects of 415 interviewees, responses of 408 people who gave answers were utilized in the final analysis. This study used the secondary data.

Assessment

Suicidal tendency was measured by the Korean version of mini international neuropsychiatric interview (K-MINI). The MINI is an abbreviated interview developed for Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM-IV) and International Classification of Diseases and Related Health Problems 10th edition (ICD-10) psychiatric disorders. We employed the K-MINI which Yoo et al.[12] translated into Korean. The Suicidal module was composed of 6 questions. Points less than 5 was marked as low, 6−9 as middle and over 10 as high. For the measurement of depression, depression module of K-MINI was employed. Health-related quality of life was measured with a brief version of World Health Organization Quality-of-life Scale (WHOQOL-BREF). The WHOQOL was developed in the project initiated by the World Health Organization (WHO) to evaluate quality of life cross-culturally.[13] The WHOQOL-BREF, an abbreviated version of the WHOQOL for the convenience in research, is comprised of 26 items covering 4 domains, namely physical health, psychological health, social relationships, and environment. We utilized the Korean version of the instrument translated and validated by Min and colleagues.[14] In this study, the result score was converted into the 100-point scale.

Alcohol problem was assessed by the Korean version of the alcohol use disorders identification test (AUDIT-K). The original version was developed by Babor and Grant[15] for the WHO in 1989 and Lee et al.[16] translated the tool into Korean and standardized it in 2000. The AUDIT-K consists of 10 questions, with 5-point scale for each. Tests that scored over 12 were considered to have alcohol problems, over 15 to be sufficiently diagnosed with an alcohol use disorder, and over 26 to have alcohol dependence. The frequency of interaction with family, friends and neighbors was questioned to measure the degree of social support that the participants had. The participants were asked to choose one of the three level of the interaction. No interaction was marked as 0, occasional interaction as 1, and frequent interaction as 2. Information on sex, education level, age, and income was also gathered as controlled variables. The Korean version of mini-mental state examination (MMSE-KC) was used to assess the cognitive decline.

Data analysis

Chi-square and Fisher's exact test was used to examine the association of suicidal tendency with variables such as demographical characteristics, social activity and mental health problems. Multiple logistic regression was used to identify variables associated with suicidal tendency. Level of significance was p = 0.05 (two-sided). We performed all exploratory and formal statistical analyses with SPSS version 18.0 (SPSS Inc., Chicago, IL, USA) for Windows.

Results

Characteristics of the study population

Demographic information of all participants is presented in Table 1. Women were predominant than men (71.1% vs. 28.9%).

Table 1. Characteristics of the study population

Variables		Category	Frequency	Ratio (%)
Sex		Male	118	28.9
		Female	290	71.1
Age		Under 79 year-old	277	67.9
Average	SD	Over 80 year-old	131	32.1
76.49	6.564			
Reason of solitude		Bereavement	246	62.2
		Separation/divorce	101	24.7
		Unmarried	53	13.0
Type of socialized medicine		Health insurance	190	46.6
		First-class medical care assistance	183	44.9
		Second-class medical care assistance	29	7.1
		Uninsured	6	1.5
Education standard		Uneducated	111	27.2
		Elementary school dropout	76	18.6
Average	SD	Elementary school diploma−high school dropout	155	38.0
5.48	4.716	Higher than high school diploma	66	16.2
Residence period of current area		Less than 5 years	41	92.2
Average	SD	More than 5 years	367	7.8
408.71	250.75			
Monthly income		Less than 500000	376	92.2
		More than 500000	32	7.8
Status of employment		Unemployed	353	86.5
		Employed	55	13.5
Supportive system		Isolated	53	13.0
		Weak	196	48.0
		Solid	159	39.0

SD : standard deviation

Table 2. The suicidal tendency by sex

Variables	Male		Female		p
	Frequency	Ratio (%)	Frequency	Ratio (%)	
Concrete suicide ideation	43	36.8	63	21.8	0.02
Experience of suicidal plan	21	17.9	29	10.0	0.03
Experience of suicidal attempt	12	10.3	23	8.0	NS

