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PHARMACOEPIDEMIOLOGY AND PRESCRIPTION

Merete W. Nielsen · Ebba Holme Hansen
Niels Kristian Rasmussen

Patterns of psychotropic medicine use and related diseases across educational groups: national cross-sectional survey

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Abstract *Objective*: To analyse whether the use of different groups of psychotropic medicines among educational groups in a general population was congruent with the occurrence of related diseases.
Methods: Data from The Danish Health and Morbidity Survey 2000 were analysed. The survey was conducted by face-to-face interviews with a representative sample of the Danish population aged 16 years and above ($n = 16{,}690$). The prevalence of four different types of psychotropic medicine use and related diseases in educational groups was analysed by indirect standardisation. Age and gender standardised prevalence ratios (SPRs) and 95% confidence intervals were calculated based on the total study population.
Results: In general, respondents in the two least-educated groups used psychotropic medicines more often and had a higher proportion reporting the related disease than could be expected according to indirect standardisation. The opposite picture appeared for respondents in the two highest educated groups (SPR < 100). The overall patterns were similar for all four groups of psychotropic medicine users, although some of the SPRs were not significant.
Conclusions: The results documented an uneven distribution of health problems in the general population. Psychotropic medicine use was congruent with the distribution of related health problems, which means that the least-educated groups in most need of treatment also had the most-frequent medicine use. Expenses incurred by the individual user did not seem to be a barrier to access to medicines, not even for specific groups of medicine ineligible for reimbursement in Denmark.

Keywords Psychotropic medicine · Education · General population

M. W. Nielsen (✉)
Department of Social Pharmacy,
The Danish University of Pharmaceutical Sciences,
Universitetsparken 2, 2100 Copenhagen, Denmark
E-mail: mwn@dfuni.dk
Tel.: +45-3530-6000
Fax: +45-3530-6050

M. W. Nielsen · E. H. Hansen · N. K. Rasmussen
FKL–Research Centre for Quality in Medicine Use,
Copenhagen, Denmark

N. K. Rasmussen
National Institute of Public Health, Copenhagen, Denmark

Research on social differences in medicine use is scarce in general, although the use of psychotropic medicines has been subject to a few investigations. Psychotropic medicines are widely prescribed in Western countries, and their expense has been worrisome to health insurance and reimbursement agencies [1]. Prescription patterns for psychotropic medicines have changed markedly over time relative to the introduction of new therapeutic categories in the market [2]. In the past, the prescription of barbiturates and benzodiazepines was subject to intervention to reduce reimbursement expenses by curbing or removing subsidisation [2]. More recently, expenses for the consumption of selective serotonin reuptake inhibitors (SSRIs) became a matter of concern to health insurance and reimbursement agencies.

Medicine expenses can be considerable for the individual user and thus a barrier to access to medicine. Hence, it is important that possible intervention by reimbursement systems is not socially imbalanced, preventing some patients from being able to afford necessary medicines. Investigations of social differences in psychotropic medicine use in general populations can elucidate whether the least prosperous have access to these medicines.

Findings from studies on social differences in psychotropic medicine use are inconsistent and difficult to compare due to differences in measurements, such as time and location of study, population groups, psychotropic medicines included, duration of use and conceptualisation of socio-economic position (SEP). The varying study parameters make general conclusions impossible. Studies reported below were performed with

general populations and included health status in the analyses.

The overall use of psychotropic medicine and the prescribing of antidepressants have been found to be negatively associated with SEP in the United Kingdom [3, 4]. A study from Austria found no such association for the overall use of psychotropic medicine [5].

Studies on hypnotics, sedatives and/or benzodiazepines found that the unemployed used these medicines to a greater extent than the employed [6, 7, 8]. Use of benzodiazepines was not associated with education in an Italian study [7], whereas use of anxiolytics was found to be negatively associated with education in a publication from the United States [9]. The application of a composite index of education and income revealed no social differences in hypnotic use in Norway [10]. A paper from Sweden indicated that current and regular users of benzodiazepines seemed to differ with respect to SEP [6].

