Suicidal Ideation, Death Thoughts, and Use of Benzodiazepines in the Elderly Population

Cindy Bossé, Michel Préville, and Helen-Maria Vasiliadis
Université de Sherbrooke, and Charles LeMoyne Research Centre

Sarah-Gabrielle Béland
Université de Montréal

Sylvie Lapierre
Université du Québec à Trois-Rivières

Scientific Committee of the ESA Study
Charles LeMoyne Research Centre

ABSTRACT

Benzodiazepines have been associated with suicidal behaviour in older adults. This study aimed to examine the association between the use of benzodiazepines and suicidal ideation or death thoughts in 2,494 community-dwelling older adults who took part in an interview. Multivariate analysis showed that suicidal ideation or death thoughts were significantly associated with long-term use and a high dose of benzodiazepines. Other contributing factors were the presence of psychological distress symptoms, daily hassles' level, chronic illnesses, and marital status. Physicians should pay attention to the potential for inappropriate prescribing of psychotropic drugs in the elderly with suicide-related risk factors.

Keywords: benzodiazepines, suicidal ideation, elderly

Cindy Bossé, Faculty of Medicine and Health Sciences, Université de Sherbrooke, and Charles LeMoyne Research Centre, Greenfield Park, Quebec; Michel Préville, Faculty of Medicine and Health Sciences, Université de Sherbrooke, and Charles LeMoyne Research Centre, Greenfield Park, Quebec; Helen-Maria Vasiliadis, Faculty of Medicine and Health Sciences, Université de Sherbrooke, and Charles LeMoyne Research Centre, Greenfield Park, Quebec; Sarah-Gabrielle Béland, Faculty of Pharmacy, Université de Montréal, Quebec; Sylvie Lapierre, Department of Psychology, Université du Québec à Trois-Rivières, Quebec.

Correspondence concerning this article should be addressed to Cindy Bossé, Charles LeMoyne Research Centre, 150 Place Charles-Le Moyne, bureau 200, C.P. 11, Longueuil QC J4K 0A8. Email: Cindy.Bosse@USherbrooke.ca

Older adults are common users of benzodiazepines; the prevalence rate of benzodiazepine use in the elderly population has been reported to be as high as 31.9% (Alvarenga, Loyola Filho, Firmo, Lima-Costa, & Uchoa, 2008; Fourrier, Letenneur, Dartigues, Moore, & Begaud, 2001). Because of demographic changes in the North American elderly population, the number of benzodiazepine users is expected to increase in the coming years.

Benzodiazepines are commonly prescribed for the treatment of mental health–related problems such as anxiety disorders, insomnia, and alcohol withdrawal as well for epileptic disorders and muscular spasticity (Canadian Pharmacists Association, 2008). The prevalence rate of anxiety disorders in the elderly has been reported to be up to 10.2% (Beekman et al., 1998; Cairney, Corna, Veldhuizen, Kurdyak, & Streiner, 2008; Schaub & Linden, 2000).

In 2005, the suicide rate in the Canadian elderly population reached 13.1 per 100,000 people (Statistics Canada, 2009). A study conducted by Neutel and Patten (1997) reported a higher risk of suicide attempts with the use of benzodiazepines. More recently, Voaklander and colleagues (2008) also suggested that the use of benzodiazepines, narcotic pain killers, and antidepressants was associated with a higher risk of suicide among seniors. A 15-year longitudinal study also showed a higher risk of committing suicide among women using hypnotics, also a class of benzodiazepines (Allgulander & Näsman, 1991).

It has been hypothesized that paradoxical reactions (depression, gross behavioural disturbances, including uninhibited behaviour, hostility, rebound anxiety, aggression, and rage) may occur with the use of benzodiazepines, particularly in older adults (Agence Française de Sécurité Sanitaire des Produits de Santé, 2002; Bond, 1998; Gutierrez, Roper, & Hahn, 2001; Hall & Zisook, 1981; Kandemir, Yumru, Kul, & Kandemir, 2008; Lee, Petty, & Coccaro, 2009). In fact, the use of benzodiazepines with a long half-life has been associated with self-aggressive behaviours, especially when high doses were consumed (Berman, Jones, & McCloskey, 2005). It is suggested that older adults are at greater risk of experiencing an extended action of benzodiazepines since the drugs' pharmacokinetics are altered in seniors, mainly due to a decrease in renal efficiency and an increased percentage of body fat (Bourin & Renard, 2001; Canadian Pharmacists Association, 2008; Katzung, 2001). Moreover, with aging, the serotonergic system is altered and the receptors of benzodiazepines become more sensitive to this drug (Bissette, 1996; Bourin & Renard, 2001). The serotonergic system is known to play an important role in depression, regulation of anxiety, and suicide (Asberg, Traskman, & Thoren, 1976; Nordström et al., 1994; Stillion & McDowell, 1996).

Although these observations support the hypothesis of a causal association between the use of benzodiazepines and the risk of suicide in older adults, to our knowledge no epidemiological study controlling for potential confounding factors has been done. The goal of the present study was to examine the association between the use of benzodiazepines and the risk of suicide measured by suicidal ideation or death thoughts in the elderly population, controlling for important socioeconomic, demographic, and co-morbid conditions.

