Prevalence and Association of Suicide Ideation among Taiwanese Elderly − A Population-based Cross-sectional Study

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Background: Elders commit suicide almost twice as frequently as people in the general population. This study aimed to investigate the prevalence and associated factors of suicide ideation among a representative sample of elderly people in Taiwan.

Methods: We used data from the Health Promotion Knowledge, Attitudes, and Performance Survey in Taiwan and focused on 3,853 subjects with over 65 years old. Univariate and multivariate logistic regression were used to compare subjects with and without suicide ideation in terms of their subject characteristics, smoking, disability, depressive symptoms, physical disorders, and pain symptoms.

Results: The point prevalence of elderly suicidal ideation was 6.1%. Female gender, age over 85 years, low level of of education, single status, unemployment. no income, disability, current smoking, self-perceived bad to very bad health, depressive symptoms, various physical disorders (heart disease, diabetes, asthma, osteoporosis), and pain symptoms (joint pain, lower back pain, neck pain, sciatica, headache) were strongly associated with suicide ideation. Multivariate analyses showed that the female gender, former smoker, no income, depressive symptoms, and heart disease were the predictors of elderly suicide ideation.

Conclusion: Elderly subjects who are women, or former smokers, and have depressive symptoms, heart disease or no income should be cautioned about the risk of suicide.

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Key words: elderly, suicide ideation, depression, physical disorder

The suicide rate of elderly people, who have the highest suicide rate of all age groups, is twofold the rate of Taiwan's general population.[1] The elderly suicide rate increased from 24.7/100,000 in 1993 to 36.6/100,000 in 2008.[2] Older individuals made more fatal attempts, but less directly communicated their intent to die, than younger ones, which makes the early detection of risk more difficult.[3] Suicide ideation is a risk factor of attempted suicide and completed suicide.[4] Since there has been a rapid increase in the proportion of elderly people in Taiwan, it is vital to understand the prevalence and

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associated factors of suicide ideation among them in order to prevent further suicides.

Previous studies observed that the prevalence of elderly suicide ideation was 12.3% in Japan,[5] 14.6% in Korea,[6] and 6% in Hong Kong.[7] Using the Taiwan Depression Questionnaire (TDQ) Yen et al. (2005) estimated that the point (one week) prevalence of elderly suicide ideation was 16.7% in Taiwan.[8] Chang et al. (2008) used 5 questions and assessed that the lifetime suicide ideation among the elderly was 23.2%.[9] Results from these two studies also indicated depressive symptoms, a lower educational level, no community participation in the past 6 months, and poor quality of life (QOL) in the physical domain were independent risk factors for suicide ideation among elderly people in Taiwan.[8,9] Since these two studies surveyed only a local area in southern Taiwan, the generalization of their findings was limited. So the prevalence of suicide ideation among elderly people in Taiwan is unclear.

This study is based on a large representative random sample from the whole of Taiwan, where certain variants from socio-demographic data such as depressive symptoms, physical disorders, and pain symptoms were collected. The purpose of this study is to investigate the prevalence and associated factors of suicide ideation among Taiwan's elderly population.

METHODS

Study population

This study is based on data from the National Survey of Health Promotion Knowledge, Attitudes, and Practice (HPKAP), provided by the Bureau of Health Promotion, Department of Health, Taiwan. Three-stage systematic random sampling was based on the National Census Register 2002. Some townships from all 21 counties and cities in Taiwan were randomly selected as the primary sampling units, and within each township, some neighborhoods were randomly selected as secondary sampling units. Finally, 4 eligible persons older than 15 years were randomly selected from each neighborhood as the third sampling unit. A two-stage systemic random sampling procedure was applied to Taipei and Kaohsiung city, where some neighborhoods were randomly selected from each district as the primary sampling units. Within each neighborhood, 4 subjects older than 15 years were randomly selected as eligible persons. The sample rates of Taipei, Kaohsiung and each county were different, since their populations vary.