In summary, the consistency of results among studies is poor, which seems to depend on several parameters. In general, social differences seem to be increasing psychotropic medicine use with decreasing SEP.

It is crucial to consider people's health status when investigating SEP in relation to medicine use, as health problems are more frequent in the lower social classes than in the more prosperous part of the population [11]. If the use of a medicine group and related disease/diagnosis are congruent in a socio-economic group, access to medicine may be considered adequate for the users in the population studied.

The level of the association between psychotropic medicine use and disease could be underestimated due to misclassification of diseased respondents. It is possible that diseased persons who are symptom free due to medication do not report their disease, but only their use of medicine. It was therefore decided to perform analyses at the aggregated level.

The objective of this study was to analyse whether the use of different groups of psychotropic medicine in a general population was congruent with the occurrence of related diseases in educational groups.

Materials and methods

Study

Data derived from the cross-sectional Danish Health and Morbidity Survey 2000. A random sample of 22,486 Danish citizens aged 16 years and above was drawn from the Centralised Civil Register. The sample was stratified to include at least 1,000 respondents from each of the 16 Danish counties. Eventually a total of 16,690 persons participated, resulting in a response rate of 74.2%. Respondents are estimated as representative of the Danish population [12]. The data were collected in three waves during February, May and September of 2000. The respondents were interviewed in their homes by trained interviewers.

Setting

The Danish health care sector is financed primarily by public taxes and is characterised by free access to general practitioners and hospital care for all residents [13]. In hospitals, expenses for pharmaceuticals are fully paid by the public, whereas the expenditures in primary health care are subject to different levels of individual co-payment [13]. Antidepressants (ATC group N06A) and antipsychotic medicines (ATC group N05A) are eligible for reimbursement, while anxiolytics, hypnotics and sedatives (ATC groups N05B and N05C) are not [14]. Denmark has a reimbursement system that is graded in relation to level of medicine use. Pensioners and people with a chronic or terminal disease or low income are eligible for further reimbursement [13].

Measurements

Regular use of medicine was measured by the item: "Do you regularly or continuously take any medicine?" The interviewer wrote down the names of medicines reported as used regularly. After data collection, the medicines were coded according to the ATC system [15]. In this study, regular use of three groups of psychotropic medicines were analysed: (1) psychotropic medicines as a whole, defined as psycholeptics and psychoanaleptics combined (ATC groups N05 and N06), (2) antidepressants (ATC group N06A) and (3) anxiolytics, hypnotics and sedatives (ATC groups N05B and N05C). It was not possible to analyse the use of antipsychotic medicines (ATC group N05A) due to the scarcity of users ($n = 162$).

Use of prescription medicine within the past 14 days was measured by the question: "Have you taken any of the following medicines within the past 2 weeks?" followed by a list of therapeutic categories including sleeping medicine and sedatives. Specific products were not reported for this question and hence ATC codes were not available.

Chronic disease was measured by the question: "Do you suffer from any longstanding illness, longstanding residuals from injury, any disability or other longstanding condition?" Longstanding was specified as at least 6 months. The reported diseases were subsequently classified into 14 groups based on a Danish version of the International Classification of Diseases (ICD-8) [12]. The first three digits in the code correspond to the ICD-8, whereas the fourth digit is added in the Danish version. In this study, the presence of mental disorders (code 2900–3169) was analysed.

Symptoms within the past 14 days were measured by the question: "During the past two weeks, have you been bothered by any of the complaints listed?" followed by a list of specific symptoms. Three symptoms were used for the purpose of this study: anxiety/nervousness, sleeping problems and depression/unhappiness.

Education was coded by the ISCED = International Standard Classification of Education, which includes a combination of school education and further education [16]. In this article, four educational groups were used: short (maximum 10 years of schooling), medium (11–12 years of schooling), long (13–14 years of schooling), longer (15+ years of schooling).

