Original article

Epidemiology and socioeconomic impact of seasonal affective disorder in Austria

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A B S T R A C T

Background: Seasonal affective disorder (SAD) is a subtype of recurrent depressive or bipolar disorder that is characterized by regular onset and remission of affective episodes at the same time of the year. The aim of the present study was to provide epidemiological data and data on the socioeconomic impact of SAD in the general population of Austria.
Methods: We conducted a computer-assisted telephone interview in 910 randomly selected subjects (577 females and 333 males) using the Seasonal Health Questionnaire (SHQ), the Seasonal Pattern Assessment Questionnaire (SPAQ), and the Sheehan Disability Scale (SDS). Telephone numbers were randomly drawn from all Austrian telephone books and transformed using the random last digits method. The last birthday method was employed to choose the target person for the interviews.
Results: Out of our subjects, 2.5% fulfilled criteria for the seasonal pattern specifier according to DSM-5 and 2.4% (95% CI = 1.4–3.5%) were diagnosed with SAD. When applying the ICD-10 criteria 1.9% (95% CI = 0.9–2.8%) fulfilled SAD diagnostic criteria. The prevalence of fall-winter depression according to the Kasper-Rosenthal criteria was determined to be 3.5%. The criteria was fulfilled by 15.1% for subsyndromal SAD (s-SAD). We did not find any statistically significant gender differences in prevalence rates. When using the DSM-5 as a gold standard for the diagnosis of SAD, diagnosis derived from the SPAQ yielded a sensitivity of 31.8% and a specificity of 97.2%. Subjects with SAD had significantly higher scores on the SDS and higher rates of sick leave and days with reduced productivity than healthy subjects.
Conclusions: Prevalence estimates for SAD with the SHQ are lower than with the SPAQ. Our data are indicative of the substantial burden of disease and the socioeconomic impact of SAD. This epidemiological data shows a lack of gender differences in SAD prevalence. The higher rates of females in clinical SAD samples might, at least in part, be explained by lower help seeking behaviour in males.

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1. Introduction

Most humans experience some degree of change in psychological functioning, such as mood, drive, appetite and sleep during the course of the seasons [1]. These seasonal fluctuations in psychopathology attain clinical importance, when the symptoms lead to significant impairment and can be classified as affective episodes. Furthermore, seasonality of psychiatric symptoms might also be connected with annual variations in suicidality [2,3]. Seasonal affective disorder (SAD) was first described as a series of seasonally recurring depressive and/or (hypo)manic episodes by Rosenthal et al. [4]. The pathophysiology of the fall-winter type of SAD is complex and depressive episodes are likely triggered by the shortened photoperiod in autumn and winter [5]. Therefore, therapy with bright artificial visible light is the first line of treatment in these patients and has found widespread acceptance [6,7]. However, genetic and neuroimaging studies have also implicated alterations in monoaminergic neurotransmission, especially within the serotonergic system, in the pathogenesis of SAD [8]. For this reason, conventional antidepressant treatment is also widely used in SAD patients [9,10]. Over 20 reports on the prevalence of SAD have been published. In Europe epidemiological studies have been published in the adult general populations of Denmark [11,12], Finland [13], Iceland [14], Italy [15], the Netherlands [16], Sweden [17,18], Switzerland [19–21], and the UK [22]. However, there is no published prevalence data on SAD for Austria (9.5° to 17.2° eastern longitude and 46.4° to 49.0° northern latitude).

Studies investigating the occupational impairment of symptomatic SAD patients have yielded rates of sick leave that were

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more than 5 times higher than in the general population [23], which points to the socioeconomic importance of this disorder. After treatment there was a significant reduction of days with reduced functioning. However, up to now, the burden of disease as well as the social and economic sequelae associated with SAD have not yet been studied in the general population.

The aim of the present study was to provide prevalence data for SAD and subsyndromal SAD (s-SAD) from a representative sample of the adult general population of Austria. Moreover, we wanted to estimate socioeconomic impairment as a consequence of seasonally varying affective symptoms.

2. Method

This study was approved by the local institutional review board, the Ethics Committee of the Medical University of Vienna (project number EK 902/2010). We investigated a random sample of the general population of the republic of Austria by telephone interviews. We performed a power analysis according to the following formula: $n = (Z^2 P (1 - P))/d^2$, in which n is sample size, Z is the value of the standard normal distribution at a specific level of confidence (here 1.96), P is the expected prevalence (that can be obtained from previous studies and which was assumed to be 0.02), and d is the desired precision, which is recommended to be set at $P/2$ if $P < 0.1$ [24,25].

According to this sample size calculation we intended to include at least 904 (753 + 20% oversampling because of expected missing data) subjects.

