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Changes of clinical pattern in seasonal affective disorder (SAD) over time in a German-speaking sample

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Abstract *Objective* The goals of this study are to provide estimates of clinical and demographic variables of patients with seasonal affective disorder (SAD) in Germany and Austria, to compare our results with those of previously published SAD studies, and to find out whether the clinical pattern of SAD remained stable over several years. *Method* We investigated 610 SAD patients from the outpatient clinics in Bonn (n = 190) and Vienna (n = 420). Patients in Bonn were recruited in the fall-winter season of the years 1989–1992, those in Vienna in the years 1993–2001. *Results* We observed a change in the clinical pattern in our patients: patients from Bonn, who were diagnosed and treated about 5 years earlier, were more likely to suffer from melancholic depression, whereas Viennese patients rather suffered from atypical depression ($\chi^2 = 54.952$, df = 2, $p < 0.001$). The symptoms of hypersomnia, daytime fatigue, increased eating and carbohydrate-craving were more frequent in the Viennese sample, anxiety and deterioration of patients' capacity to perform at work predominated in Bonn. In addition, patients from Vienna obtained a higher GSS (global seasonality score, measured by the SPAQ – Seasonal Pattern Assessment Questionnaire) than those from Bonn (15.7 ± 3.3 and 14.6 ± 4.1 respectively; $t = 3.104$, $p = 0.002$). Taken together, our results were in good accordance to other published SAD materials, but we were able to demonstrate that our patients reported "feeling worst" (measured by item 13H of the SPAQ) in November and December, whereas SAD patients in the USA clearly had their worst months in January and February. *Conclusions* We suggest that an increase in awareness of fall-winter depression in the last decade by both doctors, who referred patients, as well as patients or the entire population must have caused patients to sign up for light therapy at the Viennese SAD clinic because of having heard about the atypical symptom profile. This increased awareness of SAD can also be measured by a statistically significant reduction in the diagnostic latency (from the age of onset to the diagnosis of SAD) when comparing the two study locations.

Key words seasonal affective disorder · SAD · fall-winter depression · seasonality

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Introduction

The fact that human beings' well being and behavior depend on seasonal changes has been observed ever since ancient Greek and Roman times (Roccatagliata, 1986). Chronobiological research in psychiatry has been stimulated by the clinical description of a seasonally relapsing depressive disorder by Lewy et al. (1982) and Rosenthal et al. (1984) termed seasonal affective disorder (SAD) and also its subsyndromal form (s-SAD, winter blues) by Kasper et al. (1989a). Ever since, SAD and its most frequent manifestation, which is the fall-winter-depression, has been subject to research with special focus on epidemiology, etiology and pathogenesis as well as on diagnosis and therapy (Kasper et al. 1988a, 1988b).

Almost every human being's behavior and well being

is affected by seasonal changes to a certain extent. Even healthy persons show signs of seasonal variations in their serotonergic system, which is an essential indicator for the etiopathogenesis of SAD (Neumeister et al. 2000), but their psychopathological changes do not reach the degree of impairing their health. Patients with SAD-winter type experience clinically relevant impairment in a subjective as well as an objective way in the fall and winter. When compared to healthy controls, SAD patients show a significant decrease in the availability of serotonin transporters in their brain (Willeit et al. 2000), which could possibly be an indicator for a compensatory regulation mechanism.

The prevalence rates of SAD and of s-SAD in the population in our part of the hemisphere are probably between 4.3 and 17.8 % depending on the latitude where the measurements are taken (Kasper, 1994). Clinically relevant seasonality can also be found frequently in patients with affective disorders that are not caused by seasonal changes per se: Kasper and Kamo (1990) were able to demonstrate that 11.4 % of the patients admitted at the University Hospital for Psychiatry in Heidelberg with major depression showed worsening of their symptoms during the fall and winter.