METHOD

Data came from a cross-sectional survey on older adults' mental health (Étude sur la Santé des Aînés [ESA] Survey), conducted in 2005–2006. Researchers used a probabilistic sample ($n = 2{,}811$) of French-speaking community-dwelling adults aged 65 and over (94% of the Quebec population speaks French). A

random digit dialling method was used to develop the study sampling frame, which included stratification according to three geographical areas (metropolitan, urban, and rural). In each geographical area, a proportional sample of households was derived on the basis of Quebec's 16 administrative regions. A random sampling method was also used to select only one older adult within the household. The response rate for this study was 66.5%.

Procedure

The research procedure was previously reviewed and authorized by the ethics committee of the Sherbrooke Geriatric University Institute. Informed consent was obtained from all respondents at the beginning of the ESA interview. The consent form included a specific section where respondents could give their medical insurance number in order to allow the ESA researchers to get information on their drug use from the pharmaceutical services files of the RAMQ (Quebec drug insurance plan). RAMQ is an administrative database that holds information on physicians' fees paid out for medical services (inpatient and outpatient) and drugs dispensed. Pharmaceutical services information was linked to the data of the ESA study for 2,494 of the 2,784 respondents who participated in the survey.

Data were collected as follows. First, a health professional contacted the potential respondents by phone to describe the objectives and length of the study and ask them to participate in an in-home interview. A letter was also sent to reassure probable participants about the credibility of the investigation. Appointments were then made with those who volunteered (n = 2,811). The interviewers were health professionals, working for a national polling firm; they were given two days' training on the administration of the ESA computer-assisted questionnaire.

The in-home interviews took place within two weeks of initial contact. Respondents signed a written consent form and were offered CAN$15 compensation for their participation. Since memory problems affect the accuracy of the information given and performance on psychological questionnaires, 27 individuals presenting severe or moderate cognitive problems based on the Mini-Mental State Examination (< 22) were excluded (Burke, Houston, Boust, & Roccaforte, 1989; Crum, Anthony, Basset, & Folstein, 1993; Folstein, Folstein, & McHugh, 1975; Kafonek et al., 1989). Thereafter, participants presenting no moderate or severe cognitive problems (n = 2,784, which represented 99.0% of the initial sample) were invited to respond to the ESA questionnaire.

Measures

Three indicators were used to characterize the benzodiazepine use of the respondents:

- the self-reported use of benzodiazepines during the 12-month period preceding the ESA survey,

- the mean daily dose of benzodiazepine (MDD index) consumed during this period, and

- the number of days of use during the same period as determined by the RAMQ's files.

The length of treatment was categorized as (a) no use, (b) short-term use (1–90 days), and (c) long-term use (91–365 days) in accordance with the guidelines of Quebec College of Medicine (Collège des Médecins du Québec, 1997). The MDD index was constructed using the total number of doses of benzodiazepines received

during the last year divided by the number of days between the first and last prescription of benzodiazepines. At this step, dosages of benzodiazepines were transformed into daily dose of diazepam equivalent (Robitaille, Courchesne, Sylvain, & Vadnais, 1991). In calculating the exposure period, the time respondents were hospitalized or institutionalized was excluded. The MDD index was categorized into a dichotomous variable based on the results reported by Berman and colleagues (2005), which showed that a single dose of 10 mg of diazepam facilitated self-aggression in healthy research volunteers. Since half of the dose prescribed for adults was considered to be an appropriate dose for the elderly (Agence Française de Sécurité Sanitaire des Produits de Santé, 2002; Ashton, 2005), the MDD index was categorized as respondents taking (a) 0 mg, (b) 0 through 5 mg, or (c) more than 5 mg of diazepam equivalent.

The respondents' sociodemographic characteristics such as gender, age, education, family income, region of residence, and marital status were obtained. Age was divided into two categories: 65–74 years, and 75 years and over. Education was classified as elementary school (0–7 years), and high school or more (8 years and over). Family income was dichotomized in reference to the levels designated by Statistics Canada (2000) as indicating low socioeconomic status. It was measured on an annual basis using the following two categories: less than $15,000, and $15,000 or more. The respondents' region of residence was categorized according to population density criteria: metropolitan ($\geq$ 100,000 inhabitants), urban ($\geq$ 1,000), or rural (< 1,000) as defined by the Québec Institute of Statistics (Institut de la statistique du Québec, 2005, p. 5). For this analysis, region of residence was dichotomized as (a) metropolitan, and (b) urban or rural. Finally, marital status was categorized as (a) married, or (b) separated, divorced, widowed, or single.

The presence or absence of suicidal ideation and death thoughts was based on responses to the following questions:

1. During the last 12 months, did you have a period of at least 2 weeks where you thought that you would be better off dead?

2. During the last 12 months, did you seriously think about committing suicide or taking your own life?

These particular questions were used in a Canadian survey and refer to depression criteria according to the DSM-IV (American Psychological Association, 1994; Canadian Community Health Survey 1.2, 2002). Since it has been reported that older people who died by suicide expressed their wish to die to their family or friends or to their doctor before they committed suicide, suicidal ideation and death thoughts were used as proxy variables for suicide risk (Preville, Boyer, Hebert, Bravo, & Seguin, 2005; Waern, Beskow, Runeson, & Skoog, 1999). Risk was categorized as (a) presence of suicidal ideation and/or death thoughts, or (b) absence of suicidal ideation and/or death thoughts. Even if interviewers were not trained to diagnose, they had a list of referrals that they could give, if needed, to respondents who reported psychological distress.