NS : not significant

Average age was relatively high marking 76.5, with 67.9% (277 out of 408) of the group over 80 and 32.1% of the group less than 80. Bereavements mostly accounted for the reason for living alone, as suspected by the high average age, followed by separation/divorce and unmarried state. An absolute majority of participants (98.5%, 402 out of 408) reported any form of health insurance while 1.5% (6 people) had no insurance at all. 16.2% (66 out of 408) had high school education or higher, and average years of education was 5.48 years. Most of the participants reported the relatively stable residence state as 90% (367 out of 408) did not move over 5 years. Economic state was relatively poor as most participants (92.2%) had a living with under 500000 won of monthly income. The state of unemployment outweighed employment, with 86.5% (353 out of 408) to 13.5% (55 people).

People in complete isolation accounted for 13%(53 out of 408), while the others had some degree of relationship (87%, 345 people). 94.9% (387 out of 408) did not participate in social activities, while 5.1% (21 people) participated in any form of social activities.

The Suicidal tendency by sex

Table 2 shows that suicidal tendency covering suicidal ideation, suicidal plan and the history of suicidal attempt was higher in men than women. Separately, there was a significant difference between male and female on suicide ideation and suicidal plan, with male higher in both (p = 0.02, p = 0.03, respectively), while

experience of suicidal attempt showed no statistical difference.

Distribution of suicide risk by demographical variables

A univariate analysis was conducted to identify suicide-risk distribution by demographical variables, health, and the quality of life. Table 3 shows that the younger age group under 79 (p = 0.024), depressive disorder (p < 0.000), low quality of life (p = 0.002), and alcohol problems (p = 0.022) were likely to predict the higher previous suicidal attempt, while cognitive dysfunction did not make any significant differences.

Factors influencing the suicidal tendency in the elderly living alone

An analysis of logistic regression was conducted to identify the influence of factors on the entire suicide risk including sui-

cidal ideation, suicidal plan, and suicide attempt (Table 4). The result showed that the suicide risk was high in persons isolated from social support [odds ratio (OR) = 4.49, 95% confidence interval (CI) = 1.23−16.33, p = 0.02], having depression (OR = 14.85, 95% CI = 5.88−37.52, p < 0.001), and having low quality of life (OR = 4.39, 95% CI = 0.97−19.78, p = 0.05).

Discussion

The aim of this study is to investigate the risk factors affecting suicidal tendency in the elderly living alone on basic care services and to find a approach for future interventions. Our finding confirmed that depression, social support and health-related quality of life are risk factors for suicidal attempts in the elderly living alone on basic care services. Depression showed

Table 3. Suicide-risk distribution by demographical variables

Variable	Category	Previous suicide attempt				p
		No (n = 372)		Yes (n = 34)		
		Frequency	Rate (%)	Frequency	Rate (%)	
Sex	Male	88	28.8	10	29.4	NS
	Female	265	71.2	24	70.6	
Age	Under 79 year-old	247	66.4	29	85.3	0.024
	Over 80 year-old	125	33.6	5	14.7	
Education standard	Uneducated	99	26.6	12	27.3	NS
	Elementary school dropout	67	18.0	8	18.5	
	Elementary school diploma-high school dropout	142	38.2	12	37.9	
	Higher than high school diploma	64	17.2	2	16.3	
Residence period of current area	Under 5 year	39	10.5	1	2.9	NS
	Over 5 year	333	89.5	33	97.1	
Monthly income	Over 500000 won	340	91.4	34	100	NS
	Under 500000 won	32	8.6	0	0	
Employment	Unemployed	321	86.3	30	88.2	NS
	Employed	51	13.7	4	11.8	
Social support	Isolated	47	12.6	6	17.6	0.064
	Weak	175	47.0	19	55.9	
	Solid	150	43.1	9	26.5	
Participation of social activities	No	350	95.1	37	92.5	NS
	Yes	18	4.9	3	7.5	
Presence of depressive disorder	No	302	81.2	14	41.2	0.000*
	Yes	70	18.8	20	58.8	
Quality of life	Low	84	22.6	17	50.0	0.002
	Middle	206	55.4	12	35.3	
	High	82	22.0	5	14.7	
Presence of cognitive impairment	Yes	208	55.9	16	52.9	NS
	No	164	44.1	18	47.1	
Having alcohol problem	Yes	164	2.2	4	10	0.022
	No	360	97.8	36	90	