An individual genetic vulnerability is considered to be of pathogenetic importance (Magnússon and Axelsson, 1993; Madden et al. 1996; Jang et al. 1997) in experiencing seasonal variations in mood and behavior and an exogenous deficiency of light is believed to trigger the manifestation of SAD. Because of this, research was conducted to find out about the degree of prevalence and clinical manifestation of this phenomenon in different geographical regions and in various populations (e. g., Blazer et al. 1998; Dam et al. 1998; Hardin et al. 1991; Kasper et al. 1989b; Murase et al. 1995; Okawa, 1996; Morrisey et al. 1996; Suhail and Cochrain, 1997; Williams and Schmidt, 1992). As a result of this research an increase in the prevalence of SAD and s-SAD was registered in northern latitudes (Rosen et al. 1990), but in some rather isolated populations prevalence rates were unexpectedly low (Magnússon and Stefánson, 1993), indicating a selection toward increased tolerance of winter darkness.

The treatment of choice for fall-winter depression is light therapy (as monotherapy or in addition to antidepressant pharmacotherapy). Its practical application has been described elsewhere (Kasper, 2000). The acceptance of this treatment and the interest in it has continuously been increasing ever since its first description (Kasper et al. 1994).

In 1989 an outpatient clinic for SAD at the University Hospital for Psychiatry in Bonn was established by authors SK and HJM. This led to an increase in awareness concerning this disorder, which had been neglected at many other German university hospitals. Subsequently, in 1993 an outpatient clinic for SAD was founded at the Department of General Psychiatry at the University of Vienna by SK. This research paper will discuss the demographic and clinical characteristics of SAD patients in Bonn and Vienna. These patients were diagnosed and treated in one of the SAD clinics mentioned above. A survey of over 600 patients makes this the largest sample size of patients with SAD that has ever been examined in Europe.

Methods

Patients

Included in this research project were 610 patients (473 women, 137 men) with the fall-winter type of seasonal affective disorder (SAD), which had been treated at the University Hospitals for Psychiatry in Vienna and Bonn. Patients were examined in two recruiting waves, which were on average approximately 5 years apart: 190 patients (146 women and 44 men) were recruited at the outpatient clinic for SAD in Bonn during the time period of November to February of 1989–1992; 420 patients (327 women and 93 men) went to the outpatient clinic at the University Hospital for Psychiatry in Vienna for consultations on fall-winter depression during the winter months of the years 1993–2001. The offer to treat patients was targeted at the population in the areas of Vienna and Bonn. In order to enhance the awareness and subsequent referrals, media contacts (newspapers, radio, TV) were intensified.

Bonn has 281,000 inhabitants and has many administration and government facilities as well as a university with 40,000 students. Vienna has a population of a little over 1.8 million; about 150,000 students are signed up at universities in Vienna. The city of Bonn is located on 07° 04' eastern longitude and on 50° 43' northern latitude, Vienna on 16° 19' eastern longitude and 48° 12' latitude. The average temperature of the air in the dark time of the year (October to March) is 4.9 °C in Bonn, in Vienna 4.0 °C. The average duration of sunshine during the months of the fall-winter season is considerably longer in Vienna with 2.8 hours/day in comparison to Bonn with 2.0 hours/day.

At the University Hospital in Bonn, participants were recruited by advertisements in newspapers and on billboards; doctors and specifically psychiatrists working in the area were informed about the offer to treat patients at the clinic. These steps were necessary because not many people had heard of SAD in the 1980s. The outpatient clinic for SAD in Vienna had received its patients through referrals from the general psychiatric outpatient clinic and from local doctors/psychiatrists. A large number of patients had heard about the program through the print media, radio and TV and decided to participate. The clinic has been keeping its clients informed through its own homepage since 2000 (Url: http://beam.to/sad-amb). Treatment has been offered to patients not only in Vienna, but also to those in the surrounding areas of the city.

Diagnostic procedure

The requirements to take part in this study were to fulfill the DSM-IV criteria of a recurrent major depression (DSM-IV: 296.3) and those of a SAD-winter type (American Psychiatric Association, 1994) and also the ICD-10 criteria (WHO, 1994) for recurrent depressive disorder (ICD-10: F33). After a screening interview with a doctor, an examination followed in which the patient filled out one of our SAD-questionnaires with self-evaluating questions concerning general medical and psychiatric history, family history, present psychiatric symptoms (especially symptoms of depression) and social behavior.

