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Prevalence and correlates of psychotropic medication use among older adults in Israel: Cross-sectional and longitudinal findings from two cohorts a decade apart

Tzvia Blumstein[1], **Yael Benyamini**[2,3], **Angela Chetrit**[1], **Eliyahu H. Mizrahi**[4], and **Liat Lerner-Geva**[1,5]

[1]The Gertner Institute for Epidemiology and Health Policy Research, Sheba Medical Center, Tel Hashomer, Israel

[2]Bob Shapell School of Social Work, Tel Aviv University, Tel Aviv, Israel

[3]The Herczeg Institute on Aging, Tel Aviv University, Tel Aviv, Israel

[4]Department of Geriatric Medicine & Rehabilitation, Sheba Medical Center, Tel Hashomer, Israel

[5]Sackler Faculty of Medicine, Tel Aviv University, Israel

Abstract

Objectives—To assess: 1) changes in use of psychotropic medications across two cohorts, ten years apart, of community-dwelling elderly and the socio-demographic, physical and mental health correlates of their use; and 2) changes in psychotropic medication use over 3.5 years follow-up.

Methods—Data were taken from two national surveys of the Israeli Jewish population aged 75–94, which respectively sampled two cohorts in 1989 (n=1200) and again in 1999 (n=421). Psychotropic medications were assessed from the list of all medications recorded during a face-to-face interview. The current analysis focused on two medication groups: anxiolytics & sedatives/hypnotics and antidepressants.

Results—Sedatives/hypnotics & anxiolytics use increased from 22.2% in 1989 to 25.4% in 1999 and antidepressants from 3.8% to 4.8% (both nonsignificantly) corresponding to a decline in the health profile of community-dwelling older adults. Similar patterns of associations were observed for socio-demographics, physical and mental health status indicators with use of psychotropic medications across the two cohorts. The pooled multivariate analysis showed significantly higher use of sedative/hypnotics & anxiolytics among women and lower use among religious elderly. Additional risk factors were sleeping problems, number of other medications, depressive symptoms and traumatic life events. Antidepressants use was related to a higher education, ADL disability and depressive symptoms. Longitudinally, use of psychotropic medications was not significantly different among participants who were followed again after 3.5 years.

Conclusions—Sedative/hypnotics & anxiolytics use was relatively high while antidepressants use was low even among depressed elderly suggesting that some depressed elderly were treated inappropriately with benzodiazepines.

Corresponding author: Tzvia Blumstein, The Gertner Institute, Sheba Medical Center, Tel Hashomer, Ramat Gan 52621, Israel, Tel: (+) 972-3-5303505; Fax: (+) 972-3-5354057, tzviabl@gertner.health.gov.il.

Introduction

The elderly are high users of sedatives, hypnotics and anti-anxiety agents, psychotropic medications that are widely prescribed in ambulatory care. The higher use of these medications among the old-old population is related to their higher rates of sleep disturbances, chronic physical diseases, depressive symptoms and use of health services (Beland et al., 2010; Jorm, Grayson, Creasey, Waite, & Broe, 2000).

Studies on patterns of psychotropic medications use among the old-old raise an important concern with regard to the appropriate use of benzodiazepines, the main ingredient in most sedative, hypnotic and anti-anxiety medications, because of potential adverse consequences in their long term use. Recently, among older people with dementia, use of central nervous system medications was linked to a high number of drug-related problems such as syncope, fatigue, delirium, falls and fractures (Fick, Kolanowski, & Waller, 2007). Other adverse consequences among the general older population include reduced cognitive function (Bowen & Larson, 1993);(Hanlon et al., 1998), increased risk of falls (Herings, Stricker, de Boer, Bakker, & Sturmans, 1995) leading to hip-fractures (Cumming & Klineberg, 1993) (Lichtenstein, Griffin, Cornell, Malcolm, & Ray, 1994), increased depressed affect (Sonnenberg, Beekman, Deeg, & van Tilburg, 2003) and lower subjective and objective sleep quality (Beland et al., 2010).

Trends in the use of psychotropic medications across time were assessed on the basis of nationally representative cross-sectional health surveys at two or more points in time (Paulose-Ram, Safran, Jonas, Gu, & Orwig, 2007; Wittkampf et al., 2010; Zuvekas, 2005), national/municipal data for prescribing these medications by general practitioners (Middleton, Gunnell, Whitley, Dorling, & Frankel, 2001) or drugs sales statistics (Isacson & Smedby, 1988). Generally, information with regard to older individuals can be retrieved from population-based studies. Overall, use of psychotropic medications, particularly antidepressants, increased during the 1990s in the U.S. and U.K (Middleton et al., 2001; Olfson et al., 2002; Paulose-Ram et al., 2007) while the use of benzodiazepines has decreased or remained stable among the elderly (Paulose-Ram et al., 2007; Taylor, McCracken, Wilson, & Copeland, 1998).

