Health Services Research and Managerial Epidemiology
Volume 5: 1-5

DOI: 10.1177/2333392818792683
journals.sagepub.com/home/hme
SAGE

Mental Health and Disability Pension Onset: Changes in Consumption of Antianxiety and Hypnotic Drugs

Ingunn Fride Tvete[1], Trine Bjørner[2], and Tor Skomedal[3]

Abstract

Introduction: In Norway, disability pension (DP) has been more prevalent over the later years, with mental disorders being a frequent cause. Previous analyses have questioned whether receiving DP is beneficial for mental health by considering changes in antidepressant drug consumption. To explore this further, we examined changes in antianxiety and hypnotic drug consumption following DP onset.

Methods: Based on national Norwegian register data, this retrospective study encompassed 8617 working-age individuals (25-50 years) who became DP during 2005 to 2013. We compared their benzodiazepines (BZD) and Z-hypnotic consumption 1 year pre- and postdisability pension onset.

Results: About 80% of the individuals did not change their altogether benzodiazepine/Z-hypnotic consumption. Among individuals with an initial consumption $\leq$1 defined daily dose (DDD), 18.9% increased their consumption to above 1 DDD. Individuals in the age-group 45 to 50 versus 24 to 34 years had a lower risk of dose escalation (odds ratio [OR], 0.756, 95% confidence interval [CI]: 0.601-0.957). Individuals who used Z-hypnotics only had a higher risk of dose escalation compared to the joint benzodiazepine/Z-hypnotic user group (OR, 1.594, 95%CI: 1.284-1.970).

Conclusion: In general, we cannot see that DP is associated with changes in benzodiazepine/Z-hypnotic consumption, but younger users and individuals using Z-hypnotics only had a greater risk of dose escalation compared to the older users and users with combined BZD and Z-hypnotic use.

Keywords

community health, efficiency, health outcomes, medications, pharmacy

Introduction

Work is a positive factor for mental health,[1] but good mental health is also a premise for work–life participation.[2] Mental disorders are some of the most prevalent causes for disability pension (DP).[3] In Norway, mental disorders have been the most common cause for receiving DP among young adults.[4] Early-age DP onset results in many lost working years and represents a burden both for the disabled themselves and for their families and an economic cost for the society.

Benzodiazepines (BZD) are prescribed to individuals suffering both from daytime anxiety and sleeplessness, while Z-hypnotics are prescribed for sleep disorders. Benzodiazepines and Z-hypnotics are most often prescribed in general practice[5] for a wide range of conditions, from temporary sleeping problems to serious mental disease. These drugs are addictive and often used in larger doses and for a longer time than recommended. Just as antidepressant use might indicate poor mental health so could antianxiety and hypnotic drug use indicate reduced mental health and well-being. Wedegaertner et al,[6] Mykletun et al,[7] and Torske et al[8] identified anxiety as a risk factor for receiving DP.

[1] The Norwegian Computing Center, Oslo, Norway
[2] Department of General Practice, Institute of Health and Society, Oslo University Hospital, Oslo, Norway
[3] Department of Pharmacology, Institute of Clinical Medicine, Oslo University Hospital, Oslo, Norway

Submitted June 21, 2018. Accepted June 21, 2018.

Corresponding Author:
Ingunn Fride Tvete, The Norwegian Computing Center, PO 114 Blindern, 0314 Oslo, Norway.
Email: ingunn.fride.tvete@nr.no

Previous works have examined how DP initiation affects mental health, measured by changes in antidepressant purchases.[9,10] Oksanen et al[9] concluded that DP initiation might be beneficial for mental health. Laaksonen et al[10] found that antidepressant purchases decreased following DP onset but that hypnotic and sedative purchases increased (no change for other psychotropic drugs). We explored this further by comparing BZD and Z-hypnotic consumption 1 year before and after DP onset.