Social support was measured using responses to three questions:

1. In your environment, is there someone you can confide in or talk to freely about your problems?

2. Is there someone in your family or circle of friends who could assist you in time of need?

3. Is there someone you feel close to, a family member or friend, who shows affection towards you?

The variable was categorized as (a) absence of at least one of these sources of social support, and (b) presence of the three sources measured.

Perception of daily hassles was measured using the French adaptation for the elderly of the Daily Hassles Scale (DHS; Landreville & Vezina, 1992; Vezina & Giroux, 1988). The DHS 30-item questionnaire refers to hassles in different areas of life such as family, health, money, and security. Respondents were asked to score the severity of each hassle that occurred in the last month on a 5-point scale ranging from 1 (*not at all severe*) to 5 (*extremely severe*). An index of daily hassles stress was calculated by dividing the sum of the severity score on the 30 items by the total number of items reported. The stress index indicated a low level (< 2, the median score) or a high level (≥ 2) of stress.

The respondents' physical health status was assessed using the number of chronic illnesses reported from a list of 16 diseases based on the International Classification of Disease (ICD-10). Participants were divided according to the number of illnesses: (a) one or no chronic illnesses, and (b) two or more chronic illnesses. The respondents' mental health status was measured using a computer-assisted questionnaire based on DSM-IV criteria (American Psychological Association, 1994). Symptoms of psychiatric diagnostics were measured using the Diagnostic Interview Schedule (DIS) and the Composite International Diagnostic Interview (CIDI), which demonstrated satisfactory reliability (kappa ≥ 0.5) and good validity for depression and anxiety (Levitan, Blouin, Navarro, & Hill, 1991; Murphy, Monson, Laird, Sobol, & Leighton, 2000; Semler et al., 1987; Wittchen, 1994; Wittchen et al., 1991). However, the ESA survey was designed to include additional information on impairment in social functioning activities relevant for the elderly. The complete definition of the disorders studied in the ESA survey has been reported previously (Preville et al., 2008). For the analysis, the respondents were classified as having (a) no psychological distress symptoms, or (b) one or more psychological distress symptoms.

Analysis

Data were weighted to ensure that the true proportions of older adults in each region and geographical area were reflected in the analysis. A bivariate and a multivariate logistic regression were performed to describe the association between suicidal ideation and death thoughts and the covariates studied. The three indicators of benzodiazepine use (Model 1: self-reported use; Model 2: MDD index; and Model 3: length of use) were included separately in three different multivariate models since these variables were strongly correlated. The statistical analysis was performed using SPSS software version 16.0. The odds ratio was used as a measure of association between the variables studied, and the hypothesis was tested at a significance level of 5%.

RESULTS

As shown in Table 1, a small majority of the sample were women, 58% of the respondents were aged between 65 and 74 years, 54% were unmarried, and 44% were living in a metropolitan area. Nearly 76% of the respondents had an annual income greater than $15,000. A majority of the respondents (77.4%) reported having 8 or more years of education. Twenty-five percent of the respondents reported using at least one benzodiazepine during the year preceding the ESA interview. Overall, 6.3% of respondents indicated having had suicidal ideation or death thoughts in the same period (10.6% of the benzodiazepine users and 4.4% of the non-benzodiazepine users; $p < .01$). About 86% of the respondents reported receiving all three sources of social support measured, and 60% had a daily hassles stress index of two or more. Finally, 33% of

respondents reported having at least one psychological distress symptom in the 12-month period preceding the ESA survey, and 78.2% reported at least two chronic illnesses at the time of the interview.

Table 1
Respondents' Sociodemographic and Health Characteristics

	Sample (n = 2,494)		
	n	%	CI (95%)
Gender			
Woman	1,445	57.9	55.4 - 60.4
Man	1,049	42.1	39.1 - 45.1
Age			
65–74 years	1,447	58.0	55.5 - 60.5
75 years and over	1,047	42.0	39.0 - 45.0
Marital status			
Married	1,155	46.3	43.4 - 49.2
Separated/divorced/widowed/never married	1,339	53.7	51.0 - 56.4
Region			
Urban/rural	1,401	56.2	53.6 - 58.8
Metropolitan	1,093	43.8	40.9 - 46.7
Income			
Less than $15,000	414	16.6	13.0 - 20.2
More than $15,000	1,892	75.8	73.9 - 77.7
Education			
0–7 years	561	22.6	19.0 - 26.0
8 years and over	1,926	77.4	75.3 - 79.1
Benzodiazepine users (self-reported)			
Yes	625	25.0	21.6 - 28.4
No	1,869	75.0	73.0 - 77.0
Suicidal ideation or death thoughts			
Yes	156	6.3	2.5 - 10.1
No	2,338	93.7	92.7 - 94.7
Sources of social support			
0–2 sources	354	14.4	10.6 - 17.8
3 sources	2,112	85.6	83.2 - 86.2
Daily hassles stress index			
Less than 2	993	39.8	36.8 - 42.8
2 or more	1,501	60.2	57.7 - 62.7
Number of psychological distress symptoms			
None	1,671	67.0	64.7 - 69.3
One or more	823	33.0	29.8 - 36.2
Number of chronic illnesses			
0–1	543	21.8	18.3 - 25.3
2 or more	1,951	78.2	76.4 - 80.0

Note. CI = confidence interval.