* : p < 0.001. NS : not significant

Table 4. Influencing factors on the suicidal tendency in the elderly living alone

Variable	Category	OR	95% CI Lower	95% CI Upper	p
Sex	Male	1			
	Female	0.48	0.17	1.32	0.15
Age	Under 79 year-old	1			
	Over 80 year-old	0.41	0.15	1.14	0.09
Education	Uneducated	1			
	Elementary school dropout	2.03	0.68	6.09	0.21
	Elementary school diploma-high school dropout	0.59	0.19	1.87	0.37
	Higher than high school diploma	1.94	0.48	7.94	0.35
Monthly income	Under 500000 won	1			
	Over 500000 won	0.61	0.11	3.54	0.58
Employment	Unemployed	1			
	Employed	0.45	0.15	1.38	0.16
Social support	Solid	1			
	Weak	2.00	0.76	5.27	0.16
	Isolated	4.49	1.23	16.33	0.02
Reason for living alone	Bereavement	1			
	Separation/divorce	0.91	0.34	2.47	0.86
	Unmarried	1.28	0.35	4.67	0.71
Presence of depression	No	1			
	Yes	14.85	5.88	37.52	0.00*
Quality of life	High				
	Middle	2.76	0.64	11.91	0.17
	Low	4.39	0.97	19.78	0.05
Presence of cognitive impairment	No	1			
	Yes	1.84	0.72	4.69	0.20
Having alcohol problem	No	1			
	Yes	0.19	0.03	1.09	0.06

＊：p < 0.001. OR：odds ratio, CI：confidence interval

the strongest association with suicidal tendency in both univariate and multivariate analyses, which is consistent with many previous studies.[4-17] While the prevalence of depression was reported relatively low in this study (22%, 90 out of 406) considering the known higher prevalence in this population, the proportion of people with depression among suicidal attempters (58.8%, 20 out of 34) approximated to other studies.[18,19] While males were more likely to show suicidal ideation and planning, we were unable to find the difference in the experience of suicidal attempts by sex in the univariate analysis. Although suicidal idea and plan as symptoms of depression are generally known to be more prevalent in women across the life span, living alone affects more men than women in the elderly.[20,21] A Korean study investigating gender difference in mental health among elderly Koreans reported that men living alone were approximately three times more likely to have depressive symptoms and five times to have suicidal ideation while women were

not affected by the factor of living alone.[22]

As for the discrepancy between experience of suicidal attempt and plan, many studies investigated the gap between simple ideation and suicidal attempts.[23,24] For example, Lewitzka et al.[23] compared a group of people with only suicidal ideation to the group with history of suicidal attempts. It showed that while the proportion of female was higher in both groups, female were significantly more likely to have suicidal ideation without attempts. This seemingly different report of suicidal ideation by sex may be down to the difference in the study population as the previous reserch was conducted with the patients with an affective disorder, whereas our study was conducted with people living within a community. It should be noted, however, that male complete suicides outnumbered female in most studies.[25,26]

Those who have younger age, depression, low health-related quality of life and an alcohol problem were significantly more likely to report the experience of suicidal attempts, as shown in

the univariate analysis. The weaker social support showed the moderate association with history of suicidal attempts. Depression is a predominant risk factor reported consistently for suicidality regardless of the population. Although health condition affects the mental health factors and vice versa, and both interplay in forming suicidality, one study suggested that physical health solely had an independent influence on the suicidal ideation.[27] Some authors argued that physical illness is more associated with men than women in terms of suicidality, which could be a hint for developing interventions specific to this population. Alcohol problem showed the significant association not with suicidal tendency, but suicidal attempts. Consistent with the previous study conducted with the elderly living alone in Seoul, our study strongly suggested that the alcohol problem played an important role in pushing the ideation into action.[28] Interestingly, our study showed less suicidality in age over 80, which is counter-intuitive given the fact that the group over 80 shows the highest suicidal rate among all age groups in Korea.[29] This may imply the distinctive mechanism between suicidal ideation and suicidal attempt.