Others have considered BZD use after initiating DP.[11,12] To the best of our knowledge, changes in BZD and Z-hypnotic use following DP onset has not been previously studied. We considered BZD and Z-hypnotic redemptions as a proxy for individuals' mental health concerning anxiety and sleep disturbances. By examining such use over time, we obtained an indication of individuals' mental and emotional health with respect to becoming disability pensioners.

Methods

Disability pension data were retrieved from the Progress database safe (FD Insurance), Statistics Norway (SSB).[13] From SSB, we also obtained information on the individuals' education level. The study is approved by the Regional Committees for Medical and Health Research Ethics (2010/1514 REK Sør-Øst) and the Norwegian Data Protection Authority (12/00730-9). We considered working-age individuals (25-50 years) granted DP during 2005 to 2013. To eliminate sporadic users, we excluded individuals with <6 redemptions for BZD/Z-hypnotics during the year prior to receiving DP. We omitted individuals dying in the year following DP onset.

Redemptions from pharmacies for BZD and Z-hypnotics were obtained from the Norwegian Prescription Database.[14] Benzodiazepines included klonazepam (N03AE01), diazepam (N05BA01), oxazepam (N05BA04), alprazolam (N05BA12), nitrazepam (N05CD02), and flunitrazepam (N05CD03). The BZD-like drugs for sleeping disorders Z-hypnotics included zopiklon (N05CF01) and zolpidem (N05CF02). As in all register studies, we assumed that the amount of BZD and Z-hypnotics redeemed was consumed.

We compared the amount of BZD/Z-hypnotics redeemed the year prior to and after DP onset by considering the defined daily doses (DDDs)[15] per day on average for the 2 periods. As these drugs should be used only for a short period of time (maximum 4 weeks[16]), 1 year is a relative long observation interval. Figure 1 gives the flowchart for identifying the 8617 individual study population.

The amount of DDD was categorized into 3 levels: level 0—no dispensations, level 1—redeemed prescriptions for between 0 and 1 DDD per day on average, and level 2—redeemed prescriptions for more than 1 DDD per day on average. We focused on 3 BZD/Z-hypnotic user groups: receiving both BZD and Z-hypnotics, only BZD and only Z-hypnotics in the year prior to initiating DP, in light of known background information such as gender, age, education level and whether he or she had redemptions for other drugs.

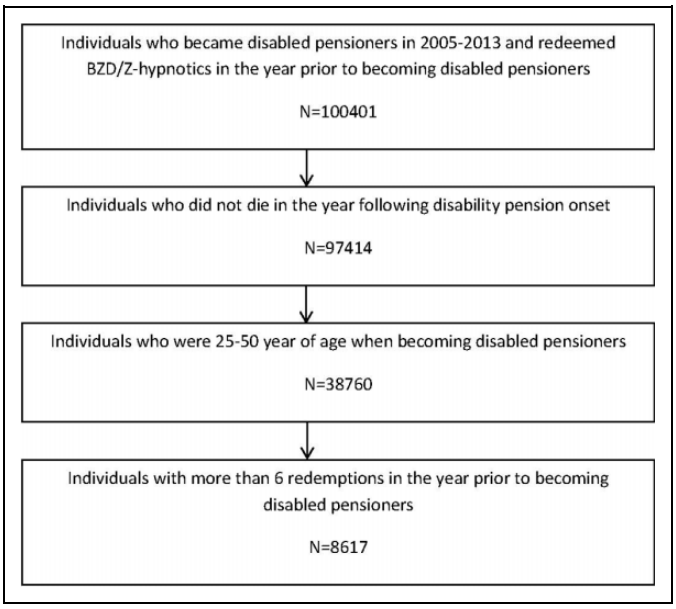

Figure 1. Flowchart of study population.

We considered other drug groups as a proxy of illness and severity (drugs for cardiac diseases, rheumatic diseases, chronic obstructive pulmonary disease [COPD], antipsychotics, antidepressants and opioids, antialcohol, and smoking cessation drugs).