The analyses included individuals 25 years and older, and age was separated into three groups: 25–44, 45–59 and 60+ years.

Statistical analyses

The prevalence of psychotropic medicine use by age and gender was detected and the Cochran-Armitage's test for trend performed. Next, the reported prevalence of use of four groups of psychotropic medicines was combined with the prevalence of four related diseases and analysed in relation to educational groups.

Regular use of psychotropic medicines as a whole (ATC groups N05 and N06 combined) across educational groups was compared with the proportion of respondents reporting mental disorders. Regular use of antidepressants (ATC group N06A) was compared with the presence of depression/unhappiness within the past 14 days across educational groups. Furthermore, regular use of anxiolytics, hypnotics and/or sedatives (ATC groups N05B and N05C) across educational groups was compared with the proportion of respondents reporting mental disorders. Use of sedatives and/or sleeping medicine within the past 14 days across educational

groups was compared with the presence of at least one of the symptoms anxiety/nervousness and/or sleeping problems within the same time period.

The prevalence of medicine use and diseases/symptoms across educational groups was detected and the Cochran-Armitage's test for trend performed. The significance level was set at 0.05. Indirect standardisation based on the total study population as the standard population was used as the method for further analyses [17]. Age–gender standardised prevalence ratios (SPRs) by educational group were calculated from the prevalence of psychotropic medicine use and diseases. The SPR corresponds to the standardised mortality ratio (SMR). A SPR above 100 indicates a greater proportion of medicine users or respondents with disease/symptoms compared with the total study population of the same age and gender distribution. Finally, 95% confidence intervals (CI) were calculated as described elsewhere [17]. In each educational group, the SPRs of all subgroups of age and gender were checked for congruence. Different directions of SPRs in these subgroups would mean that the overall SPR calculated for that specific educational group would mask SPRs in different directions for subgroups of age and gender. No such interactions were detected.

Results

The trends in prevalence by age and gender are presented first, followed by the results of the analyses for each pair of psychotropic medicine use and disease.

Psychotropic medicine use by age and gender

Table 1 shows that women used all kinds of psychotropic medicines to a greater extent than men. Furthermore, a significant increasing prevalence with increasing age was detected for both genders and all types of psychotropic medicine use (Table 1).

Regular use of psychotropic medicines as a whole in relation to mental disorders

The prevalence of psychotropic medicine use (ATC groups N05 and N06) was 5.6% and a significant decreasing prevalence was found with increasing education, although the two most-educated groups (13–14 and 15+ years of schooling) had a similar prevalence of psychotropic medicine use. The prevalence of mental disorders was 1.9%, and the pattern across educational groups resembled that of psychotropic medicine use (Table 2).

The age–gender standardised SPRs of psychotropic medicine use are summarised in Table 2. Respondents with a maximum of 10 years of schooling used psychotropic medicines significantly more frequently than could be expected, whereas the two most-educated groups had

Table 1 Prevalence (%) of four types of psychotropic medicine use by gender and age. Prevalence across age groups was tested by the Cochran-Armitage's test for trend

	Men ($n=6979$)					Women ($n=7336$)				
	Total	25–44 years	45–59 years	60+ years	*P* value*	Total	25–44 years	45–59 years	60+ years	*P* value*
Regular use of psychotropic medicines	3.9	2.0	3.5	7.2	<0.0001	7.2	2.9	6.6	13.7	<0.0001
Regular use of antidepressants	1.8	1.3	1.9	2.3	0.0119	3.3	2.1	3.6	4.9	<0.0001
Regular use of anxiolytics, hypnotics and/or sedatives	1.9	0.5	1.4	4.4	<0.0001	3.9	0.7	3.3	8.9	<0.0001
Use of sedatives and/or sleeping medicine within the past 14 days	5.2	2.3	4.9	9.9	<0.0001	9.6	3.0	8.2	20.2	<0.0001