Findings from longitudinal studies showed trends in individual usage over time (Blazer, Hybels, Simonsick, & Hanlon, 2000; Colman, Wadsworth, Croudace, & Jones, 2006). In a follow-up study of elderly 65+ over 10 years in the U.S., the use of sedatives, hypnotics, and anti-anxiety medications decreased only slightly from 1986 to 1996 with no meaningful decline in persons aged 85+ (Blazer et al., 2000). Findings from a longitudinal follow-up in a Dutch community (van Hulten, Leufkens, & Bakker, 1998) showed reduced use of benzodiazepines from 1983 to 1992 for all ages, based on prescription sales.

Cross-sectional patterns of use of psychotropic medications show consistent findings with regard to gender (more frequent in women), race (more frequent among Whites), high depressive symptoms and worse reported health (Blazer et al., 2000; Dealberto, Seeman, McAvay, & Berkman, 1997; Gleason et al., 1998; Preville, Hebert, Boyer, & Bravo, 2001). Findings with regard to age are less consistent. In several community studies, use of benzodiazepines increased among those 85 years and older (Morgan, Dallosso, Ebrahim, Arie, & Fentem, 1988; Stewart, Marks, Padgett, & Hale, 1994) while in another survey it increased after the age of 75 (Dealberto et al., 1997) and after the age of 70 in Israel (Grinshpoon, Marom, Weizman, & Ponizovsky, 2007). The last mentioned population-based study that assessed the use of psychotropic medications in Israel did not estimate trends over time.

The current study aimed to assess usage of psychotropic medications and its correlates across cohorts of the old population (aged 75–94) sampled a decade apart and across time among the same individuals. The specific aims of this study were: 1) to evaluate changes in the prevalence and usage patterns of psychotropic medications in community dwelling elderly (aged 75–94) from two cohorts ten years apart (1989 and 1999); and 2) to assess the extent of subsequent use among the same individuals, participants in the 1989 sample, who were followed to a second interview. We first applied a cohort comparative design in the concurrent analysis in order to assess differences/similarities in factors associated with use of these medications over time. The rationale for this approach was to examine if policy changes related to the price of medications occurring after the implementation of the National Health Law (in the mid 1990s) and a growing awareness among physicians treating the elderly to recommendations to reduce the use of benzodiazepines, had any implications on the patterns of prescribing psychotropic medications.

Methods

Sampling

The current study is based upon data collected from two nationally representative samples of two cohorts sampled in 1989 and 1999. The first sample was part of the Cross-Sectional and Longitudinal Aging Study (CALAS). The baseline sample included Jewish participants aged 75–94 who were alive and residing in Israel as of 01/01/89, when randomly selected from the National Population Registry (NPR). The sample was stratified by age (75–79, 80–84, 85–89, 90–94), sex, and origin (place of birth: Israel, Asia/Africa, Europe/America). Out of 2400 persons in the original sample, 1820 were interviewed (8.5% refused and 15.7% were not located) during 1989–1992. At the follow-up of the 1989 CALAS sample, the original participants of the study were re-interviewed with a questionnaire identical to the baseline. Mean follow-up time was 3.5 years (±0.7). Further information regarding the method and results of the CALAS is detailed in various publications (Blumstein, Shmotkin, Eyal, Shorek, & Lerner-Geva, 2008)(Fuchs et al., 2003)(Shmotkin, Blumstein, & Modan, 2003; Walter-Ginzburg, Blumstein, Chetrit, & Modan, 2002; Fuchs et al., 2003).

The second sample was part of the Israeli Multidisciplinary Aging Study (IMAS). The IMAS conducted a multidimensional assessment of a random sample of the older Jewish population in Israel stratified by age group (65–69, 70–74, 75–79, 80–84, 45–89, 90–94), gender, and place of birth. The sample was drawn from the NPR in December 1999. Out of 1757 sampled individuals (after exclusion of 438 who lived in institutions or abroad, or passed away between the sampling day and the interview date), 825 community dwelling individuals were fully interviewed during 2000–2002 (15.1% were not located, 32.3% refused to be interviewed, and 5.7% could not be fully interviewed).The IMAS used the CALAS questionnaire with only slight modifications and both surveys used a similar procedure of data collection. A description of the IMAS study design and results from the comparative CALAS-IMAS data base have been published elsewhere (Shmotkin et al., 2010).

Participants

The comparative analysis of the 1989 (CALAS) and 1999 (IMAS) samples presented here includes only participants of parallel age groups in the two surveys (i.e., those aged 75–94) who were living in the community at the time of the baseline interview and were interviewed personally. Thus, the actual study samples include 1200 participants from the CALAS and 421 participants from the IMAS (baseline surveys only). The mean ages in the study samples were nearly identical 83.1 (*SD*=5.3) and 83.1 (*SD*=5.2) in the respective surveys.

The longitudinal analysis is based on individuals interviewed personally in wave I and again in wave II of the CALAS study. Out of 1200 persons included in the baseline CALAS study, 31% (n=377) died between the waves, and another 3.6% (n=43) were lost to follow-up. Thus, the longitudinal analysis is based on 780 individuals.

