



Short communication

Influence of gender on inpatient treatment for bipolar disorder: An analysis of 60,607 hospitalisations



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ABSTRACT

Background: The influence of gender on inpatient treatment patterns in bipolar patients is unclear. The aim of this study is to examine whether differences in length of stay and frequency of inpatient episodes, according to ICD-10 bipolar disorder (BD)-subgroups, exist between men and women.

Methods: All episodes of a manic (F31.0-2), depressive (F31.3-5) or mixed (F31.6) subtype of BD during an inpatient stay in an Austrian hospital in the period of 2001–2014 were included in this study. Data on episodes was provided by the national statistics agency. Weekly admission rates per 100,000 people were calculated by directly age-standardized rates.

Results: The database comprised 60,607 admissions (35.8% men). The number of inpatient episodes was significantly higher ($p < 0.001$) in women in all BD subgroups. Average length of stay in manic ($p < 0.001$) and depressive ($p < 0.001$) episodes was shorter in women compared to men. No difference could be found for mixed episodes.

Limitations: Only aggregated patient data and no single case histories were available for this study.

Conclusions: The current study reveals relevant gender differences regarding inpatient treatment patterns, as women were overrepresented in all BD-subgroups. Despite equal life time prevalence, severe mood episodes lead more often to hospitalisations in women. There is a high necessity to further research the underlying causes of these findings.

1. Introduction

Bipolar disorder (BD), characterised by recurrent depressive and manic or hypomanic episodes, is a common and severe mental disorder (Grande et al., 2016). Worldwide life-time prevalence rates for BD I disorder are 0.6% and 0.4% for BD II disorder, independent of ethnic or cultural background (Merikangas et al., 2011). Recurrence risk in BD is as twice as high compared to unipolar depression and BD is responsible for the loss of more disability adjusted life-years than all major neurological disorders like Morbus Alzheimer or epilepsy and all cancer sub-types (Grande et al., 2016; Merikangas et al., 2011). Moreover, BD shows a high rate of comorbidity, especially for alcohol and substance abuse, which further increase the burden on the individual patients (Merikangas et al., 2011; Kawa et al., 2005). Patients with BD also have a markedly increased suicide risk, with a lifetime suicide risk of about 7% (Nordentoft et al., 2011).

Further research assessing the heterogeneity of the clinical course of

BD is essential to improve long-term outcome in this patient group, especially by identifying those patients with the most severe course. Previous studies showed that gender influences the course of disorder in an important clinical way (Diflorio and Jones, 2010). While life-time prevalence rates in most studies are equally distributed among both genders (Merikangas et al., 2011; Diflorio and Jones, 2010), several studies found differences regarding BD subtype, polarity and frequency of mood episodes. Higher rates for bipolar II, rapid cycling and mixed episodes were described in women (Diflorio and Jones, 2010; Nivoli et al., 2011). Further, there is some evidence that women with bipolar disorder are more likely to spend more time in subsyndromal depressed mood and dysphoria (Diflorio and Jones, 2010; Altshuler et al., 2010). Important gender differences were also found in patterns of co-morbidity, such as substance dependence, which was more often diagnosed in men, while eating or panic disorders are more often comorbid in women (Kawa et al., 2005; McElroy et al., 2016). However, these results are inconsistent and in several studies no gender differences could

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be found for BD subtype, polarity of onset, rates of depressive episodes and severity of the disorder (Kawa et al., 2005; Diflorio and Jones, 2010; Baldassano et al., 2005). Further, previous studies either were based on rather small samples, or when using larger national hospital discharge data, focused only on the cost of BD (Ösby et al., 2009; Kleine-Budde et al., 2014) or on seasonal patterns in admission rates (Geoffroy et al., 2014).

We conducted this study to gather further evidence on the impact of gender on the course of disorder in BD, by analysing national data on inpatient treatment episodes over a 14-year time period. We hope to identify those patients in which severe mood episodes lead most frequently to inpatient episodes, as they are in need of improved biopsychosocial care. To the best of our knowledge, this study is the first which uses national hospital discharge data to analyse gender differences in hospitalisation patterns of bipolar patients.

2. Patients and methods

For the current investigation, discharge data of all patients that were hospitalized in the period 2001–2014 in Austria and diagnosed with a bipolar disorder (F31.0–F31.9) as primary reason for current inpatient stay, was used. Hospital admissions in Austria are possible in different ways: patients can be referred by their general practitioners or their outpatient consultant. However, patients can also be admitted directly by an ambulance, or after being examined first at a local outpatient department. Typically, involuntary admissions are arranged through law enforcement forces. Regarding the percentage of involuntary admissions, no detailed data for the observation period are available. However, on average about 25% of all admissions are involuntary (Ladurner, 2017).

Data was provided by Statistics Austria the national statistics agency in anonymized form. Statistics Austria collects annually data from the Austrian health system, which are made available for scientific research.