As shown in Table 2, the most prevalent benzodiazepine used was Lorazepam (11%). Among the benzodiazepine users, the mean and the median number of days of use during the year prior to the ESA study were respectively 204.61 days (*SD* = 129.75) and 203.28 days. The mean daily dose of diazepam equivalent used and the median were 6.10 mg (*SD* = 7.60) and 3.70 mg.

Table 2
Classes of Benzodiazepines Used

	Sample (*n* = 2,494)		
	n*		%
Xanax- Alprazolam	38		1.5
Lectopam- Bromazepam	46		1.9
Rivotril- Clonazepam	66		2.6
Ativan- Lorazepam	273		11.0
Serax- Oxazepam	138		5.6
Restoril- Temazepam	55		2.2
Dalmane- Flurazepam	29		1.2
Mogadon- Nitrazepam	10		0.4
Halcion- Triazolam	3		0.1
ProSom- Estrazolam	1		0.0
	Mean	*SD*	Median
Mean daily dose (mg)	6.10	7.60	3.70
Number of days of use (1–365)	204.61	129.75	203.28

Note. *Certain respondents used more than one benzodiazepine.

As reported in Table 3, the bivariate analysis showed a significant association between the respondents' suicidal ideation or death thoughts and gender, marital status, income, daily hassles stress index, number of psychological distress symptoms, and number of chronic illnesses. A significant bivariate association was found between the presence of suicidal ideation or death thoughts and reported use of benzodiazepines, their mean daily dose, and the number of days of benzodiazepine use. In the multivariate analysis, the self-reported use of benzodiazepines (*OR* = 1.46, 95% CI: 1.02–2.11), the long-term use of benzodiazepines (> 90 days; *OR* = 1.57, 95% CI: 1.05–2.33), and a higher mean daily dose of benzodiazepines (> 5 mg; *OR* = 1.87, 95% CI: 1.18–2.98) were still significantly associated with the presence of suicidal ideation or death thoughts. The multivariate models also showed a significant association between the presence of suicidal ideation or death thoughts and respondents' marital status (*OR* = 1.98, 95% CI: 1.31–2.99), daily hassles stress index (*OR* = 2.59, 95% CI: 1.62–4.13), the presence of more than two chronic illnesses (*OR* = 2.26, 95% CI: 1.21–4.22), and the presence of psychological distress symptoms (*OR* = 9.47, 95% CI: 5.96–15.05).

Table 3

Bivariate and Multivariate Logistic Regression Between Suicidal Ideation or Death Thoughts and Respondents' Sociodemographic, Health Characteristics, and Use of Benzodiazepines

	Presence of suicidal ideation or death thoughts				Sample (n = 2,494)					
						Model 1		Model 2		Model 3
	No	Yes	OR	CI (95%)	OR**	CI (95%)	OR**	CI (95%)	OR**	CI (95%)
Gender										
Man	1,004	45	*		*		*		*	
Woman	1,334	111	1.86	1.30 - 2.65	1.15	0.77 - 1.71	1.14	0.76 - 1.70	1.11	0.74 - 1.65
Age										
65–74 years	1,354	93	1.07	0.77 - 1.49	1.19	0.81 - 1.73	1.20	0.83 - 1.76	1.19	0.82 - 1.74
75 years and over	984	63	*		*		*		*	
Marital status										
Married	1,107	47	*		*		*		*	
Separated/divorced/widowed/never married	1,231	109	2.09	1.47 - 2.97	1.99	1.32 - 3.00	1.98	1.31 - 2.99	1.98	1.31 - 2.99
Region										
Urban/rural	1,302	99	1.38	0.99 - 1.93	0.96	0.66 - 1.41	0.94	0.64 - 1.37	0.95	0.65 - 1.38
Metropolitan	1,036	57	*		*		*		*	
Income										
Less than $15,000	376	38	1.61	1.09 - 2.36	1.02	0.65 - 1.62	0.97	0.61 - 1.55	1.00	0.63 - 1.59
More than $15,000	1,780	112	*		*		*		*	
Education										
0–7 years	521	40	1.20	0.83 - 1.74	0.93	0.61 - 1.42	0.91	0.60 - 1.40	0.93	0.61 - 1.42
8 years and over	1,809	116	*		*		*		*	
Sources of social support										
0–2 sources	325	30	1.48	0.98 - 2.24	1.18	0.73 - 1.90	1.17	0.72 - 1.88	1.18	0.73 - 1.90
3 sources	1,988	124	*		*		*		*	
Daily hassles stress index										
Less than 2	967	26	*		*		*		*	
2 or more	1,371	130	3.52	2.30 - 5.41	2.59	1.62 - 4.13	2.62	1.64 - 4.18	2.60	1.63 - 4.16
Number of psychological distress symptoms										
None	1,647	24	*		*		*		*	
One or more	691	132	13.16	8.40 - 17.24	9.59	6.03 - 15.24	9.47	5.96 - 15.05	9.61	6.05 - 15.27
Number of chronic illnesses										
None or one	531	12	*		*		*		*	
2 or more	1,807	144	3.52	1.94 - 6.41	2.31	1.23 - 4.31	2.26	1.21 - 4.22	2.30	1.23 - 4.30
Benzodiazepine use (self-reported)										
Yes	558	67	2.40	1.72 - 3.34	1.46	1.02 - 2.11				
No	1,780	89	*		*					
Mean daily dose of benzodiazepines (MDD index)										
0 mg	1,673	77	*				*			
1–5 mg	424	42	2.13	1.44 - 3.15			1.42	0.92 - 2.19		
> 5 mg	241	37	3.31	2.18 - 5.01			1.87	1.18 - 2.98		
Length of benzodiazepine use										
None (0 days)	1,673	77	*						*	
Short-term (1–90 days)	206	21	2.18	1.31 - 3.61					1.70	0.97 - 2.97
Long-term (91–365 days)	459	58	2.73	1.91 - 3.89					1.57	1.05 - 2.33