Measures

Psychotropic medications were assessed from the list of all medications recorded by the interviewer. Interviewees were asked if they are currently taking prescribed or self-prescribed drugs for a specified list of medical conditions (heart disease, hypertension, diabetes, kidney disease, sleeping difficulties, depression etc.). They were requested to display the containers of all medications they were taking, and the name, frequency and duration of use were recorded. A coding system was developed whereby each drug was given a four digit code: the first two digits represented the therapeutic class according to the classification by the Monthly Ethical Drug Indexed Compilation (a bi-monthly publication of all products according to their indications), and the next two served for assigning a number for every drug in the group. According to the Medic coding system (Medic 2010), different commercial drugs with the same generic ingredient were assigned the same number.

For the purpose of the present analysis, only drugs in the following CNS therapeutic groups - Hypnotics and Sedatives, Tranquillizers and Antidepressants (as classified in the original coding system described above) - were reviewed by a clinician and the generic name was retrieved through the Medic and converted into the Anatomical Therapeutic and Chemical (ATC) classification system (WHO Collaborative Center for Drug statistics, 2010). According to the ATC classification, four pharmacological subgroups were identified: Anxiolytics (benzodiazepines derivatives and other anxiolytics), Sedatives/Hypnotics (benzodiazepines derivatives and other Sedative/Hypnotics), Antipsychotics and Antidepressants.

Variables from three domains of interest were examined as correlates of use of psychotropic medications: Sociodemographic characteristics, health status, physical and mental functioning, and life events variables.

Socio-demographic variables included age, gender, place of birth (born in Israel, Asia-Africa, Europe-America), education (number of school years), marital status (currently married versus unmarried), income (having only a National Insurance pension versus additional income resources), and religiousness (being religious, traditional, or secular).

Physical health and functioning measures included—*Physical functioning* was measured by a modified version of the Katz activities of daily living (ADL) scale (Katz, Downs, Cash, & Grotz, 1970). The ADL indicator was defined as a need for human assistance in performing one or more of seven activities: crossing a small room, washing, dressing, eating, grooming, transferring, and toileting.

Number of diseases (comorbidity) was measured by the number of ever diagnosed diseases reported by the respondent out of a list of 18 chronic diseases (e.g., hypertension, diabetes, cardiac disease, stroke, arthritis, cancer).

Number of other (non-psychotropic) medications was categorized into 4 categories: none, 1–2, 3–5, 6+ medications.

Mental health and life events variables included—*Sleeping problems* were defined as a positive answer to one or two of the following questions: a) Do you have difficulties falling asleep? And, b) Do you wake up early in the morning and cannot fall asleep again?

Affective functioning was measured by the Center for Epidemiological Studies - Depression scale (CES-D) (Radloff, 1977). The Cronbach alpha coefficients of internal reliability of this 20-item measure were 0.88 and 0.87 in the CALAS and IMAS samples, respectively. The scale was categorized to a 3-level variable: Low depressive symptoms (0–10), moderate (11–16), and high (17+), which corresponds to an accepted cut-off point for the definition of high depressive symptoms.

Cognitive functioning was measured by the Orientation-Memory-Concentration Test (Katzman et al., 1983). This measure includes 6 test items referring to basic cognitive functions such as knowing the current date and time, remembering a name and an address, and counting backwards. The total score of the items on a scale range from 0–28 was categorized to 3 levels: Normal cognitive status on this scale was estimated by a score of 0–8, slight impairment 9–19, and significant impairment 20–28. The alpha coefficients of this measure were 0.73 and 0.72 in the CALAS and IMAS samples, respectively.

Holocaust survivorship was defined according to two inclusion criteria: a) Participant report that during 1939–1945 they had been in any European country occupied or dominated by the Nazi regime, and, b) a positive answer to the question "Do you define yourself as a holocaust survivor?".

Traumatic life events - the number of traumatic events was measured by the question, "Have you ever undergone a traumatic event that has influenced your entire life? " with an option to list up to 3 such events. The variable was recoded to a dichotomous variable denoting no report of such events (0) or one or more events (1).

Statistical analysis

The differences in use of psychotropic medication groups between the two cohorts were tested using chi-square tests for categorical variables. The longitudinal change in use of medications between baseline (W1) and follow-up (W2) among the same individuals was tested using the McNemar test of significance for marginal homogeneity in the matched table of subjects interviewed in W1 and W2.

In order to test for similarities/differences in the associations between correlates and use of psychotropic medications between cohorts, tests for estimating an interaction effect of cohort membership (1989 vs. 1999) and each predictor were conducted. The results of these analyses are not shown since there were no significant interactions of any characteristic with cohort membership. As a result, the data for the baseline of the two cohorts were pooled and a special variable denoting cohort membership was introduced in all models. The final multivariate logistic regression models included those indicators found to be significantly related to either one of the two medication groups in the univariate analyses. Age, gender, origin (the stratification variables in both cohorts) and cohort membership were included irrespective of their association with use of medications. The analysis for the combined Sedatives/Hypnotics/Anxiolytics group was performed separately for all medications in the group and for benzodiazepines alone subgroup.