The dataset contains following variables: BD sub-diagnoses (F31.0–F31.9), week of discharge, gender and the length of hospital stay in days. For further calculations, BD sub-diagnoses were grouped, according to the subtype, in manic (F31.0–F31.2), depressive (F31.3–F31.5) and mixed (F31.6) episodes. Excluded from analysis were ICD-10-diagnosis: F31.7–9 ($n = 7660$, F 31.7 BD, currently in remission, F 31.8 other BD, F31.9 BD, unspecified) because of being not specific enough to be categorised, as well as patients with length of stay greater than 1 year ($n = 38$).

2.1. Statistical methods

Data management and analysis was done in SAS version 9.4 (SAS Institute Inc., Cary, NC, USA). Directly age standardized rates (Rothman et al., 2008) and 95% confidence intervals were calculated based on the European standard population and by means of SAS procedure “proc stdrate” in order to adjust for a possible shift in the age distribution, comparisons of standardized rates by sex were done by rate ratios. Comparison of mean length of stay between groups were done by Wilcoxon signed rank test. The significance level was set to 5%. Individual p-values were set to 5%/3 in order to adjust for multiple testing because of 3 BD sub-diagnosis groups. 2.5% and 97.5% percentiles for the difference in the mean were calculated by $n = 1000$ bootstrap samples because of the skewed distribution of length of stay.

3. Results

The database comprised 60,607 admissions ($n = 28,311$ for depressive, $n = 23,198$ for manic and $n = 9098$ for mixed episodes). In total, 35.8% ($n = 21,711$) of the admissions were men (demographic characteristics according to BD-subtypes see Table 1). Patients had a mean age at admission of 47.56 years (SD 14.42), 46.71 years (SD

Table 1
Number and percentage of admissions for bipolar disorder (total and sub-groups) according to gender.

Gender	Bipolar disorder (BD) sub-group			BD
	Manic	Depressive	Mixed	Total
	F31.0-2	F31.3-5	F31.6	F31.0-6
Males	9184	9750	2777	21,711
	39.6%	34.4%	30.5%	35.8%
Females	14,014	18,561	6321	38,896
	60.4%	65.6%	69.5%	64.2%
Total	23,198	28,311	9098	60,607

13.89) in men and 48.03 years (SD 14.69) in women. The population based admission rates were significantly higher in women in total and in all BD-subtypes ($p < 0.001$), with a male to female rate ratio for manic episodes of 0.67, depressive episodes of 0.55 and mixed episodes of 0.46 (Table 2).

The average length of stay for women in manic (18.23 [95%CI: 17.91–18.56] vs. 19.77 days [95%CI: 19.30–20.25], $p < 0.001$) and depressive (19.17 [95%CI: 18.85–19.48] vs 19.79 days [95%CI: 19.36–20.23], $p < 0.001$) episodes was significantly shorter compared to men. No significant gender difference could be found for mixed episodes (17.29 [95%CI: 16.79–17.79] vs 17.30 days [95%CI: 16.54–18.07], $p = 0.189$).

4. Discussion

This study aimed at investigating the influence of genders on inpatient treatment patterns in bipolar disorder, by analysing admission rates of a nationwide sample over a period of 14 years.

Our results show that there are significant differences in the rates of hospitalisation due to severe mood episodes between men and women. Although the majority of epidemiological studies, show that the lifetime prevalence rate for BD is equally distributed between the two gender (Merikangas et al., 2011; Diflorio and Jones, 2010), we found that women have higher admission rates, as men represented roughly only 1/3 of all inpatient episodes. This is in line with Ösby et al. (2009) using also national data on admission rates, but focusing on the cost of BD in Sweden for the time period from 1997 to 2003. Increased hospitalisation numbers in women were observed, as they represented 61% of all hospitalisations, while representing only 55% of all patients. A high rate of readmissions was further shown in the following 5 years, as 15% of the patients were responsible for 66% of all readmissions (Ösby et al., 2009). Female gender was also positively associated with treatment use in a Canadian study with 852 bipolar subjects and in a 9-year observational study with 1856 inpatients in Spain (Schaffer et al., 2006; Martínez-Ortega et al., 2012). The analysis according to the BD sub-groups in our data revealed that women are not only overrepresented in the depressive and mixed subgroup, which is a robust result in the literature, but also in the manic (Diflorio and Jones, 2010). This is an important finding, as most previous reports stated that manic episodes affect men more frequently (Altshuler et al., 2010; Taylor and Abrams, 1981; Christensen et al., 2003). Exceptions are for example Martínez-Ortega et al. (2012) and Hendrick et al. (2000) who also found, in a 3-year study period of 131 patients diagnosed with BD, that women were hospitalized more often for mania. In contrast to our results, Hendrick et al. did not find differences regarding hospitalisation rates for depressive episodes between the two genders (Hendrick et al., 2000).

Several factors may explain why women had higher hospitalisation rates. First, health care utilization is known to differ between women and men, as women are reported to seek professional help from mental health care providers not only more frequently, but also at earlier stages compared to men (Schaffer et al., 2006; Oliver et al., 2005; Morgan

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