By using the SPAQ (Seasonal Pattern Assessment Questionnaire; Rosenthal et al. 1987; German version: Kasper, 1991) information on seasonal variation of SAD-typical variables was gathered. The SPAQ is a retrospective self-evaluation method to determine the seasonal fluctuation of the duration of sleep, social activity, mood, weight, appetite and energy levels. This information is evaluated quantitatively on a five-point scale. The sum of these six questions asked is equivalent to the global seasonality score (GSS, the obtainable score lies between 0–24). The SPAQ is able to indicate the degree of seasonal

changes retrospectively with a good test-retest-reliability (Hardin et al. 1991). For GSS scores of 9 and below, it was assumed that the degree of overal seasonal variation in SAD-typical variables was low and patients were suffering from s-SAD. These subjects were not included in this evaluation.

Statistical analysis

Statistical analyses were performed using SPSS for Windows (release 8.0). Differences between the groups (male – female; patients from Bonn – Vienna) were analyzed with Pearson's chi-square test for categorical (nominal) variables after arranging them in contingency tables. Student's t-test with independent samples or unifactorial analysis of variance (ANOVA) was calculated for data on a ratio or interval scale after performing a Levene-statistic to test the homogeneity of the variance of the groups. The $p = 0.05$ level of significance was adopted. All statistical comparisons were two-tailed. In this article quantitative variables will be presented in the format: arithmetic mean ± standard deviation, for proportions 95 % confidence intervals will be given in brackets as a measure of variability estimating the population parameter.

Results

Demographic parameters

In our study population there were significantly more female than male patients ($\chi^2 = 185\,075$, df = 1, $p < 0.001$). The sex ratio was 3.4:1 (women:men) in the entire group, for unipolar depressives 5.0:1 and for bipolar patients 1.5:1. The proportion in Bonn (3.5:1) was not significantly different ($\chi^2 = 0.077$, df = 1, $p = 0.781$) from that at the Viennese clinic (3.3:1). The average age of the patients at the first presentation was 41.1 ± 12.9 years. Viennese SAD patients were younger at 39.9 ± 13.0 than patients in Bonn at 43.8 ± 11.4 years ($t = -3.721$, $p < 0.001$). There was no significant difference in age between women (40.9 ± 12.5) and men (41.7 ± 13.4; $t = -0.674$, $p = 0.50$). 72.3 % [68.9–76.4 %] of the female patients were pre- and 27.7 % [23.7–31.8 %] postmenopausal.

Course characteristics

Symptoms had occurred for the first time at the average age of 29.8 ± 13.1 years. There was no significant difference between the two centers (Bonn: 30.7 ± 12.6, Vienna: 29.4 ± 13.5; $t = -1.093$, $p = 0.275$) nor between the sexes (women: 29.9 ± 12.9, men: 29.6 ± 14.0; $t = 0.205$, $p = 0.838$). For the entire group of participants the diagnosis of SAD was made on average 11.3 ± 9.4 years after the first depressive episode. No statistically significant difference could be found between the sexes here either (women: 11.1 ± 9.4, men: 11.9 ± 9.6; $t = -0.850$, $p = 0.396$), but the diagnosis of SAD was made on average 2.6 years earlier in Vienna (10.4 ± 8.9) than in Bonn (13.0 ± 10.3; $t = -2.989$, $p = 0.003$). An average of 9.0 ± 7.9 depressive episodes occurred between the first manifestation and the diagnosis of SAD. The approximate probability for a SAD patient to suffer from a further episode of depression during the next winter was 80 % as calculated by dividing the mean phase number by the diagnostic latency.

Of our patients, 77,0 % [73.6–80.4 %] were diagnosed as unipolar depressive (UP), 21.7 % [18.4–25 %] as bipolar-II (BP-II), the remaining 1.3 % [0.4–2.2 %] as bipolar-I (BP-I). More often women had a unipolar depressive disorder ($\chi^2 = 34.272$, df = 1, $p < 0.001$), while men were diagnosed as suffering from BP-II more frequently ($\chi^2 = 35.113$, df = 1, $p < 0.001$; Table 1). After splitting up the population of the two centers, the gender differences in polarity were significant only in Vienna ($\chi^2 = 38.165$, df = 2, $p < 0.001$).