All analyses were performed using SPSS 15.0.

Results

The comparison of sociodemographic characteristics and other study variables between the two cohorts is presented in Table 1. No significant differences in the distribution of the three stratification variables (age group, gender and place of birth) were observed. However, the latter cohort (1999) was composed of participants with significantly higher education, more sources of income and a lower proportion of religious elderly. Nevertheless, participants in the latter cohort had lower levels of physical functioning, higher comorbidity, sleeping problems, and use of other medications. The percent of elderly receiving home nursing services (9% and 26% in the 1989 and 1999 cohorts respectively) reflects a growing trend in the 1990s toward receiving formal care at home rather than moving to long term care institutions. While more elderly identified as holocaust survivors in the 1999 cohort, they reported less life traumas than those in the 1989 cohort.

Table 2 presents the changes in the use of psychotropic medications by type of medication group across the two cohorts and between baseline and follow-up among CALAS (1989 cohort) participants. The main change in use across the cohorts was observed in the sedative/hypnotic medication group ($p=0.05$) while anxiolytics, a drug category in highest use in the 1989 cohort (13.7%), remained stable in use in the 1999 cohort (14.5%). Among anxiolytics, over 90% of all medications were benzodiazepines while among sedative/hypnotics over 85% were benzodiazepines. The last two groups were combined to form one outcome group of psychotropic medications showing similar rates of use across the decade (22% in 1989 and 25% in 1999). Antipsychotic medication use was significantly reduced from 2.6% in 1989 to almost 0% in the 1999 cohort and was not considered in any further analysis. Antidepressant use did not change significantly across time (from 3.8% in 1989 to 4.8% in 1999).

In addition, the assessment of change across cohorts was computed for two age groups separately showing that the significant increases were among the oldest old (age 85–94) in the Sedatives/Hypnotics and the combined Anxiolytics & Sedative/Hypnotic groups.

Longitudinally, among participants in two waves of data collection ($n=780$), no significant differences were observed in the use of all groups of medications, (Table 2). The 23.8% use at wave 2 (W2) of all anxiolytics & sedative/hypnotics was composed of both recurrent use (13.3%) and new use (10.5%). Recurrent and new use of antidepressants was 1.5% and 1.9% respectively (data not shown).

The tests for the associations of each characteristic with use of the two groups of psychotropic medications (Table 3), based on the pooled data, showed that gender (women), place of birth (Europe/America), marital status (not married) and religious identification (secular/traditional) were significantly associated with higher use of sedatives/hypnotics & anxiolytics while higher use of antidepressants was associated significantly with European/American origin and higher educational level. The univariate analysis (Table 3) also showed that use of both groups of psychotropic medications was associated with worse health (needing assistance in ADL, increased number of diseases and other medications, sleeping problems, depressive symptoms), and with Holocaust survivorship. Reporting lifetime trauma was significantly related to use of sedatives/hypnotic and anxiolytics but not to use of antidepressants.

Multivariate analysis for use of sedatives/hypnotics and anxilolytics showed that use of these drugs differed significantly across several social categories (Table 4). The findings indicated lower odds of use for men as compared to women, for religious elderly compared to secular and higher odds for European-born participants compared to the Israeli-born. Additional measures positively and significantly related to use of sedatives/hypnotics and

anxilolytics were the number of other medications, sleeping problems, depressive symptoms, and reporting past traumas. The findings for use of benzodiazepines alone showed the same significant correlates as described above.

The results for the use of antidepressants (Table 4) showed a somewhat different profile of users: Being married and higher education (9 or more school years compared to less than 9 years) were associated with higher odds for use of antidepressants. Needing assistance in ADL was associated with an over twofold increase in use of antidepressants while moderate and high levels of depressive symptoms were significantly related to threefold use of antidepressants. The Hoshmer and Lemeshow tests showed good fit of the above models: Chi-square values were 3.49 (p=0.90) and 4.60 (p=0.80) for sedatives/hypnotics & anxiolytics and antidepressants respectively.

A separate analysis was performed for assessing the predictors of recurrent use of sedatives/hypnotics & anxilolytics among the same individuals, participants in two waves of the 1989–1992 survey (results not shown in the tables). Sleeping problems and the use of other medications were the only significant predictors of recurrent use, although gender, place of birth, religious identification, number of diseases and depressive symptoms showed the same pattern of associations as in the concurrent analysis.

Discussion

The current study examined trends in psychotropic medications use among community-dwelling old Israelis between cohorts a decade apart and longitudinally among survivors of the 1989–1992 survey. The findings point to an increase in sedatives/hypnotics use among the oldest old subgroup; stable levels of anxiolytics and antidepressants use across the 1990s, and a small non significant increase in psychotropic medications use across time among the same individuals. The findings also point to stable usage patterns across the nineties for socio-demographic, health status and life events indicators with use of psychotropic medications. The main correlates of use of sedatives/hypnotics & anxilolytics at baseline were related to mental health indicators (sleeping problems, depressive symptoms, past life traumas) and physical health (high use of other medications) while correlates of antidepressants use were high depressive symptoms and dependency on human assistance for everyday activities of daily living.