*Cochran-Armitage's test for trend

Table 2 Regular use of psychotropic medicines as a whole (ATC groups N05 and N06) and mental disorders in relation to education. Prevalence (%) and Cochran-Armitage's test for trend. Standardised prevalence ratios (SPR) in educational groups by standardisation for age and gender based on the total study population

		Regular use of psychotropic medicines		Mental disorders	
	n	Prevalence (%)*	SPR (95% CI)	Prevalence (%)*	SPR (95% CI)
Total	14315	5.6	–	1.9	–
Education					
Short, maximum 10 years	3571	10.0	129.3 (115.9–142.7)†	2.5	129.7 (102.5–156.8)†
Medium, 11–12 years	3495	6.0	102.4 (88.5–116.2)	2.0	111.1 (85.0–137.3)
Long, 13–14 years	4323	3.1	72.9 (60.6–85.3)†	1.4	74.2 (55.5–92.9)†
Longer, 15+ years	2926	3.3	73.0 (58.4–87.5)†	1.7	88.7 (63.6–113.7)

*$P<0.0001$ in Cochran-Armitage's test for trend
†$P<0.05$
95% CI: 95% confidence interval

significantly lower proportions of psychotropic medicine users than could be expected. Respondents with a medium education of 11–12 years did not differ significantly from the total study population (Table 2).

The proportion of respondents with a maximum of 10 years and 13–14 years of education who reported mental disorders differed significantly from the study population, whereas respondents with 11–12 years and 15+ years of education resembled the study population with respect to the proportion of those with mental disorders (Table 2).

Regular use of antidepressants in relation to being depressed/unhappy within the past 14 days

The prevalence of regular antidepressant use (ATC group N06A) was 2.6%, and a significant decreasing trend was found with increasing education. The two most-educated groups had similar proportions of antidepressant users. The prevalence of the symptom being depressed/unhappy within the past 14 days was 6.0%, and the decreasing trend with increasing education resembled that of regular use of antidepressants (Table 3).

Only one age–gender standardised SPR of antidepressant use and the symptom in question was significant at the 5% level. The proportion of respondents with only a few years of education (maximum 10 years) reporting the symptom depressed/unhappy within past 14 days was significantly higher than could be expected (Table 3).

Regular use of anxiolytics, hypnotics and/or sedatives in relation to mental disorders

The prevalence of regular use of anxiolytics, hypnotics and/or sedatives (ATC group N05B and N05C) was 2.9%. A significant decreasing trend was found with increasing education. However, again we found that the prevalence among respondents with the longest educations was similar (Table 4). The proportion of respondents reporting mental disorders across educational groups has been summarised above.

The age–gender standardised SPRs of regular use of anxiolytics, hypnotics and/or sedatives were all significant, except for the SPR for respondents with a medium level of education (11–12 years) (Table 4). The two least-educated groups used this type of medicine more often than could be expected based on indirect standardisation, whereas the opposite was found for respondents with a longer education (15+ years, Table 4). The SPRs for mental disorders across educational groups were summarised above.

Table 3 Regular use of antidepressants (ATC group N06A) and being depressed/unhappy within the past 14 days in relation to education. Prevalence (%) and Cochran-Armitage's test for trend. Standardised prevalence ratios (SPR) in educational groups by standardisation for age and gender based on the total study population

		Regular use of antidepressants		Depressed and/or unhappy within the past 14 days	
	n	Prevalence (%)*	SPR (95% CI)	Prevalence (%)*	SPR (95% CI)
Total	14315	2.6	–	6.0	–
Education					
Short, maximum 10 years	3571	3.7	116.7 (96.7–136.7)	7.5	115.3 (101.5–129.1)†
Medium, 11–12 years	3495	2.7	103.6 (82.6–124.6)	5.8	101.1 (87.2–115.1)
Long, 13–14 years	4323	2.0	86.0 (67.6–104.3)	5.3	90.0 (78.4–101.6)
Longer, 15+ years	2926	2.0	88.3 (65.9–110.7)	5.4	92.6 (78.1–107.0)