Basis for recruitment were the telephone directories of all nine federal states of Austria. Phone numbers were randomly selected and the last two digits were changed according to a random last digits procedure [26], in order to include unlisted numbers. If a generated phone number did not exist, a further number was created. When nobody was reached at an existing phone number, up to three further attempts were made at different times of the day (between 9 a.m. and 9 p.m.). Only numbers from private households were used for this study and business numbers were excluded. If our call was answered, we asked to speak to the person with the most recent birthday (last birthday method) [27]. If the subject thus selected was not at home, we called again. All subjects had to provide oral informed consent before any study procedures were undertaken. To minimize a sample bias by initial refusal to participate, we called later at a time more appropriate for the subject and again explained our study (refusal conversion). If subjects refused a second time, they were listed as drop-outs. Minimum age for participation was 18 years. Subjects had to live in Austria at least for the past three years. Subjects who could not perform the interview, e. g. because of limited language capabilities, were excluded from the study. Documentation of the interviews was performed as computer assisted telephone interview (CATI) [26].

Demographical data of the subjects was inquired at the beginning of the telephone interview. During the interview we employed telephone versions of the three following psychometric instruments:

- the Seasonal Health Questionnaire (SHQ) [28,29] was used to establish a diagnosis of major depressive disorder (MDD) and of SAD according to DSM-5. The SHQ has a positive predictive value of 0.929 and a negative predictive value of 0.786 for diagnosis of SAD during the past 10 years [29]. The test does not allow for a diagnosis of s-SAD;
- the Seasonal Pattern Assessment Questionnaire (SPAQ) [30] is a retrospective assessment of seasonal fluctuations of psychopathology. Seasonal changes in mood, drive, appetite, sleep and social behaviour are graded and summed up to form a Global

Seasonality Score (GSS) and a Seasonal Problem Score, which has before served to classify SAD and s-SAD according to the Kasper-Rosenthal criteria [4,31]. The SPAQ has been criticised because of low validity for the diagnosis of SAD [28,29]. We used the SPAQ for the sake of comparability with earlier epidemiological studies, because it allows for establishment of a diagnosis of s-SAD and finally to assess the validity of this scale in comparison with the SHQ;
- the Sheehan Disability Scale (SDS) [32] was used to measure the degree of social impairment due to seasonally occurring psychopathological functioning. The SDS is an easy to administer three-item instrument, which considers the impact of an illness in three domains (work, social life, family life). Hodgins [33] has investigated the reliability and validity of an interview format version of the SDS and concluded that the scale can be administered by telephone. Furthermore, the number of days lost due to illness and days with reduced productivity were inquired.

Apart from the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) [34], we also intended to calculate the frequency of diagnosis according to the criteria of the International Classification of Diseases (ICD-10) [35]. As the SHQ does not assess one of the secondary criteria of a ICD-10 depressive episode, namely "bleak and pessimistic views of the future", we assumed the possibility of this symptom to be absent or present for each case, thus calculating a lower and upper margin of error for the ICD-10 diagnosis. The presence or absence of this symptom did not change the diagnosis for recurrent depressive disorder in a single patient and consequently also did not change the rate of SAD according to the ICD-10.

Statistical calculations were carried out with IBM SPSS Statistics [36]. Data were analysed by means of descriptive statistics. To estimate the indirect costs of SAD we calculated the economic burden for the Austrian economy taking into account published estimates for the costs for sick leave [37]. Univariate non-parametric tests were used to examine differences in regard to demographic variables and disability between diagnostic groups. The $P \leq 0.05$ level of significance (two-tailed) was adopted for all statistical comparisons. Data are either presented as arithmetic mean ± standard deviation or in the case of percentage values together with 95% confidence intervals in square brackets. Error bars in figures represent 95% confidence intervals.

3. Results

A total of 910 telephone interviews (498 from landlines and 412 from mobile phone numbers) were completed. The characteristics of this sample in comparison to the Austrian adult general population are presented in Table 1.

According to the DSM-5 criteria 15.60% [13.19–18.02] were suffering from major depressive disorder (MDD), 6.92% [5.22–8.63] from MDD single episode and 8.57% [6.70–10.45] from MDD recurrent. A total of 2.53% [1.45-3.60] fulfilled the criteria of the seasonal pattern specifier and 2.42% [1.36–3.47] were diagnosed with the fall-winter type of SAD during the past 10 years (Fig. 1). Using the ICD-10 criteria the lower estimate for depressive disorder (F32 + F33) was 14.51% [12.16–16.85] and the upper estimate was 15.05% [12.68–17.43]. The lower and upper estimate for a single depressive episode (F32) were 6.37% [4.73–8.02] and 6.92% [5.22–8.63], respectively. 8.02% [6.20–9.84] were classified as suffering from recurrent depressive disorder, 2.09% [1.10–3.07] from any form of SAD and 1.87% [0.93–2.80] from SAD, fall-winter type (Fig. 2). Utilizing the SPAQ and the Kasper-Rosenthal criteria 4.29% [2.91–5.66] were diagnosed with SAD, 3.52% [2.26–4.77] with the fall-winter type and 0.44% [0.00–0.92] with the