The increase in use of psychotropic medications over a 3.5 year follow-up period was not significant. Levels of recurrent and new use of sedatives/hypnotics & anxilolytics (13.3% and 10.5% respectively) were moderate. These findings, available only in the earlier cohort, suggest that the cross-sectional findings relate to occasional as well as long term users of these medications.

Rates of use of psychotropic medications

Comparing prevalence of psychotropic medications use across countries is problematic because of inconsistent definition of the outcome medication groups and the age range under study. The prevalent use of psychotropic medications assessed in this investigation by community dwelling elderly aged 75–94 (24%–28%) is in line with other findings from Israel (Grinshpoon et al., 2007) for elderly aged 70 and over (23%) but higher than reported for ages 65 and over in the U.S. (19%) for all psychotropic prescriptions (Aparasu, Mort, & Brandt, 2003).

The prevalence of use of sedatives/hypnotics & anxilolytics was also higher than observed in the U.S. (Blazer et al., 2000) and in Britain among adults aged 65+ (Taylor et al., 1998). The difference cannot be related to the different age groups under study since no age effect

was observed in the U.S study while in Britain only hypnotics' use increased with age. Similar prevalence rates to those reported in the current study were reported among Australians aged 75+ for any benzodiazepine use (Jorm et al., 2000).

The level of antidepressant use was low (3.8% to 4.8%), similar to the level reported in a Dutch study of the elderly (4.9%) for ages 55–85 (Sonnenberg et al., 2003) and the increase in use over a decade was very moderate. This differs from findings of increased use over the last two decades in antidepressant medications use in several Western countries (Helgason, Tomasson, & Zoega, 2004; Olfson et al., 2002). In general, our findings may reflect under-detection and under-treatment of mental health problems in primary care in Israel, similar to findings from studies in other countries with regard to older adults (Geulayov, Lipsitz, Gross, 2010) and to trends in the general population (Callahan, 2001; Unutzer & Bruce, 2002; Geulayov, Lipsitz, Gross, 2010). Potential patient-related barriers to treatment of depression included concern about medication cost, potential side effects and embarrassment about treatment. Other barriers relate to traditional prescribing patterns prevailing among family physicians, low inclination to include new psychiatric drugs in the state-provided health basket as compared to life-saving medications, and the variability in attitudes and knowledge of family physicians to diagnosing and treatment of mental health problems (Geulayov, Lipsitz, Gross, 2010). In the current study the use of medications was based on self report of the elderly with an inventory of all containers currently in use. Therefore, the findings reflect prescription habits of family physicians as well as personal usage preferences.

The crude trend for increased use of sedatives/hypnotics at the end of the 1990s disappeared when the model predicting use of these medications was adjusted to health characteristics of the participants in the pooled analysis (as indicated by the lack of significance for the cohort membership indicator in all analyses). Thus, this increase partly reflects an adjustment to the observed decrease in the health and functioning profile of this age group in the community-dwelling population, due partly to the growing availability of home nursing services by the end of the nineties. On the other hand, no significant increase was observed for use of anxiolytics and antidepressants. As mentioned above, following policy changes in the mid 1990s, part of these newer psychiatric medications have a low chance of being introduced into the state-provided health basket (Munitz H., 2010) and therefore are prescribed privately at a high cost for the old segment of the population.

The unexpected finding of a reduced use of antipsychotic medications probably reflects the methodological limitation related to the smaller size of the later sample (2001–2002 survey) and thus a lower representation for rare psychiatric disorders among the old population. In addition, it may reflect a lower inclination of prescribing older generation psychiatric ingredients in medications used in the early 1990s (such as sulpiride and thioridazine) because of strong side effects.

Correlates of use of sedatives/hypnotics/anxiolytics

In line with previous studies, our findings indicated significantly higher odds for use of sedatives/hypnotics & anxilolytics medications among women as compared to men after taking into account their higher comorbidity and depressive symptoms (Aparasu et al., 2003; Blazer et al., 2000; Dealberto et al., 1997; Gleason et al., 1998). In addition, a cultural trend for lower use by Jews of Mid-Eastern origin and higher use by European-born Jews as compared to Israeli born (with borderline statistical significance) was observed in the multivariate analysis, as shown also with regard to the number of all prescribed medications in previously published findings in Israel (Fuchs et al., 2003). These findings can be related partly to a cultural preference to home remedies observed in more traditional societies or to poorer communication with the family physician due to language barriers or cultural

restraint in discussing emotional distress with the family physician (Fuchs et al., 2003; Geulayov,Lipsitz, Gross, 2010) . Similar findings were observed in The Netherlands where a decreased risk of ADHD medications was shown among Turkish and Moroccan immigrants as compared to the native population (Wittkampf et al., 2010). Lower use of psychotropic medications by Orthodox Jews was also observed in the former mentioned Israeli national study which pointed to the negative attitudes of Orthodox Jews to mental disorders (Grinshpoon et al., 2007).