Age-groups were 25 to 34, 35 to 44, and 45 to 50 years. Education level was categorized into 4 groups: low (none or primary school), middle (secondary school), high (college/ university), or unknown.

We conducted a subanalysis of younger and presumably healthier subgroup of individuals aged 25 to 34 years of age who had not used other drugs previously.

We compared the 3 BZD/Z-hypnotic user groups with respect to changes in dose level following DP initiation (logistic regression). We initially considered a model adjusting for all known background information. We applied a standard automatic model selection procedure for deciding on which background information to include (using Akaikes information criterion[17]). The results are presented as OR with corresponding 95 confidence intervals (CIs) and *P* values. The analysis was conducted in the statistical analyses program R, using the «step»-function.[18,19]

Results

Cohort Description

Altogether 49.41% used both BZD and Z-hypnotics prior to initiating DP, while 36.38% and 14.20% used only BZD or Z-hypnotics, respectively. There were more women (53.57%) than men, and 14.34%, 43.89%, and 41.77% were in the 25- to 34-, 35- to 44-, and 45- to 50-year age-groups, respectively. Altogether, 54.40%, 34.11%, 9.66%, and 1.83% had low, middle, high, and unknown education, respectively. We found that 24.65%, 8.29%, 18.36%, 26.19%, 44.76%, and 9.88% had

Table 1. Number (%) Going From Dose Level 1 or 2 Prior to DP Onset to Level 0, 1, or 2 Following DP Onset, and the Number (Percentage) Experiencing Increase, Decrease, or no Change in Dose Level.

	To Level		
From level	0	1	2
1	154 (4.35)	2717 (76.75)	669 (18.90)
2	94 (1.85)	826 (16.27)	4157 (81.88)
Number (%) With Increased Dose Level	Number (%) With Decreased Dose Level	Number (%) With Unchanged Dose Level	
669 (7.76)	1074 (12.46)	6874 (79.77)	

Abbreviation: DP, disability pension.

Table 2. The Number (Percentage) Who Increased/Did Not Increase Their Dose Level for the BZD/Z-Hypnotic User Groups, and or the Background Characteristics.

		Increase	Not Increase
BZD/Z-hypnotics	Both BZD and Z-hypnotics	308 (7.23)	3950 (92.77)
	BZD only	227 (7.24)	2908 (92.76)
	Z-hypnotics only	134 (10.95)	1090 (89.05)
Gender	Men	301 (7.52)	3700 (92.48)
	Women	368 (7.97)	4248 (92.03)
Age (years)	25-34	112 (9.06)	1124 (90.94)
	35-44	299 (7.91)	3483 (92.09)
	45-50	258 (7.17)	3341 (92.83)
Education	Lower	354 (7.55)	4334 (92.45)
	Middle	233 (7.93)	2706 (92.07)
	High	67 (8.05)	765 (91.95)
	Unknown	15 (9.49)	143 (90.51)
Drugs for cardiac diseases	Had not	514 (7.92)	5979 (92.08)
	Had	155 (7.30)	1969 (92.70)
Drugs for rheumatic diseases	Had not	616 (7.79)	7287 (92.21)
	Had	53 (7.42))	661 (92.58)
Drugs for COPD	Had not	560 (7.96)	6475 (92.04)
	Had	109 (6.89)	1473 (93.11)
Antipsychotics	Had not	485 (7.63)	5875 (92.37)
	Had	184 (8.15)	2073 (91.85)
Antidepressants	Had not	359 (7.54)	4401 (92.46)
	Had	310 (8.04)	3547 (91.96)
Opioids, anti-alcohol and smoking cessation drugs	Had not	593 (7.64)	7173 (92.36)
	Had	76 (8.93)	775 (91.07)

Abbreviations: BZD, Benzodiazepines; COPD, chronic obstructive pulmonary disease.

redeemed drugs for cardiac diseases, drugs for rheumatic diseases, drugs for COPD, antipsychotics, antidepressants and opioids, antialcohol, and smoking cessation drugs in the year prior to initiating DP, respectively. Altogether 58.92% had a BZD/ Z-hypnotics consumption of more than 1 DDD per day on average in the year prior to DP initiation.