Seasonal Pattern Assessment Questionnaire – SPAQ

The global seasonality score (GSS) measured by the SPAQ was on average 15.4 ± 3.5 points for the entire group. Viennese patients had a higher GSS (15.7 ± 3.3) than patients from Bonn (14.6 ± 4.1; $t = 3.104$, $p = 0.002$). Also, we were able to demonstrate that women had a significantly higher GSS (15.6 ± 3.6) than men (14.8 ± 3.5; $t = 2.127$, $p = 0.035$). The demonstration of a statistically significant difference between the sexes could be upheld only in Vienna, when we analyzed the patients of both study populations (Bonn and Vienna) separately ($t = 2.299$, $p = 0.023$). In addition, we examined whether there is a decrease in GSS with age, a finding Kasper et al. (1989b) have observed in a random sample of the general population. We used the GSS as the dependent and age as the independent variable and fitted a linear

Table 1 Demographic and clinical characteristics of female and male SAD patients in Bonn and Vienna

	Total	Women	Men
Number of patients	610	473	137
Age (years)	41.1 ± 12.9	40.9 ± 12.5	41.7 ± 13.4
Polarity (%)			
UP	77.0	82.3[1]	58.2[1]
BP-II	21.7	16.4[2]	40.3[2]
BP-I	1.3	1.3	1.5
GSS	15.4 ± 3.5	15.6 ± 3.6[3]	14.8 ± 3.5[3]
Age of onset (years)	29.8 ± 13.1	29.9 ± 12.9	29.6 ± 14.0
Duration (years) until diagnosis of SAD was made	11.3 ± 9.4	11.1 ± 9.4	11.9 ± 9.6
Number of depressive episodes	9.0 ± 7.9	8.9 ± 7.9	9.3 ± 8.2
Psychiatric comorbidity (%)	37.4	42.7[4]	19.0[4]
Positive family history (%)			
Depression	40.0	41.0	38.0
Alcohol problem	6.9	7.0	6.6
Schizophrenia	2.1	1.7	3.6

Differences between women and men: [1] $\chi^2 = 34.272$, df = 1, $p < 0.001$, [2] $\chi^2 = 35.113$, df = 1, $p < 0.001$, [3] $t = 2.127$, $p = 0.035$, [4] $\chi^2 = 25.553$, df = 1, $p < 0.001$

UP unipolar depressive disorder, *BP-II* bipolar-II affective disorder, *BP-I* bipolar-I affective disorder; *GSS* global seasonality score

regression equation (GSS = 16.516–0.027*age; F = 4.57; p = 0.033) to our data that – though significant – only showed a small decrease of the GSS with age with correlation analysis indicating a relatively weak relationship between the variables ($r^2 = 0.864\,\%$, $r = -0.093$, $p = 0.033$).

We measured the percentage of patients who reported "feeling worst" per month with item 13H of the SPAQ. November and December were the worst months for our patients with 88.7 % [85.9–91.5 %] and 89.5 % [86.8–92.2 %], respectively (Fig. 1 a). We found no sex differences in the distribution of percentages per month ($\chi^2 = 2.272$, df = 8, p = 0.972) nor differences between the study locations (Bonn, Vienna: $\chi^2 = 8.143$, df = 8, p = 0.420). The mean duration of the time of feeling worst was 3.9 ± 1.5 months. No differences between the sexes were observed either (t = 0.050, p = 0.960), but Viennese patients had a longer period where they felt worst (4.1 ± 1.5 months) than patients in Bonn (3.6 ± 1.4 months; t = 3.087, p = 0.002).