The field work was conducted between September 2002 and March 2003. A total of 323 skilled interviewers employed by the Bureau of Health Promotion were trained at a 3-day workshop to ensure standardization of interviews across Taiwan. All interviews were conducted on a face-to-face basis. Of the 32,660 eligible persons, 26,755, or 81.92%, responded to the interview. We have previously investigated the association between a transient ischemia accident and elderly depression using part of the data from the HPKAP.[10] To explore elderly suicide ideation and associated factors, all 3,596 adults ≥ 65 years old were included in this study, which was approved by the Institutional Review Board of Chang Gung Memorial Hospital.

Measurements

Dependent variable: suicide ideation

A subject was considered to have suicide ideation if he or she responded "yes" to the statement, "I feel miserable and even want to die." This question was one of eighteen items on the TDQ.

Independent variables

Depressive symptoms were assessed by the TDQ, which consists of 18 items and is designed to evaluate depressive symptoms over the past week. A score of 0- never, 1-sometimes, 2-often, or 3-always was given to each item, according its severity and frequency. The TDQ is a culturally relevant questionnaire which has a sensitivity of 0.89 and a specificity of 0.92 at a cutoff score of 18/19, and can be adapted for screening depressed people in the community for epidemiologic studies.[11] In the questionnaire, subjects are asked to recall a physician's diagnosis of eight common physical disorders, (hypertension, hyperlipidemia, diabetes, asthma, heart disease, stroke, renal disease, and osteoporosis). They are also asked if they have any of five common pain symptoms, including joint pain, neck pain, lower back pain, sciatica, and headache, to assess their severity. Disability is assessed using a standard questionnaire of six basic activities of daily living (ADL), which is dichotomized as the presence of functional limitation (functionally dependent in one or more

ADL tasks by observation) and the absence of functional limitation (functionally independent in all ADL tasks by observation).

Statistical analysis

Univariate logistic regression was undertaken to explore the relationship between suicide ideation and subject data, smoking, disability, perceived health status, depression, physical disorders and pain symptoms. Multivariate logistic regression (forward stepwise), using statistically significant variables from the above test, was applied to estimate the predictive power of the variables on suicide ideation.

RESULTS

Of the 3,596 adults ≥ 65 years, 1,846 were men (weighted 52.6%) and 1,750 were women (weighted 47.4%). Two thirds were between 65 and 75 years old, and their mean age was 73.5 years (SD = 5.8). Most (71.3%) had at least one physical disorder. The point prevalence of suicide ideation among elderly patients was 6.1% (men 4.4%, women 7.8%). The prevalence of suicide ideation was 5.9% for those 66-75 years old, 6.1% for those 76-85 years old, and 8.2% for those over 85 years old.

Table 1 presents the univariate relationships between suicide ideation and subject characteristics. Female gender, age over 85 years, non-married status, unemployment, no income, disability, current smoking, and self-perceived bad to very bad health status were founded to be significantly associated with elderly suicide ideation.

Table 2 presents the relationships between suicide ideation and depressive symptoms, physical disorders, and pain symptoms. The current prevalence of depressive symptoms (TDQ score ≥ 19) among the elderly was 9.2% (3.9% mild depression, 3.1% moderate depression, 2.2% severe depression). Depressive symptoms were significantly associated with suicide ideation. Higher scores on the TDQ were significantly correlated with more suicide ideation, and comorbidity with heart disease (OR = 2.03, 95% CI = 1.46-2.80), diabetes (OR = 1.58, 95% CI = 1.09-2.29), asthma (OR = 2.84, 95% CI = 1.76-4.58), and osteoporosis (OR = 1.90, 95% CI = 1.38-2.62) was found to be significantly associated with suicide ideation. When the comorbidity with physical disorders or pain symptoms increased, the association with suicide ideation also increased. Joint pain (OR = 2.07, 95% CI = 1.51-2.82), neck pain (OR = 2.37, 95% CI = 1.71-3.29), lower back pain (OR = 2.51, 95% CI = 1.94-3.43), sciatica (OR = 1.94, 95% CI = 1.36-2.77), and headache (OR = 2.47, 95% CI = 1.81-3.39) were significantly associated with suicide ideation.