Changes in BZD/Z-Hypnotic Dose Level

Table 1 displays changes in dose level after initiating DP and a distribution of who experienced increase, decrease or no change in dose level. About 80% did not change their dose level.

Altogether 76.78% continued combined BZD and Z-hypnotic use after initiating DP. Among initially exclusive BZD users, 15.22% also used Z-hypnotics afterward, while 22.55% previously Z-hypnotic exclusive users also used BZD afterward.

Among youngsters without a history of other drug use, 47.05% used both BZD and Z-hypnotics, while 42.80% and 10.15% used initially only BZD or Z-hypnotics, respectively. A somewhat larger percentage increased (9.96% vs 7.76%) and decreased (15.68% vs 12.46%) consumption compared to the overall study population.

Regression Analysis

Table 2 gives an overview of the number (percentage) who increased/did not increase their BZD/Z-hypnotic consumption, given previous BZD/Z-hypnotics use and patient characteristics.

The fitted regression model, Table 3, adjusts for age and possibly previous use of opioids, antialcohol, or smoking

Table 3. Fitted Logistic Regression Model, Focusing on BZD/Z-Hypnotic Use Prior to DP Initiation, Adjusting for Age and Previous Use Opioids, Anti-Alcohol, and Smoking Cessation Drugs; OR, 95% CI, and *P* Values.

Variable	Group	OR	95% CI	*P* Value
BZD/Z-hypnotics (both)	BZD only	0.99	0.83-1.18	.885
	Z-hypnotics only	1.59	1.28-1.97	<.001
Age (25-34 year)	35-44	0.85	0.67-1.07	.147
	45-50	0.76	0.60-0.96	.018
Opioids, anti-alcohol and smoking cessation drugs		1.21	0.93-1.54	.141

Abbreviations: BZD, benzodiazepines; CI, confidence interval; DP, disability pension; OR, odds ratio.

cessation drugs. Gender, education, and previous use of other drugs except opioids, antialcohol, or smoking cessation drugs were not found to be relevant.

Initially, exclusive Z-hypnotic users had a larger risk for dose increase compared to combined BZD and Z-hypnotics users (OR 1.59, 95% CI: 1.28-1.97). Individuals aged 45 to 50 years had a lower risk for increasing their dose level compared to individuals aged 24 to 34 years old (OR, 0.76, 95% CI: 0.60-0.96). Opioids, antialcohol, and smoking cessation drug users had an increased, nonsignificant risk for dose escalation compared to individuals without such previous use.

Analyzing the youngest age-group without a history of other drug use, we found that initially exclusive BZD users had higher risk of dose increase compared to combined BZD and Z-hypnotics users (OR, 2.23, 95% CI: 1.20-4.32).

Discussion

The major finding is that the combined BZD and Z-hypnotics consumption for most individuals remained unchanged from the year prior to the year following DP onset.

Individuals aged 45 to 50 years had a lower risk of increasing dose level than individuals aged 25 to 34 years. Exclusive Z-hypnotics users had a higher risk of increasing their dose level compared to combined BZD and Z-hypnotic users.

The process of receiving DP is long and demanding. To come to terms with ones DP status could be positive and perhaps result in less need for medication. Still, some might find the DP label stigmatizing and troublesome and could therefore wish for more medication. Becoming unable to work at young age can be extra difficult, giving a feeling of being an outsider; it might be demanding to fill the days with meaningful activities. This might explain why a greater proportion of young individuals increased their dose level compared to the entire study population. Receiving DP and to be out of work does not necessarily have a positive impact on one's mental health.

In the group of individuals aged 45 to 50 years, there was a higher percentage previously using cardiac drugs, drugs for rheumatic diseases, COPD drugs, and antidepressants compared to the 25- to 34-year age-group. This could be a group with an established drug use due to chronic somatic illness rather than ill mental health.