Depressive symptoms were associated significantly with higher use of sedative/hypnotics & anxilolytics, in line with several community studies of the elderly (Blazer et al., 2000; Dealberto et al., 1997). Similar findings were reported in studies using other indicators of mental health such as diagnosed depression or anxiety or psychological distress (Preville et al., 2001; Sonnenberg et al., 2003; Taylor et al., 1998).

Addressing the specific Israeli context of old Israelis whose life histories include major traumatic events such as the Holocaust and immigration, these findings point to an additional health toll on old survivors as expressed in more use of benzodiazepines. As noted before, vague symptoms of nervousness and sleep disturbances (perhaps as a result of life traumas) can lead to prescribing benzodiazepines and in turn can have a depressing effect and lead to addiction (Sonnenberg et al., 2003).

Correlates of antidepressants

The observed role of higher education and support from a spouse in seeking psychiatric care and, as a consequence, higher level of treatment with antidepressants, supports the notion that among the older population in Israel, composed mainly of immigrants with low level of education, the stigmatized attitude to mental health services is partly responsible for the low use of these drugs in community dwelling older adults especially during the early 1990s. In the same venue, high education was shown to be related to more outpatient visits for treatment of depression in a national U.S study suggesting that individuals with low education (as well as minority groups) are more vulnerable to under treatment of depression (Olfson et al 2002).

The finding that disability in ADL was associated with an over twofold use of antidepressants, after adjustment for depressive symptoms, is indicative that depression often co-occurs with multiple health, functioning and psychosocial problems. Among the competing demands and health problems, depression sometimes is perceived as low priority both by the elderly and their physicians (Proctor, Hasche, Morrow-Howell, Shumway, & Snell, 2008). Our findings, showing that only a small percent (5%) of those depressed were using antidepressants while the use of benzodiazepines among them was high (31%) correspond to Dutch findings where benzodiazepines use was about twice as likely as antidepressant use among the depressed group.

Limitations

Several limitations should be taken in consideration with regard to the current study. First, the method of assigning the psychotropic medications into the different sub-categories may suffer from lack of precision and specificity since dosage was not taken into consideration when assigning drugs for multiple indications. On the other hand, reason for taking the medication was included in the original medication code. The potential cross-over between sedatives/hypnotics and anxiolytics probably does not affect the findings since the main outcome of interest was the combined group containing mainly benzodiazepines.

Second, this study did not include a validation of a diagnosis of depression or other mental disorders. Our conclusions with regard to treatment of depression were inferred from using

an accepted cut-off point on the CES-D depressive symptoms scale. However, since only cognitively normal -respondents who were able to answer the self report questions were included in the current study, one can assume that self reports in this study are reasonably accurate.

A third limitation refers to the cross-sectional analysis using two cohort studies based on different sample size in order to compare parallel age groups of 75–94 years old living in the community. Thus, despite the relatively large size of the 1989 sample (n=1200), the statistical power of the comparison between the cohorts was limited by the smaller 1999 sample (n=421).

Another limitation is the time passed since the data was collected, which raises a question as to more recent changes in prescribing these medications. However, the current findings can be a basis for evaluating potential future changes in prescribing these medications. Despite potential limitations, these national studies were the first to include the old and oldest old population in a high representation rate and allowed the assessment of trends and patterns of psychotropic medication use over time in Israel.

Conclusions

The level of use of benzodiazepines in Israeli old-old was relatively high in comparison to Western countries while the level of antidepressants use was low even among highly depressed elderly suggesting that some depressed elderly were treated inappropriately with benzodiazepines. In light of the negative effects of these medications reported in the literature specifically among the old-old, it is important to monitor the prescription of these medications with caution, to follow those who take them regularly, and repeat the provision of pharmacological guidelines to primary care providers on a regular basis.

No significant reduction in overall benzodiazepine prevalence was found across the period of two surveys from the early 1990s to the early 2000s. In fact, as this study shows, the level of dependent elderly living in the community has increased, thus raising more concern for the possible low detection of depression among them. Further research to assess the extent of long term use and changes in use of psychotropic medications in more recent and future years is important in order to plan strategies to reduce inappropriate use of benzodiazepines.

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Table 1

Descriptive Characteristics of the Two Cohorts: 1989 and 1999

	1989 Sample N=1200 %	1999 Sample N=421 %	Chi Square
Age			$\chi^2(3)=0.31$
75–79	33.9	35.4	
80–84	28.8	28.3	
85–89	23.1	22.6	
90–94	14.3	13.8	
Gender			$\chi^2(1)=0.46$
Women	44.9	45.3	
Place of birth			$\chi^2(2)=0.75$
Asia-Africa	32.7	33.5	
Europe-America	37.0	34.7	
Israel	30.3	31.8	
School years			$\chi^2(3)=47.5^{***}$
0–4	31.9	17.9	
5–8	25.9	26.1	
9–12	28.6	29.9	
13+	13.6	26.1	
Missing (n)	(51)	(30)	
Marital status			$\chi^2(1)=1.18$
Married	46.6	49.6	
Missing (n)	(6)	(2)	
Sources of income			$\chi^2(1)=40.99^{***}$
Only national support	41.8	24.0	
Additional income	58.2	76.0	
Missing (n)	(45)	(16)	
Religious identification			$\chi^2(2)=24.96^{***}$
Religious	36.9	24.1	
Traditionalist	35.9	39.3	
Secular	27.3	36.6	
Missing (n)	(9)	(6)	
Health and physical functioning			
Number of diseases			$\chi^2(4)=24.64^{***}$
None	13.8	10.0	
1	19.6	14.3	