In Table 3, we used multivariate logistic regression (forward stepwise) to examine the influence of these variables, which were significant in the previous analysis of suicide ideation in elderly people. Female gender, no income, former smoker, depressive symptoms, and heart disease were found to be significantly associated with elderly suicide ideation.

DISCUSSION

This study analyzed data from a large random sample of the general population, which represented all of the elderly people in Taiwan. The point prevalence of elderly suicide ideation was found to be 6.1%. It was also found that female gender, age over 85 years, low level of education, non-married status, unemployment, no income, disability, current smoking, self-perceived bad to poor health, depressive symptoms, various physical disorders (heart disease, diabetes, asthma, osteoporosis), and pain symptoms (joint pain, lower back pain, neck pain, sciatica pain) were associated with suicide ideation. Moreover, female gender, former smoker, no income, depressive symptoms and heart disease were found to be predictors of elderly suicide ideation.

The point prevalence of elderly suicide idation in our result is much lower than those in two other studies in Taiwan.[8,9] The fact that the study population and instruments differed between these studies may explain why the results are very different. The study samples of Yen et al.[7] and Chang et al.[8] were limited to a local area in southern Taiwan, while our study sample was randomly selected from all of Taiwan. Yen et al. used the same items in the TDQ as our study to assess elderly suicide ideation within one week (point prevalence),[7] but Chang et al. adopted a broader definition of suicide ideation including life not worth living and thoughts of death,[8] to survey the lifetime prevalence rate of suicide ideation among the elderly. When a Diagnostic Interview Schedule was used over nine countries in the last decade, it was reported that the lifetime

Table 1. Subject Data and Suicide Ideation among Elderly People (N = 3,596)

	Suicide ideation (+)		Suicide ideation (-)		Univariate analysis	
	n = 218	Weight %	n = 3,378	Weight %	OR	95% CI
Sex						
Male	82	35.1	1,764	53.9	1	
Female	136	64.9	1,614	46.1	2.17	1.57-3.00
Age (years)						
66-75	146	65.1	2,314	67.3	1	
75-85	60	27.4	930	28.7	0.99	0.69-1.41
> 85	12	7.5	134	4.0	1.93	1.05-3.57
Marital status						
Married	118	52.2	2,100	63.0	1	
Others*	100	47.8	1,278	37.0	1.56	1.14-2.12
Education (years)						
> 12	7	3.2	164	7.4	1	
≦12	211	96.8	3,214	92.6	2.39	1.01-5.66
Religion affiliation						
No	18	9.1	381	12.8	1	
Yes	200	90.9	2,997	87.2	1.46	0.86-2.50
Living status						
Not alone	181	87.7	2,973	88.8	1	
Alone	37	12.3	405	11.2	1.12	0.70-1.79
Employment						
Employed	20	7.5	481	13.4	1	
Unemployed	198	92.5	2,897	86.6	1.91	1.06-3.41
Household income						
Have income	147	62.8	2,595	77.6	1.00	
No income	71	37.2	783	22.4	2.05	1.48-2.84
Disability						
No	156	73.9	3,010	89.1	1	
Yes	62	26.1	368	10.9	2.87	2.00-4.13
Smoking						
Never smoked	139	64.5	2,056	59.6	1	
Former smokers	47	22.5	634	20.1	1.04	0.71-1.52
Current smokers	32	13.0	688	20.3	0.59	0.37-0.94
Perceived health status						
Very good	6	3.9	251	7.9	1	
Good	17	7.4	722	21.3	0.71	0.27-1.85
Fair	58	26.9	1,356	41.5	1.33	0.58-3.05
Bad	96	42.2	925	26.0	3.34	1.48-7.51
Very bad	41	19.6	124	3.2	12.42	5.19-29.76

*: Others included single, divorced, widowed, and separated.