Profile of symptoms

The frequency of symptoms of our SAD patients is outlined in Table 2. Loss of energy (98.4 % [97.4–99.4 %] of the patients) and depressive mood (93 % [90.1–95.1 %]) were the most common symptoms. Of our patients, 65.6 % [61.7–69.4 %] suffered from increased anxiety during their depressive episodes. More patients from Bonn (91.6 % [87.4–95.8 %]) complained about this symptom than the Viennese patients did (55.4 % [50.6–60.2 %]; $\chi^2 = 69.068$, df = 1, $p < 0.001$). Hypersomnia and daytime fatigue were found in 72.2 % [68.5–75.9 %] of the patients in Bonn and 93.7 % [91.7–95.7 %] of the Viennese patients, respectively. Patients in Vienna suffered more frequently from these symptoms than the ones from Bonn (Hypersomnia: 76.4 % [72.3–80.5 %] to 59.4 % [51.2–67.7 %]; $\chi^2 = 14.854$, df = 1, $p < 0.001$; daytime fatigue: 95.2 % [93.2–97.3 %] to 89.6 % [84.9–94.3 %]; $\chi^2 = 6.306$, df = 1, p = 0.012). A large number of patients showed changes in their eating habits during the winter months: 64.6 % [60.8–68.5 %] had an increase in their appetite, 18.4 %

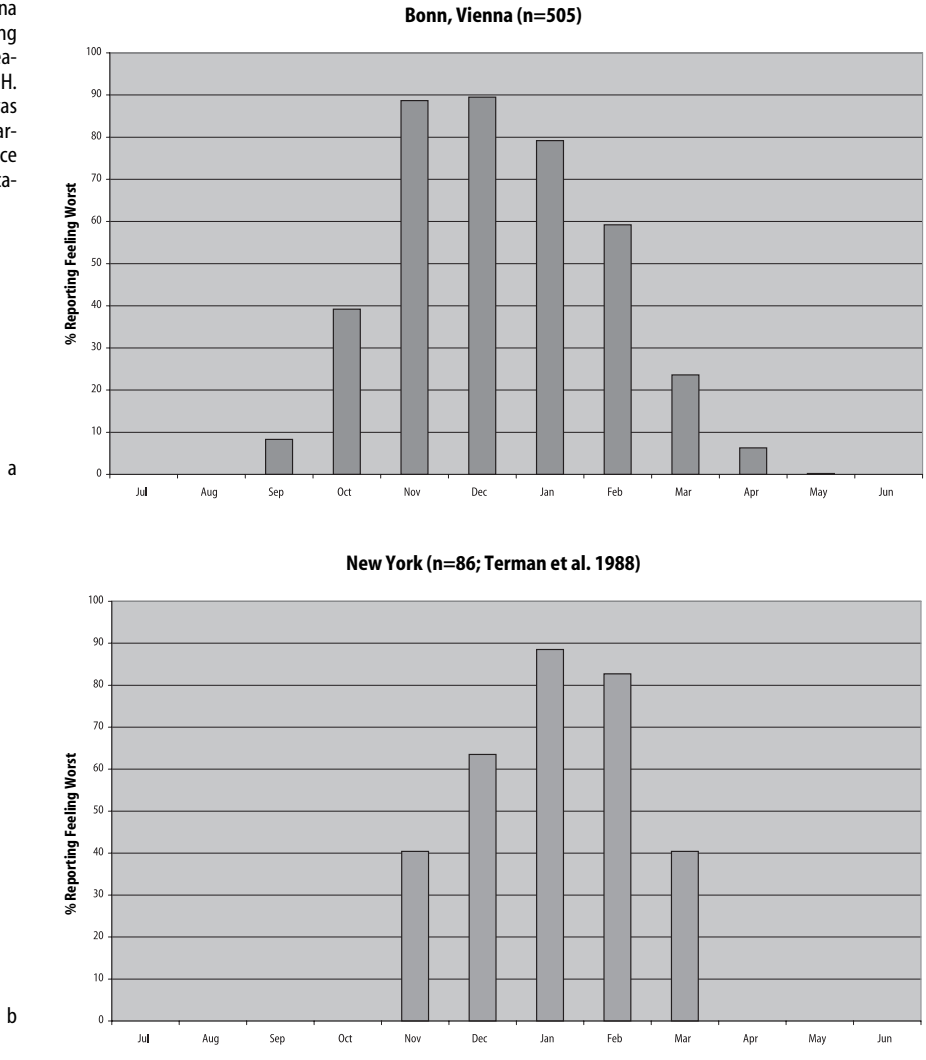

Fig. 1 Percentage of SAD patients in Bonn/Vienna (n = 505) and New York (n = 86), who report "feeling worst" per month. Data was obtained from the Seasonal Pattern Assessment Questionnaire, item 13H. The graphic published by Terman et al. (1988) was redesigned with kind permission of the author. Pearson's Chi-Square test showed a significant difference ($p < 0.001$) between the distribution of the two locations.