*$P \leq 0.0001$ in Cochran-Armitage's test for trend
†$P < 0.05$
95% CI: 95% confidence interval

Table 4 Regular use of anxiolytics, hypnotics and/or sedatives (ATC groups N05B and N05C) and mental disorders in relation to education. Prevalence (%) and Cochran-Armitage's test for trend. Standardised prevalence ratios (SPR) in educational groups by standardisation for age and gender based on the total study population

		Regular use of anxiolytics, hypnotics and/or sedatives		Mental disorders	
	n	Prevalence (%)*	SPR (95% CI)	Prevalence (%)*	SPR (95% CI)
Total	14315	2.9	–	1.9	–
Education					
Short, maximum 10 years	3571	6.3	139.2 (120.9–157.4)†	2.5	129.7 (102.5–156.8)†
Medium, 11–12 years	3495	3.2	102.7 (83.7–121.6)	2.0	111.1 (85.0–137.3)
Long, 13–14 years	4323	1.1	57.4 (41.0–73.9)†	1.4	74.2 (55.5–92.9)†
Longer, 15+ years	2926	1.0	48.7 (31.3–66.1)†	1.7	88.7 (63.6–113.7)

*$P \leq 0.0022$ in Cochran-Armitage's test for trend
†$P < 0.05$
95% CI: 95% confidence interval

Table 5 Use of sedatives and/or sleeping medicine within the past 14 days and anxiety/nervousness and/or sleeping problems within the same time period in relation to education. Prevalence (%) and Cochran-Armitage's test for trend. Standardised prevalence ratios (SPR) in educational groups by standardisation for age and gender based on the total study population

		Use of sedatives and/or sleeping medicines within the past 14 days		Anxiety, nervousness and/or sleeping problems within the past 14 days	
	n	Prevalence (%)*	SPR (95% CI)	Prevalence (%)*	SPR (95% CI)
Total	14315	7.4	–	15.0	–
Education					
Short, maximum 10 years	3571	12.4	115.4 (104.7–126.1)†	18.4	107.5 (99.3–115.7)
Medium, 11–12 years	3495	7.9	99.1 (87.4–110.8)	15.7	106.2 (97.3–115.1)
Long, 13–14 years	4323	4.6	85.4 (73.5–97.3)†	12.5	88.5 (81.0–95.9)†
Longer, 15+ years	2926	5.0	86.7 (72.7–100.7)	13.9	98.1 (88.6–107.7)

*$P < 0.0001$ in Cochran-Armitage's test for trend
†$P < 0.05$
95% CI: 95% confidence interval

Use of sedatives and/or sleeping medicine within the past 14 days in relation to anxiety/nervousness and/or sleeping problems within the same timeframe

The prevalence of use of sedatives and/or sleeping medicine within the past 14 days was 7.4%. A significant decreasing trend was found with increasing level of education (Table 5). However, the prevalence for respondents with 15+ years of education was a little higher than for that of respondents with 13–14 years of education (5.0% and 4.6%, respectively). A similar gradient of prevalence across educational groups was found for anxiety/nervousness and/or sleeping problems within the past 14 days (Table 5).

The age–gender standardised SPRs for the use of sedatives and/or sleeping medicine within the past 14 days revealed that respondents with only a few years of education (maximum 10 years) used these medicines significantly more often than could be expected. Respondents with 13–14 years of education had a significantly low SPR for this kind of medicine use, whereas the remaining educational groups did not differ from the total study population (Table 5).

In general the SPRs for the symptoms in question across educational groups were not significant. The only exception were respondents with 13–14 years of education, who reported these symptoms significantly less often than could be expected (Table 5).