	1989 Sample N=1200 %	1999 Sample N=421 %	Chi Square
2–3	33.4	35.2	
4–5	20.1	18.6	
6+	13.1	21.9	
Number of non-psychotropic drugs			$\chi^2(3)=85.70^{***}$
None	17.3	13.4	
1–2	35.7	22.5	
3–5	36.6	35.6	
6+	10.5	28.5	
Need of assistance with ADLs	20.1	29.2	$\chi^2(1)=14.93^{***}$
Receipt of home nursing services	8.9	26.4	$\chi^2(1)=81.7^{***}$
Mental health & Life events			
Sleeping problem	64.8	71.5	$\chi^2(1)=6.22^{**}$
Cognitive status			$\chi^2(2)=2.27$
Normal	58.8	60.9	
Moderate	29.7	30.3	
Impaired	11.5	8.8	
Depressive symptoms			$\chi^2(2)=1.95$
Low	31.9	30.2	
Moderate	32.9	30.7	
High	35.2	39.1	
Missing (n)	(57)	(27)	
Past Traumas	46.6	34.4	$\chi^2(1)=18.57^{***}$
Missing (n)	(81)		
Holocaust survivor	9.8	14.6	$\chi^2(1)=7.09^{**}$
Missing (n)	(11)	(3)	

*** p<0.0001;

** p<0.01;

* p<0.05

Note. Age, gender and place of birth served as stratification variables in sampling.

Table 2

Patterns of psychotropic medications use across two cohorts (1989 and 1999) by age group and at baseline (W1) and follow-up (W2) among participants of the 1989 longitudinal study (%)

Age groups Type of drugs	Cohort Comparison Study						Longitudinal Study 75–94	
	75–94		75–84		85–94			
	1989	1999	1989	1999	1989	1999	(W1)	(W2)
N	1200	421	752	268	448	153	780	
Anxiolytics (Benzodiazepines only)	13.7 (12.8)	14.5 (14.0)	13.7	14.2	13.6	15.0	12.8	14.6
Sedatives/Hypnotics (Benzodiazepines only)	10.8 (9.6)	14.0* (11.9)	10.8	10.1	10.7	20.9**	10.6	11.9
All Anxiolytics & Sedatives/hypnotics (benzodiazepines only)	22.2 (20.5)	25.4 (23.8)	22.3	22.4	21.9	30.7*	21.5	23.8
Antidepressants	3.8	4.8	3.3	3.0	4.5	7.8	3.3	3.5
Antipsychotics[1]	2.6	0.2**	2.8	0.0	2.2	0.7	2.6	3.2

Differences between cohorts were tested by Chi Square;

** p<0.01;

* p<0.05;

McNemar tests were used for change in use between W1 and W2. No significant differences were observed between W1 and W2.

[1] This category was excluded from further analysis due to very low use in 1999 cohort

Table 3

Associations of socio-demographic characteristics with use of sedatives /hypnotics/anxiolytic drugs and antidepressants (pooled data from two cohorts; n=1621)

Characteristics	Sedatives/hypnotics & Anxiolytics		Anti-depressants	
Sociodemographic characteristics	**%**	**Chi- Square**	**%**	**Chi Square**
Age		$\chi^2(3)=2.57$		$\chi^2(3)=4.71$
75–79	21.0		3.6	
80–84	23.9		2.8	
85–89	25.3		5.4	
90–94	22.3		5.2	
Gender		$\chi^2(1)=41.63^{***}$		$\chi^2(1)=0.05$
Women	30.6		3.9	
Men	17.0		4.1	
Place of birth		$\chi^2(2)=38.34^{***}$		$\chi^2(2)=8.26^{*}$
Asia-Africa	16.4		2.4	
Europe-America	31.3		5.8	
Israel	20.3		3.6	
School years		$\chi^2(3)=2.29$		$\chi^2(3)=7.77^{*}$
0–4	23.9		2.3	
5–8	23.8		3.0	
9–12	23.5		4.9	
13+	19.4		5.8	
Marital Status		$\chi^2(1)=15.86^{***}$		$\chi^2(1)=1.75$
Married	18.7		3.4	
Not Married	27.1		4.7	
Sources of income		$\chi^2(1)=0.09$		$\chi^2(2)=0.04$
Only national support	22.4		4.0	
Additional income	23.1		3.8	
Religious identification		$\chi^2(2)=14.2^{**}$		$\chi^2(2)=2.35$
Religious	18.0		3.2	
Traditionalist	23.7		3.9	
Secular	27.9		5.0	
Health status & Physical Functioning				
Need of assistance with ADL's		$\chi^2(2)=14.84^{***}$		$\chi^2(1)=14.16^{***}$
No	20.8		3.0	
Yes	30.5		7.4	