Table 2. Comparison of Depressive Symptoms, Physical Disorders and Pain Symptoms in Elderly Subjects with and without Suicide Ideation

	Suicide ideation (+)		Suicide ideation (–)		Univariate analysis	
	n = 218	Weight %	n = 3,378	Weight %	OR	95% CI
Depressive symptoms						
No	76	32.5	3,238	94.9	1	
Yes	142	67.5	140	5.1	38.96	26.96-56.30
Physical disorders						
Hypertension	105	44.9	1,262	37.6	1.36	0.99-1.85
Hyperlipidemia	39	18.7	611	18.9	0.99	0.66-1.47
Heart disease	78	37.1	701	22.5	2.03	1.46-2.80
Stroke	23	8.5	203	6.7	1.28	0.73-2.24
Diabetes	49	23.4	531	16.1	1.58	1.09-2.29
Asthma	29	13.2	189	5.1	2.84	1.76-4.58
Renal disease	31	12.4	284	8.9	1.45	0.90-2.33
Osteoporosis	90	38.5	842	24.8	1.90	1.38-2.62
Pain symptoms						
Joint pain	123	53.8	1,261	36.0	2.07	1.51-2.82
Neck pain	78	36.3	682	19.4	2.37	1.71-3.29
Lower back pain	120	54.4	1,124	32.2	2.51	1.94-3.43
Sciatica	64	26.7	558	15.9	1.94	1.36-2.77
Headache	105	44.6	844	24.6	2.47	1.81-3.39

Table 3. Multivariate Logistic Regression of Subject Data, Depressive Symptoms, Physical Disorders and Pain Symptoms

	Beta	Odds ratio	95% C.I.	
Female	0.82	2.27	1.29	4.00
No income	0.52	1.68	1.11	2.53
Former smoker	0.72	2.05	1.09	3.85
Depressive symptoms	3.54	34.30	21.89	53.76
Heart disease	0.49	1.63	1.06	2.49

prevalence of suicide ideation among the general population ranged from 2.1% in Lebanon to 18.5% in New Zealand), and was 5.3% in Taiwan.[12] It is difficult to make straightforward comparisons of these prevalences without considering the different cultural backgrounds, research methodology, and instruments used.

Risk factors of suicide ideation

It should be noted that this study examined the risk factors of elderly suicide ideation, not completed suicide, and some factors may be different between them. For example, women have been found to have more suicide ideation than men, but men have more completed suicides than women.[13] Men are noted to seek treatment less often, but use more lethal methods to commit suicide than women.[14]

This study found the point prevalence of suicide

ideation among those 66-75, 76-85, and over 85 years old were 5.9%, 6.1%, and 8.2%, respectively. Some other studies also indicated that increased age is a risk factor for suicide ideation.[15] Elderly people need to face many kinds of loss, including the loss of social roles, death of a partner, declining physical condition, and diminishing cognitive function. With the increasing proportion of the old-old population in Taiwan, this risk is becoming increasingly prevalent.

Single status, smoking, disability, no income, and self perceived bad to poor health status were found to be significantly associated with elderly suicide ideation in this study. These factors have been repeatedly emphasized in other studies as being important signs in the identification of risk in the elderly.[7,15-17]

It had been estimated that the 1-month prevalence rate of elderly depressive neurosis was 13% to 15.3%, and that of major depressive disorder was 5.9% to 6.1% in Taiwan.[18,19] Using a cut off point 18/19 in the TDQ, this study found the prevalence of current depressive symptoms was 9.2%. Our results suggest that depressive symptoms are significantly and independently associated with elderly suicide ideation, which is consistent with previous studies.[20-22] Some research also determined that the severity of depression was an important predictor of suicide ideation and completed suicide in primary care for the elderly, and this was consistent with our study.[4,23]