Discussion

The main finding of this study was that similar patterns emerged for all four pairs of psychotropic medicine use and related disease/symptoms: in general, respondents in the two least-educated groups used medicine more often and had a higher proportion of reporting the related disease than could be expected from the total study population. The opposite picture appeared for respondents in the two groups with highest education. Some of the SPRs were significant and others were not, but the overall patterns were the same.

The results documented an uneven distribution of specific health problems in the general population. Psychotropic medicine use appeared to be congruent with the distribution of related health problems. This means that the least-educated groups in most need of treatment were also those groups with most-frequent medicine use. Hence, expenses incurred by the individual user did not seem to be a barrier to access to medicines, not even for specific groups of medicine ineligible for reimbursement in Denmark (e.g. anxiolytics, hypnotics and sedatives). Had this been the case, it could be expected that educational groups experiencing barriers to access to medicine and having a higher than expected occurrence of disease would have a lower level of medicine use than expected from the total study population.

Psychotropic medicine use by age and gender was higher among women than men and rose with increasing age. This finding is in accordance with former published studies [3, 5, 6, 7, 8, 9, 10].

The statistical method applied in this study could not determine the presence of social differences due to factors other than differences in health status between educational groups. It is evident that if such differences existed, they consisted of an increasing use of psychotropic medicines with decreasing education. This goes for all types of psychotropic medicines. Due to differing study parameters and the applied method of analysis, the results of this study are not directly comparable to former published studies.

In some cases, the total prevalence of medicine use was higher than the total prevalence of the related disease, but the opposite was also found. The magnitude of the prevalence for medicine use and related disease is not directly comparable, as the analyses were performed on an aggregate level. Therefore, the differences between the prevalence cannot be interpreted as different therapeutic treatment of different kinds of diseases, although it may exist.

A Swedish study found that the occupational profiles of current and regular users, respectively, of sedatives and hypnotics were different [6]. Current use of these medicines was most prevalent in the groups of disability

pensioners, the unemployed, and male self-employed and low-level, female white collared. Regular use was most prevalent in the groups of disability pensioners and unemployed [6]. In the present study, regular use of anxiolytics, hypnotics and/or sedatives and the use of these medicines within the past 14 days indicate a difference in user groups between these two kinds of medicine use. In the regular use of these medicines, three educational groups were highly significant compared with two less-significant groups with respect to use of these medicines within 14 days. Hence, the regular use of anxiolytics, hypnotics and/or sedatives deviated more from that of the total study population than did the use of these medicines within the past 14 days.

Methodological considerations

The analyses in this study were based on a cross-sectional survey in a large representative sample of the Danish population, and the response rate was satisfying (74.2%). The cross-sectional nature of the study implies that the time sequence between symptom appearance and medical treatment could not be captured. A longitudinal design would be better for this purpose.

The validity of the information on psychotropic medicine use and related diseases/symptoms is not known. It has been shown among Dutch low- and middle-income groups that self-reporting of prescription medicine use within 3 months was good to excellent. Furthermore, concordance between survey and registration data differed very little between socio-economic groups [18]. The recall period in the present study was the past 14 days and this might result in better validity of recall of prescription medicine use than a 3-month period. However, this study focused on medicines for psychological/psychiatric problems that have been shown to be particularly prone to underreporting [19]. Respondents may be reluctant to mention use of these medicines to an interviewer due to (self)-stigmatisation [20].

The prevalence of regular use of anxiolytics, hypnotics and/or sedatives was lower than that for within the past 14 days (2.9% and 7.4%, respectively). This difference seems reliable, but could also be due to influence from the structure of the questions. It has been shown that recall sensitivity is higher for questions about medicines used for specific indications (in this study paralleled to use within the past 14 days) than for open-ended questions on medicine use (regular use in this study) [21].

It is possible that the presence of chronic mental disorders was underreported due to the taboos attached to these diseases. However, the social gradient determined seems reasonable when compared with the presence of anxiety/nervousness and sleeping problems within the past 14 days.

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