The recent understanding of suicide highlighted the internal psychological process of "build-up to the final action", called an "ideation-to-action" framework.[30] This framework has shed light on contributors and protective factors by emphasizing a three-step process from suicidal ideation to attempt. This theory hypothesizes that suicidal ideation develops in combination with pain and hopelessness and lack of social connectedness, and varied contributors play a role in facilitating the progression from ideation to attempts.

Several limitations need to be addressed. First, although the sample size is relatively large compared with previous studies on the elderly living alone conducted in Korea, the larger sample may be needed to investigate possible risk factors comprehensively. Second, as our study was conducted in a specific context of Jongno district, we should be cautious with the generalization of the result.

In conclusion, suicidality is a complex phenomenon caused by internal and external contributors. We found that social support, depression and health-related quality of life are associated with suicidal tendency in the elderly living alone on basic services. Our evidence will contribute to establishing suicidal prevention policy for the elderly living alone on care services.

Conflicts of interest

The authors have no financial conflicts of interest.

REFERENCES

1) **World Health Organization** [homepage on the Internet]. Geneva: World Health Statistics Data Visualizations Dashboard 2017 [cited 2018]. Available from: http://apps.who.int/gho/data/node.sdg.3-4-viz-2?lang=en.
2) **Schulz R, Drayer RA, Rollman BL.** Depression as a risk factor for non-suicide mortality in the elderly. Biol Psychiatry 2002;52:205-225.
3) **Berglund M, Ojehagen A.** The influence of alcohol drinking and alcohol use disorders on psychiatric disorders and suicidal behavior. Alcohol Clin Exp Res 1998;22:333S-345S.
4) **Conwell Y, Van Orden K, Caine ED.** Suicide in older adults. Psychiatr Clin North Am 2011;34:451-468, ix.
5) **Centers for Disease Control and Prevention.** Promoting Individual, Family, and Community Connectedness to Prevent Suicidal Behavior. Atlanta, GA: Cent. Dis. Control Prev;2008. p.3-5.
6) **Schneider B, Lukaschek K, Baumert J, Meisinger C, Erazo N, Ladwig KH.** Living alone, obesity, and smoking increase risk for suicide independently of depressive mood findings from the population-based MONICA/KORA Augsburg cohort study. J Affect Disord 2014;152-154:416-421.
7) **Fukunaga R, Abe Y, Nakagawa Y, Koyama A, Fujise N, Ikeda M.** Living alone is associated with depression among the elderly in a rural community in Japan. Psychogeriatrics 2012;12:179-185.
8) **Gordon RS Jr.** An operational classification of disease prevention. Public Health Rep 1983;98:107-109.
9) **Statics Korea.** 2016 the Elderly Statistics. Daejeon: Statics Korea;2016.
10) **Rim CS, Jang GS, Jeong MS.** A study on influential factors for the suicide ideation of the elderly living alone. Social Science Studies 2013;22:192-223.
11) **Seo IK, Lee YS.** Mediated effects of depression on the relationship between social resources of the elderly living alone and their suicidal ideation-With a focus on the comparison between the elderly living alone in rural and urban areas. J Welf Aged Inst 2016;71:219-247.
12) **Yoo SW, Kim YS, Noh JS, Oh KS, Kim CH, Nam KG, et al.** Validity of Korean version of the mini-international neuropsychiatric interview. Anxiety and mood 2006;2:50-55.
13) **World Health Organization** [homepage on the Internet]. Geneva: WHO Quality of Life-BREF (WHOQOL-BREF) [cited 2018 Apr 10]. Available from: http://www.who.int/substance_abuse/research_tools/whoqolbref/en/.
14) **Min SK, Lee CI, Kim KI, Suh SY, Kim DK.** Development of Korean version of WHO Quality of Life Scale abbreviated version (WHOQOL-BREF). J Korean Neuropyschiatr Assoc 2000;39:571-579.
15) **Babor TF, Grant M.** From clinical research to secondary prevention: international collaboration in the development of the Alcohol Disorders Identification Test (AUDIT). Alcohol Health and Research World 1989;13:371-375.
16) **Lee BO, Lee CH, Lee PG, Choi MJ, Namkoong K.** Development of Korean version of Alcohol Use Disorders Identification Test (AUDIT-K): its reliability and validity. J Korean Acad Addict Psychiatry 2000;4:83-92.
17) **Harris EC, Barraclough B.** Suicide as an outcome for mental disorders. A meta-analysis. Br J Psychiatry 1997;170:205-228.
18) **Harwood D, Hawton K, Hope T, Jacoby R.** Psychiatric disorder and personality factors associated with suicide in older people: a descriptive and case-control study. Int J Geriatr Psychiatry 2001;16:155-165.
19) **Conwell Y, Duberstein PR, Hirsch JK, Conner KR, Eberly S, Caine ED.** Health status and suicide in the second half of life. Int J Geriatr Psychiatry 2010;25:371-379.
20) **Girgus JS, Yang K, Ferri CV.** The gender difference in depression: are elderly women at greater risk for depression than elderly men? Geriatrics 2017;2:35.
21) **Albert PR.** Why is depression more prevalent in women? J Psychiatry Neurosci 2015;40:219-221.
22) **Jeon GS, Jang SN, Rhee SJ, Kawachi I, Cho SI.** Gender differences in correlates of mental health among elderly Koreans. J Gerontol B