Notes. *Indicates the reference category for calculating the odds ratio (OR). CI = confidence interval.
**Adjusted for all covariables.

DISCUSSION

The goal of this study was to examine the association between the use of benzodiazepines and the presence of suicidal ideation or death thoughts in a community-dwelling elderly population. Results indicate that 25% of the respondents reported using benzodiazepines during the year preceding the interview. The 1-year prevalence of benzodiazepine use observed in this study is higher than the 22.1% reported by Preville, Hebert, Boyer, and Bravo (2001). This may be due to the fact that they were interested in the benzodiazepines taken by the respondents during the 2-day period prior to the interview, while the present study estimated the 1-year prevalence. The prevalence of suicidal ideation and death thoughts reported in this study (6.3%) was similar to the annual prevalence (5.5%) reported by Yip and colleagues (2003) and to results from two other studies reporting on suicidal ideation during a 2-week period in the elderly population (Ayalon, Mackin, Arean, Chen, & McDonel Herr, 2007; Pfaff & Almeida, 2005).

When the effect of potentially confounding variables was controlled, results show an association between the use of benzodiazepines and the presence of suicidal ideation and death thoughts among the elderly. More precisely, results suggest that elderly people using a mean daily dose of benzodiazepines greater than 5 mg were 1.87 times more likely to report suicidal ideation or death thoughts than non-users. In addition, results suggest that benzodiazepine long-term users (91 days and more) were 1.57 times more likely to report suicidal ideation or death thoughts than non-users. These findings agree with the results presented by Neutel and Patten (1997), who examined suicide attempters and benzodiazepine use in the general population. They found that suicide attempts and the use of benzodiazepines were statistically significantly associated, even after stratifying for antidepressant use. One drawback of the study was that the authors were unable to control for participants' mental and physical health status or other possible confounding factors. The ESA study has the advantage of including a valid measure of the mental health status of the participants. Results are also in accordance with those reported by Voaklander and colleagues (2008), who found that benzodiazepine use was associated with suicide, and that there was an elevated risk for those prescribed inappropriate benzodiazepines, as defined by Beer's Explicit Criteria. The results of this study, however, contradict findings from an earlier study reporting that high-dose benzodiazepine users, defined by the maximum dose recommended by national guidelines, were not more likely to have more suicide attempts in their histories than a control group matched for mental health status (Lekka, Paschalis, & Beratis, 2002). However, their sample was made up of psychiatric patients, who may differ clinically from the older adult general population. Although our study may or may not be in agreement with other studies, methodological discrepancies (study population, definition of inappropriate prescribing, and different outcomes such as committing suicide, suicide attempts or suicidal ideation) can still make comparisons difficult.

In this study, suicidal ideation or death thoughts are highly associated with the presence of psychological distress symptoms. Results show that a higher stress index of daily hassles and the presence of two or more chronic illnesses are also significantly associated with suicidal ideation or death thoughts in the elderly population. These findings are consistent with results from other studies that identified psychological distress, physical illness, and stressful hassles as risk factors for suicidal behaviour in the elderly (Alpass & Neville, 2005; Inoue et al., 2007; Preville et al., 2001; Preville et al., 2005; Quan, Arboleda-Florez, Fick, Stuart, & Love, 2002). Findings of the ESA study are also in agreement with results reported by Weissman and colleagues (1999) that suggested that being married is a protective factor against suicide. Finally, results suggest

that age, gender, region of residence, income, education, and social support are not significantly associated with the presence of suicidal ideation or death thoughts when controlling for potential confounding factors.

The findings of this study should be interpreted with caution. First, the cross-sectional design of this study does not allow us to determine the direction of the association observed between the use of benzodiazepines and the presence of suicidal ideations and death thoughts. It could be argued that long-term use and high doses of benzodiazepines could have caused the presence of suicidal ideation or that the presence of suicidal ideation could have led respondents to consult a general practitioner, who subsequently prescribed benzodiazepines.