In the 25- to 34-year age-group, a higher percentage had been co-medicated with antipsychotics. It is not surprising that this young age-group, with more prevalent use of psychotropics, indicating more severe mental illness, had a greater tendency to dose escalation. This corresponds to previous knowledge on causes for receiving DP.[2]

Additional BZD use after DP initiation among those who initially used Z-hypnotics only occurred in 22.55%. This could be an indication of tolerance development. Z-hypnotics, with their short action time, will aid induction of sleep but will not give a sedative/antianxiety daytime effect. These individuals could be seeking sedative/antianxiety drugs also for daytime use. Such combined drug use is not in line with guidelines[20] and could mask tolerance. A combined day and night effect can be achieved by choosing a BZD drug.[21] Previous users of BZD alone or together with Z-hypnotics could also have reached a desired effect and therefore kept their dose level after initiating DP.

Pervious users of opioids, antialcohol, and smoking cessation drugs were (nonsignificant) risk factors in accordance with previous findings.[22] They could have a general proneness to dependency and dose escalation.

Among 25- to 34-year-old individuals without previous use of other drugs, a proportion increased and another proportion decreased their dose level compared to the total study population. Among these, the exclusive BZD users had a greater risk of consumption increase compared to combined BZD and Z-hypnotic users. This is a group of disability pensioners of special interest, initially, healthy individuals who, for unknown reasons, fall out of work at an early age. This is an important finding and should be studied closer.

We focused on individuals using less or more than 1 DDD per day. Some individuals had perhaps initially used <1 DDD per day on average, increasing to just above 1 DDD following DP initiation. These became "dose-level increasers," although the average consumption might not be very different in the 2 periods.

We did not consider how much BZD versus Z-hypnotics was consumed for combined BZD and Z-hypnotic users. This could be individuals using both drugs regularly but also BZD users using Z-hypnotics sporadically.

We observed drug consumption 1-year pre- and 1-year post-PD onset. Other studies had a longer time perspective,[6] but they considered antidepressant drugs, which are drugs recommended for a longer time period (6-8 months). Benzodiazepines and Z-hypnotics should be used for a short time only.[13]

Conclusions

The main trend was that the total BZD and Z-hypnotics consumption did not change following DP initiation. This implies that the majority of disability pensioners had a reasonably constant level of consumption, independent of DP status. Still, among individuals with a consumption of 1 DDD or less per day prior to DP initiation, almost 20% increased their level of consumption. Young individuals and those using only Z-hypnotics in the year prior to DP initiation had a greater risk of increasing the dose level compared to older individuals and those who previously used both BZD and Z-hypnotics. Our findings do not indicate that becoming disability pensioner have a positive impact on young individuals' mental health. Doctors should be aware of this when meeting patients seeking DP.

Acknowledgments

We thank 2 anonymous referees for their insightful comments improving this manuscript.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was done under the Norwegian Research council project number 190420/V50.