Characteristics	Sedatives/hypnotics & Anxiolytics		Anti-depressants	
Sociodemographic characteristics	**%**	**Chi- Square**	**%**	**Chi Square**
Number of reported diseases		$\chi^2(4)=75.7^{***}$		$\chi^2(4)=13.78^{**}$
None	11.1		1.0	
1	16.9		3.4	
2–3	19.5		3.8	
4–5	28.8		4.1	
6+	40.6		7.6	
Number of non-psychotropic medications		$\chi^2(4)=88.73^{***}$		$\chi^2(3)=13.35^{*}$
None	6.5		0.8	
1–2	19.7		3.6	
3–5	26.0		4.6	
6+	40.4		6.9	
Mental health & Life events				
Sleeping problem		$\chi^2(1)=72.24^{***}$		$\chi^2(1)=4.30^{*}$
No	10.4		2.6	
Yes	29.4		4.8	
Cognitive status		$\chi^2(2)=0.26$		$\chi^2(1)=5.13$
Normal	23.5		3.7	
Moderate	23.3		5.5	
Impaired	23.3		1.7	
Missing (n)	(27)			
Depressive symptoms		$\chi^2(2)=65.15^{***}$		$\chi^2(2)=10.05^{**}$
Low	12.0		1.7	
Moderate	22.5		4.8	
High	33.1		5.2	
Missing (n)	(84)			
Past Traumas		$\chi^2(1)=23.52^{***}$		$\chi^2(1)=0.93$
No	18.4		3.7	
Yes	28.9		4.6	
Missing (n)	(81)			
Holocaust survivor		$\chi^2(1)=20.56^{***}$		$\chi^2(1)=3.75^{*}$
No	21.3		3.7	
Yes	36.5		6.7	
Cohort membership		$\chi^2(1)=1.86$		$\chi^2(1)=0.81$
1989	22.2		3.8	

Characteristics	Sedatives/hypnotics & Anxiolytics		Anti-depressants	
Sociodemographic characteristics	**%**	**Chi- Square**	**%**	**Chi Square**
1999	25.4		4.8	

*** p<0.0001;

** p<0.01;

* p<0.05

Table 4

Multivariable logistic regression analysis of sedatives/hypnotics/anxiolytics medications and antidepressants use

Characteristics	Sedatives/hypnotics & Anxiolytics			Anti-depressants		
	O.R	95% CI	p-value	O.R	95% CI	p-value
Sociodemographic characteristics						
Age (continuous)	1.01	0.98–1.04	.51	1.02	0.96–1.07	.57
Gender (men vs. women)	0.64	0.48–0.87	.004	1.05	0.56–1.97	.87
Place of birth						
Asia-Africa vs. Israel	0.73	0.51–1.06	.10	0.56	0.25–1.28	.17
Europe-America vs. Israel	1.39	0.99–1.96	.06	1.24	0.63–2.43	.54
School years						
9+ vs.0–8	0.89	0.67–1.18	.40	2.14	1.18–3.89	.01
missing data	1.02	0.57–1.86	.94	3.48	1.29–9.42	.01
Marital status						
Married vs. not married	0.99	0.74–1.34	.96	1.81	0.98–3.36	.06
Religious identification						
Religious vs. secular	0.69	0.48–1.00	.05	0.83	0.44–1.94	.92
Traditionalist vs. secular	0.79	0.74–1.34	.15	0.82	0.50–1.74	.93
Health status & Functioning						
Number of diseases	1.07	0.99–1.15	.10	1.08	0.92–1.26	.37
Number of other medications	1.20	1.11–1.29	.000	1.09	0.94–1.26	.28
Assistance in ADL's	1.02	0.75–1.40	.89	2.32	1.28–4.23	.006
Mental health & Life events						
Sleeping problems Yes vs. No	2.39	1.71–3.33	.000	1.24	0.64–2.39	.52
CES-D (reference=low level):						

Characteristics	Sedatives/hypnotics & Anxiolytics			Anti-depressants		
	O.R	95% CI	p-value	O.R	95% CI	p-value
Moderate	1.47	1.01–2.14	.05	3.24	1.34–7.85	.009
High	1.84	1.25–2.70	.002	3.26	1.28–8.28	.01
Missing data	1.43	0.70–2.91	.32	3.54	0.86–14.6	.08
Holocaust Survivor	1.34	0.90–2.09	.17	1.17	0.53–2.56	.70
Any life trauma	1.30	1.00–1.71	0.05	1.09	0.63–1.90	.76
Missing data	1.30	0.68–2.48	0.43	0.65	0.13–3.15	.59
Cohort 1999 vs.1989	0.94	0.69–1.27	.68	0.80	0.43–1.49	.48

Note: based on pooled data from two cohorts; n=1621
O.R = Odds Ratio; CI = Confidence Interval