Second, the measure of the presence of suicidal ideation or death thoughts in the ESA study may include an information bias since it relied on single self-reported items, in accordance with other research in the field (Jorm et al., 1995; Kim, Bogner, Brown, & Gallo, 2006; Scocco, Meneghel, Caon, Dello Buono, & De Leo, 2001). Moreover, the lack of a sensitivity and specificity test of the measure used to detect a case of suicidal ideation or death thoughts could be reported as a limitation. Although we recognized this limitation, there are no validated multi-item scales to explore the wish to die and the presence of suicidal ideation at the same time. Future research could develop new instruments that evaluate this concept. Third, even if the prescription claims database is reported to be one of the most accurate means of determining drugs dispensed to individuals (Tamblyn, Lavoie, Petrella, & Monette, 1995), there may be limitations in using this database for dosage information. Results from the ESA research team, however, showed that there is strong agreement between self-reported use of benzodiazepines and dispensing of benzodiazepines as reported in the RAMQ database. Finally, it was not possible to control for the respondents' use of antidepressants and/or alcohol. It could be argued that the inclusion of these potentially confounding variables would have an impact on results. In spite of these limitations, this study is one of the first population-based studies that included a large representative sample of the elderly population and investigated the association between benzodiazepine use and the wish to die while controlling for the social, mental, and physical health status of respondents.

CONCLUSION

In conclusion, evidence was found of an association between long-term use and a high dose of benzodiazepines and the presence of suicidal ideation or death thoughts in an older adult population while controlling for a number of important confounding factors. The design of the study did not make it possible to determine the temporal sequence and causality of such an association between these variables. Future population-based studies should use a longitudinal design and control for factors that consider respondents' social, physical, and mental health status in order to obtain reliable estimates of the effect of benzodiazepine use on suicidal behaviour in the elderly population.

RÉSUMÉ

La consommation de benzodiazépines a été associée au comportement suicidaire chez les aînés. Cette étude a pour but d'examiner l'association entre la consommation de benzodiazépines et les idées suicidaires ou idées de mort chez 2494 personnes âgées vivant à domicile et ayant pris part à une entrevue. L'analyse multivariée a montré que la présence d'idées suicidaires et d'idées de mort était significativement associée à une consommation à long terme ainsi qu'à une consommation de doses élevées de benzodiazépines. Les

autres facteurs associés étaient la présence de symptômes de détresse psychologique, le niveau de tracas quotidiens, les maladies chroniques et le statut matrimonial. Les médecins devraient porter une attention particulière à la prescription inappropriée de psychotropes chez les personnes âgées présentant des facteurs de risque reliés au suicide.

Mots clés : benzodiazepines, idéations suicidaires, personnes âgées

REFERENCES

Agence Française de Sécurité Sanitaire des Produits de Santé. (2002). *Soins palliatifs : spécificité d'utilisation des médicaments courants hors antalgiques, Recommandations* [Recommendations for the use of drugs in palliative care for symptoms other than pain]. Retrieved July 15, 2010, from http://www.afssaps.fr/Infos-de-securite/Recommandations-de-bonne-pratique

Allgulander, C., & Näsman P. (1991). Regular hypnotic drug treatment in a sample of 32,679 Swedes: Associations with somatic and mental health, inpatient psychiatric diagnoses and suicide, derived with automated record-linkage. *Psychosomatic Medicine, 53*(1), 101-108.

Alpass, F.M., & Neville, S.J. (2005). Suicidal ideation in older New Zealand males (1991–2000). *International Journal of Men's Health, 4*(3), 277-285.

Alvarenga, J.M., Loyola Filho, A.I., Firmo, J.O., Lima-Costa, M.F., & Uchoa, E. (2008). Prevalence and sociodemographic characteristics associated with benzodiazepines use among community dwelling older adults: The Bambuí Health and Aging Study (BHAS). *Revista Brasileira de Psiquiatria, 30*(1), 7-11.

American Psychological Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Asberg, M., Traskman, L., & Thoren, P. (1976). 5-HIAA in the cerebrospinal fluid: A biochemical suicide predictor? *Archives of General Psychiatry, 33*(10), 1193-1197.

Ashton, C.H. (2005). History of benzodiazepines: What the textbooks may not tell you. *Proceedings of the 3rd Annual Benzodiazepine Conference*, October 12, Bangor, Maine. Retrieved July 13, 2010, from http://www.psychmedaware.org/HistoryBenzodiazepines.html

Ayalon, L., Mackin, S., Arean, P.A., Chen, H., & McDonel Herr, E.C. (2007). The role of cognitive functioning and distress in suicidal ideation in older adults. *Journal of the American Geriatrics Society, 55*(7), 1090-1094.

Beekman, A.T., Bremmer, M.A., Deeg, D.J., van Balkom, A.J., Smit, J.H., de Beurs, E., . . . van Tilbury, W. (1998). Anxiety disorders in later life: A report from the Longitudinal Aging Study Amsterdam. *International Journal of Geriatric Psychiatry, 13*(10), 717-726.

Berman, M.E., Jones, G.D., & McCloskey, M.S. (2005). The effects of diazepam on human self-aggressive behavior. *Psychopharmacology, 178*(1), 100-106.

Bissette, G. (1996). Chemical messengers. In E.W. Busse & D.B.G. Blazer (Eds.), *Textbook of geriatric psychiatry* (pp. 73-93). Washington, DC: American Psychiatric Press.

Bond, A.J. (1998). Drug-induced behavioural disinhibition. *CNS Drugs, 9*(1), 41-57.

Bourin, M., & Renard, C. (2001). Pharmacotherapy of benzodiazepines in the aged patient. *Bulletin of Clinical Psychopharmacology, 11*, 192-197.

Burke, W.J., Houston, M.J., Boust, S.J., & Roccaforte, W.H. (1989). Use of the Geriatric Depression Scale in dementia of the Alzheimer type. *Journal of the American Geriatrics Society, 37*(9), 856-860.