Psychol Sci Soc Sci 2007;62:S323-S329.

23) **Lewitzka U, Spirling S, Ritter D, Smolka M, Goodday S, Bauer M, et al.** Suicidal ideation vs. suicide attempts: clinical and psychosocial profiledifferences among depressed patients: a study on personality traits, psychopathological variables, and sociodemographic factors in 228 patients. J Nerv Ment Dis 2017;205:361-371.

24) **Nock MK, Kessler RC, Franklin JC.** Risk factors for suicide ideation differ from those for the transition to suicide attempt: the importance of creativity, rigor, and urgency in suicide research. Clinical Psychology: Science and Practice 2016;23:31-34.

25) **Conwell Y, Duberstein PR, Cox C, Herrmann JH, Forbes NT, Caine ED.** Relationships of age and axis I diagnoses in victims of completed suicide: a psychological autopsy study. Am J Psychiatry 1996;153: 1001-1008.

26) **Henriksson MM, Marttunen MJ, Isometsä ET, Heikkinen ME, Aro** **HM, Kuoppasalmi KI, et al.** Mental disorders in elderly suicide. Int Psychogeriatr 1995;7:275-286.

27) **Cattell H.** Suicide in the elderly. Advances in Psychiatric Treatment 2000;6:102-108.

28) **Kwon JD, Kim YJ, Um TY.** Suicidal ideation among older adults who live alone with care services: a moderating effect of alcohol drinking in the relationship between previous suicidal attempts and suicidal ideation. J Welf Aged Inst 2011;51:297-320.

29) **Korea Suicide Prevention Center [homepage on the Internet].** Seoul: Suicide Rates by Gender and Age [cited 2018 Apr 30]. Available from: http://www.spckorea.or.kr/new/sub03/sub03.php#.

30) **Klonsky ED, May AM.** The three-step theory (3ST): a new theory of suicide rooted in the "ideation-to-action" framework. International Journal of Cognitive Therapy 2015;8:114-129.