References

1. Samuelsson Å, Ropponen A, Alexanderson K, Sveberg P. Psychosocial working conditions, occupational groups, and risk of disability pension due to mental diagnoses: a cohort study of 43000 Swedish twins. *2013, Scand J Work Environ Health*. 2013;39(4):351-3601.
2. OECD. *Mental Health and Work: Norway*. Paris: OECD Publishing; 2013. doi:10.1787/9789264178984-en. Accessed February 2018.
3. OECD Sickness, Disability and Work. Breaking the Barriers. A Synthesis of Findings Across OECD Countries. 2010. doi:10.1787/9789264088856-en.
4. Knudsen AK, Øverland S, Hotopf M, Mykletun A. Lost working years due to mental disorders: an analysis of the Norwegian disability pension registry. *PLoS One*. 2012;7(8):e42567. doi:10.1371.
5. Kjosavik SR, Ruths S, Hunskaar S. Psychotropic drug use in the Norwegian general population in 2005: data from the Norwegian prescription database. *Pharmacoepidemiol Drug Saf*. 2009;18(7):572-578.
6. Wedegaertner F, Arnhold-Kerri S, Sittaro N-A, Bleich S, Geyer S, Lee WE. Depression- and anxiety-related sick leave and the risk of permanent disability and mortality in the working population in Germany: a cohort study. *BMC Public Health*. 2013;13:145. doi:10.1186/1471-2458-13-145.
7. Mykletun Al, Heradstveit O, Eriksen K, et al. Health anxiety and disability pension award: the HUSK study. *Psychosom Med*. 2009;71(3):353-360. doi:10.1097/PSY.0b013e31819cc772.
8. Torske MO, Hilt B, Bjørngaard JH, Glasscock D, Krokstad S. Disability pension and symptoms of anxiety and depression: a prospective comparison of farmers and other occupational groups. The HUNT Study, Norway. *BMJ Open*. 2015;5(11):e009114. doi:10.1136/bmjopen-2015-009114.
9. Oksanen T, Vahtera J, Westerlund H, et al. Is retirement beneficial for mental health?: antidepressant use before and after retirement. *Epidemiology*. 2011;22(4):553-559.
10. Laaksonen M, Metsä-Simola N, Martikainen P, et al. Trajectories of mental health before and after old-age and disability retirement: a register-based study on purchases of psychotropic drugs. *Scand J Work Environ Health*. 2012;38(5):409-417. doi:10.5271/sjweh.3290.10.
11. Hartz I, Lundesgaard E, Tverdal A, Skurtveit S. Disability pension is associated with the use of benzodiazepines 20 years later: a prospective study. *Scand J Public Health*. 2009;37(3):320-326.
12. Hartz I, Tverdal A, Skurtveit S. Langtidsbruk av BZD i kombinasjon med opioider og z-hypnotika blant uføretrygdede i Norge. Norsk Farmaceutisk Tidsskrift, 2011 [In Norwegian].
13. Statistics Norway (SSB): http://www.ssb.no/. Accessed February 2018.
14. The Norwegian Prescription Database (NorPD): http://www.norpd.no. Accessed February 2018.
15. DDD: http://www.whocc.no/ddd/definition_and_general_considera/. Accessed February 2018.
16. The National Institute for Health and Care Excellence (NICE) https://www.nice.org.uk/advice/ktt6/chapter/evidence-context. Accessed February 2018.
17. Sakamoto Y, Ishiguro M, Kitagawa G. *Akaike Information Criterion Statistics*. Dordrecht, Netherlands: D. Reidel; 1986.
18. R Core Team. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.R-project.org/, R version 3.1.1.
19. Step-funksjon i R: https://stat.ethz.ch/R-manual/R-devel/library/stats/html/step.html. Accessed February 2018.
20. Handal M, Skurtveit S, Mørland JG. Co-medication with benzodiazepines. *Tidsskr Nor Laegeforen* [In Danish]. 2012;132(5):526-530.
21. Tvete IF, Bjørner T, Skomedal T. Risk factors for excessive benzodiazepine use in a working age population—a nationwide 5-year survey in Norway. *Scand J Prim Health Care*. 2015;33(4):252-259.
22. Tvete IF, Bjørner T, Skomedal T. New benzodiazepine and Z-hypnotic users and disability pension: an eight-year nationwide observational follow-up study. *Scand J Prim Health Care*. 2017;35(3):240-246. doi:10.1080/02813432.2017.135843622.

Author Biographies

Ingunn Fride Tvete, senior researcher, The Norwegian Computing Center, Oslo, Norway.

Trine Bjørner, associate professor, Department of General Practice, Institute of Health and Society, Oslo University Hospital, Oslo, Norway.

Tor Skomedal, professor emeritus, Department of Pharmacology, Institute of Clinical Medicine, Oslo University Hospital, Oslo, Norway.