Cairney, J., Corna, L.M., Veldhuizen, S., Kurdyak, P., & Streiner, D.L. (2008). The social epidemiology of affective and anxiety disorders in later life in Canada. *Canadian Journal of Psychiatry, 53*(2), 104-111.

Canadian Community Health Survey (CCHS 1.2) (2002). Derived variable document. Retrieved June 6, 2010, from www.statcan.gc.ca/imdb-bmdi/document/5015_D8_T9_V1-eng.pdf

Canadian Pharmacists Association. (2008). *Compendium des produits et spécialités pharmaceutiques* [Compendium of pharmaceuticals and specialties]. Ed. C. Repchinsky. Ottawa, ON: Author.

Collège des Médecins du Québec. (1997). L'utilisation prolongée des benzodiazépines [Long-term use of benzodiazepines]. *Le Collège, XXXVIL*(3), 23. Retrieved May 25, 2010, from http://www.cmq.org/DocumentLibrary/UploadedContents/CmsDocuments/lignesrecommandationbzd.pdf

Crum, R.M., Anthony, J.C., Basset, S.S., & Folstein M.F. (1993). Population-based norms for the Mini-Mental State Examination by age and educational level. *Journal of the American Medical Association, 269*(18), 2386-2391.

Folstein, M.F., Folstein, S.E., & McHugh, P.R. (1975). Mini-Mental State: A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research, 12*(3), 189-198.

Fourrier, A., Letenneur, L., Dartigues, J.F., Moore, N., & Begaud, B. (2001). Benzodiazepine use in an elderly community-dwelling population. Characteristics of users and factors associated with subsequent use. *European Journal of Clinical Pharmacology, 57*(5), 419-425.

Gutierrez, M.A., Roper, J.M., & Hahn, P. (2001). Paradoxical reactions to benzodiazepines: When to expect the unexpected. *The American Journal of Nursing, 101*, 34-39.

Hall, R.C., & Zisook, S. (1981). Paradoxical reactions to benzodiazepines. *British Journal of Clinical Pharmacology, 11*(Suppl. 1), 99S-104S.

Inoue, K., Tanii, H., Fukunaga, T., Abe, S., Nishimura, F., Kimura, Y., . . . Okazaki, Y. (2007). Psychosomatic tendency for suicide among the elderly in Mie Prefecture, Japan. *Psychogeriatrics, 7*(2), 44-48.

Institut de la statistique du Québec. (2005). Lexique du système du code géographique du Québec [Glossary of the system of geographical codes in Quebec]. Retrieved May 9, 2011, from http://www.stat.gouv.qc.ca/publications/referenc/pdf2008/lexique_nov2005. pdf

Jorm, A.F., Henderson, A.S., Scott, R., Korten, A.E., Christensen, H., & Mackinnon, A.J. (1995). Factors associated with the wish to die in elderly people. *Age and Ageing, 24*(5), 389-392.

Kafonek, S., Ettinger, W.H., Roca, R., Kittner, S., Taylor, N., & German, P.S. (1989). Instruments for screening for depression and dementia in a long-term care facility. *Journal of the American Geriatrics Society, 37*(1), 29-34.

Kandemir, H., Yumru, M., Kul, M., & Kandemir, S.B. (2008). Behavioral disinhibition, suicidal ideation, and self-mutilation related to clonazepam. *Journal of Child and Adolescent Psychopharmacology, 18*(4), 409.

Katzung, B.G. (2001). Special aspects of geriatric pharmacology. In B.G. Katzung (Ed.), *Basic and clinical pharmacology* (pp. 1036-1044). New York: Lange.

Kim, Y.A., Bogner, H.R., Brown, G.K., & Gallo, J.J. (2006). Chronic medical conditions and wishes to die among older primary care patients. *International Journal of Psychiatry in Medicine, 36*(2), 183-198.

Landreville, P., & Vezina, J. (1992). A comparison between daily hassles and major life events as correlates of well-being in older adults. *Canadian Journal on Aging, 11*(1), 137-149.

Lee, R., Petty, F., & Coccaro, E.F. (2009). Cerebrospinal fluid GABA concentration: Relationship with impulsivity and history of suicidal behavior, but not aggression, in human subjects. *Journal of Psychiatric Research, 43*(4), 353-359.

Lekka, N.P., Paschalis, C., & Beratis, S. (2002). Suicide attempts in high-dose benzodiazepine users. *Comprehensive Psychiatry, 43*(6), 438-442.

Levitan, R.D., Blouin, A.G., Navarro, J.R., & Hill, J. (1991). Validity of the computerized DIS for diagnosing psychiatric inpatients. *Canadian Journal of Psychiatry, 36*(10), 728-731.

Murphy, J.M., Monson, R.R., Laird, N.M., Sobol, A.M., & Leighton, A.H. (2000). A comparison of diagnostic interviews for depression in the Stirling County study: Challenges for psychiatric epidemiology. *Archives of General Psychiatry, 57*(3), 230-236.

Neutel, C.I., & Patten, S.B. (1997). Risk of suicide attempts after benzodiazepine and/or antidepressant use. *Annals of Epidemiology, 7*(8), 568-574.