Physical illness and heavy physical burdens have been associated with elderly suicide ideation,[4,7,24] and this study found that several physical disorders, including heart disease, diabetes, asthma, and osteoporosis, were significantly associated with suicide ideation in the elderly. Our results also indicated that, among all physical disorders, heart disease was an independent predictor of suicide ideation. Skoog et al. reported that myocardial infarction and peptic ulcers were significant risk factors of suicide ideation.[25] The biological basis indicated several probable mechanisms for the association between heart failure and depression, including an abnormal hypothalamic-pituitary-adrenal axis, autonomic nervous system dysfunction, inflammation pathways, cardiac arrhythmias, and altered platelet function.[26] These results indicate that treatment of depression in patients with heart disease will be helpful in preventing elderly suicides.

Joint pain, neck pain, lower back pain, sciatica and headaches were noted to be significantly associated with elderly suicide ideation in our study, and similar results were found in Japan.[24] Among patients with medical illnesses, moderate and severe pain was found to be associated with a higher suicide risk.[27] Another study also found that elderly people with chronic pain suffered adverse effects, including depressed moods, feelings of fatigue, function limitations, sleep problems and lower quality of life.[28]

This study has several limitations. First, since the data was based on a cross-sectional survey, causal inference cannot be determined. Second, depressive symptoms were assessed by the TDQ rather than a standard diagnostic interview, and recall bias should also be considered. Third, some of the variables, such as life events, social support, and cognitive function, were not measured in this study, which may have influenced the results. However, this study was based on a large representative sample, and this strength means that our results could be generalized to the whole of Taiwan. Since the sample size was large and some odds ratios of predictors were just between 1 and 2, we believe they are not only "statistically significant" but also "practice significant" and can help physicians identify suicide ideation among elderly people. To the best of our knowledge, this may be the first study to focus on the prevalence and associated factors of elderly suicide ideation covering the entire country, and it is suggested that a further perspective study should be undertaken to investigate risk factors and protective factors of elderly suicide ideation to develop an effective strategy to prevent sucides in the elderly.

In conclusion, this study found female gender, former smoker, no income, depression and heart disease were the most significant predictors of elderly suicide ideation, which indicates the importance of physicians in the prevention of elderly suicide. We suggest that it is vital that physicians are trained to recognize and manage depression and physical disorders to prevent elderly suicide in Taiwan.

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台灣老人自殺意念盛行率及其相關因素──一個以人口爲基礎的橫切面研究

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背 景： 老人自殺死亡率是一般人口的兩倍。本研究的目的在評估一個代表台灣的老人樣本中自殺意念的盛行率及其相關因素。

方 法： 3,596 位年紀大於 65 歲以上的老人取自 2002 年國民健康局健康促進知識、態度與行爲調查。用台灣人憂鬱量表 (Taiwan Depression Questionnaires, TDQ) 評估自殺意念與憂鬱症狀。使用雙變項與多變項邏輯斯回歸分析，比較有無自殺意念的老人的社會人口因素、抽菸、失能、自覺健康狀態、憂鬱症狀、身體疾病及疼痛症狀。

結 果： 老人自殺意念的點盛行率是 6.1%。女性、年紀大於 85 歲、教育程度國中或以下、非婚姻狀態、無業、無收入、失能、現在抽煙、憂鬱症狀、自覺健康不佳到很差、合併各種身體疾病 (心臟病、糖尿病、氣喘、骨質疏鬆) 及疼痛症狀 (關節痛、下背痛、頸部疼痛、坐骨神經痛、頭痛) 被發現與自殺意念顯著相關。多變項分析發現女性、無收入、憂鬱症狀、以前抽煙及心臟病，是老人自殺意念最佳危險因子。

結 論： 對於有合併憂鬱及心臟病的老人可能有自殺危險，須小心預防。

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關鍵詞：老人，自殺意念，憂鬱，身體疾病

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