Nordström, P., Samuelsson, M., Asberg, M., Traskman-Bendz, L., Aberg-Wistedt, A., Nordin, C., & Bertilsson, L. (1994). CSF 5-HIAA predicts suicide risk after attempted suicide. *Suicide and Life-Threatening Behavior, 24*(1), 1-9.

Pfaff, J.J., & Almeida, O.P. (2005). Detecting suicidal ideation in older patients: Identifying risk factors within the general practice setting. *The British Journal of General Practice, 55*(513), 269-273.

Preville, M., Boyer, R., Grenier, S., Dube, M., Voyer, P., Punti, R., . . . Scientific Committee of the ESA Study. (2008). The epidemiology of psychiatric disorders in Quebec's older adult population. *Canadian Journal of Psychiatry, 53*(12), 822-832.

Preville, M., Boyer, R., Hebert, R., Bravo, G., & Seguin, M. (2005). Correlates of suicide in the older adult population in Quebec. *Suicide and Life-Threatening Behavior, 35*(1), 91-105.

Preville, M., Hebert, R., Boyer, R., & Bravo, G. (2001). Correlates of psychotropic drug use in the elderly compared to adults aged 18–64: Results from the Quebec Health Survey. *Aging and Mental Health, 5*(3), 216-224.

Quan, H., Arboleda-Florez, J., Fick, G.H., Stuart, H.L., & Love, E.J. (2002). Association between physical illness and suicide among the elderly. *Social Psychiatry and Psychiatric Epidemiology, 37*(4), 190-197.

Robitaille, L., Courchesne, M., Sylvain, J., & Vadnais, M. (1991). Anxiolytiques et hypnotiques [Anxiolytics and hypnotics]. In G. Barbeau, J. Guimond, & L. Mallet (Eds.), *Médicaments et personnes âgées* (pp. 257-274). Saint-Hyacinthe : Edisem et Maloine.

Schaub, R.T., & Linden, M. (2000). Anxiety and anxiety disorders in the old and very old: Results from the Berlin Aging Study (BASE). *Comprehensive Psychiatry, 41*(2 Suppl. 1), 48-54.

Scocco, P., Meneghel, G., Caon, F., Dello Buono, M., & De Leo, D. (2001). Death ideation and its correlates: Survey of an over-65-year-old population. *The Journal of Nervous and Mental Disease, 189*(4), 210-218.

Semler, G., Wittchen, H.U., Joschke, K., Zaudig, M., von Geiso, T., Kaiser, S., . . . Pfister, H. (1987). Test-retest reliability of a standardized psychiatric interview (DIS/CIDI). *European Archives of Psychiatry and Neurological Sciences, 236*(4), 214-222.

Statistics Canada. (2000). *Income in Canada.* Cat. No. 75-202-XIE. Retrieved June 2, 2010, from http://www.statcan.gc.ca/pub/75-202-x/75-202-x2000000-eng.pdf

Statistics Canada. (2009). Suicides and suicide rate, by sex and by age group [Table]. Retrieved July 14, 2010, from http://www40.statcan.gc.ca/l01/cst01/hlth66d-eng.htm

Stillion, J.M., & McDowell, E.E. (1996). Perspectives on the nature and causes of suicide. In H. Wass (Consulting Ed.), *Suicide across the life span* (pp. 66-71). Washington, DC: Taylor and Francis.

Tamblyn, R., Lavoie, G., Petrella, L., & Monette, J. (1995). The use of prescription claims databases in pharmaco-epidemiological research: The accuracy and comprehensiveness of the prescription claims database in Quebec. *Journal of Clinical Epidemiology, 48*(8), 999-1009.

Vezina, J., & Giroux, L. (1988). L'Échelle des Embêtements : une étude de validation française du « Hassles Scale » pour les personnes âgées. *Proceedings of the 49th Annual Meeting of the Canadian Psychological Association*. Montreal, Quebec.

Voaklander, D.C., Rowe, B.H., Dryden, D.M., Pahal, J., Saar, P., & Kelly, K.D. (2008). Medical illness, medication use and suicide in seniors: A population-based case-control study. *Journal of Epidemiology and Community Health, 62*(2), 138-146.

Waern, M., Beskow, J., Runeson, B., & Skoog, I. (1999). Suicidal feelings in the last year of life in elderly people who commit suicide. *Lancet, 354*(9182), 917-918.

Weissman, M.M., Bland, R.C., Canino, G.J., Greenwald, S., Hwu, H.G., Joyce, P.R., . . . Yeh, E.K. (1999). Prevalence of suicide ideation and suicide attempts in nine countries. *Psychological Medicine, 29*(1), 9-17.

Wittchen, H.U. (1994). Reliability and validity studies of the WHO – Composite international diagnostic interview (CIDI): A critical review. *Journal of Psychiatric Research, 28*(1), 57-84.

Wittchen, H.U., Robins, L.N., Cottler, L.B., Sartorius, N., Burke, J.D., & Regier, D. (1991). Cross-cultural feasibility, reliability and sources of variance of the Composite International Diagnostic Interview (CIDI). The Multicentre WHO/ADAMHA Field Trials. *British Journal of Psychiatry, 159*, 645-653.

Yip, P.S., Chi, I., Chiu, H., Chi Wai, K., Conwell, Y., & Caine, E. (2003). A prevalence study of suicide ideation among older adults in Hong Kong SAR. *International Journal of Geriatric Psychiatry, 18*(11), 1056-1062.