Table 2 Profile of symptoms of 610 SAD patients in Bonn and Vienna

	Total (%)	Bonn (%)	Vienna (%)
Affect			
Depressive	93.0	88.5	94.5
Irritable	75.1	78.9	74.2
Anxious	65.6	91.6[1]	55.4[1]
Loss of energy	98.4	97.4	98.8
Appetite			
Increased	64.6	60.0	66.6
Reduced	18.4	24.0	16.0
Carbohydrate-Craving	66.5	57.6[2]	70.4[2]
Sleep			
Hypersomnia	72.2	59.4[3]	76.4[3]
Daytime fatigue	93.7	89.6[4]	95.2[4]
Reduction of libido	74.3	72.1	75.2
Difficulties at work	69.2	74.9[5]	66.7[5]

Differences between patients in Bonn and Vienna: [1] $\chi^2 = 69.068$, df = 1, $p < 0.001$, [2] $\chi^2 = 9.399$, df = 1, $p = 0.002$, [3] $\chi^2 = 14.854$, df = 1, $p < 0.001$, [4] $\chi^2 = 6.306$, df = 1, $p = 0.012$, [5] $\chi^2 = 3.870$, df = 1, $p = 0.049$

[15.3–21.5 %] had less appetite, and 66.5 % [62.7–70.3 %] reported having craving for foods containing carbohydrates (Carbohydrate-Craving, CH-Craving). Increased eating was found more often in Viennese patients (Bonn 60 % [52.7–67.3 %], Vienna 66.6 % [62.1–71.1 %]; $\chi^2 = 5.147$, df = 2, $p = 0.076$) as well as the CH-Craving (Bonn: 57.6 % [50.5–64.7 %], Vienna: 70.4 % [66.0–74.8 %]; $\chi^2 = 9.399$, df = 1, $p = 0.002$). Interestingly the body mass index (BMI) of subjects in Bonn (23.3 ± 4.4) did not differ from that of patients in Vienna (23.8 ± 3.7; $t = 1.574$, $p = 0.116$). Female patients in Bonn were prone to have a greater appetite than male patients (63.4 % [55.2–71.6 %] to 48.8 % [33.5–64.1 %]; $\chi^2 = 9.265$, df = 2, $p = 0.010$). About three quarters of the patients said they were more irritable (75.1 % [71.4–78.8 %]) and that their libido was reduced (74.3 % [70.8–77.8 %]) during the dark time of the year. Of the patients, 69.2 % [65.5–72.9 %] registered a reduction in their performance at work caused by their disorder. Patients from Bonn reported significantly more problems at work (74.9 % [68.6–81.3 %]) than those in Vienna (66.7 % [62.2–71.2 %]; $\chi^2 = 3.870$, df = 1, $p = 0.049$).

Family history

Of our patients, 48.8 % [44.7–52.7 %] had a positive family history for psychiatric disorders in their immediate family (first degree): 40 % [36.0–44 %] reported depressive disorder for first degree relatives, 6.9 % [4.9–9 %] alcohol problems, 2.1 % [0.9–3.3 %] schizophrenia. There were no significant differences between patients from Bonn or Vienna or between men and women concerning the global rate of positive family history (Bonn/Vienna: $\chi^2 = 1.279$, df = 1, $p = 0.258$; women/men: $\chi^2 = 0.576$, df = 1, $p = 0.448$) nor for the single diagnoses (Bonn/Vienna: $\chi^2 = 4.940$, df = 3, $p = 0.176$; women/men: $\chi^2 = 2.199$, df = 3, $p = 0.532$).

Feature-Specifier according to DSM-IV

The feature specifier according to DSM-IV was determined to characterize the profile of symptoms in all our patients more closely: 66.3 % [62.4–70.2 %] of all patients were characterized as "atypical" (atypical depression), 17.8 % [14.7–21 %] were diagnosed as "melancholic" (melancholic depression) and a further 15.9 % [12.9–18.9 %] were not matched with a certain feature specifier (they are called "n. o. s." – not otherwise specified). In our group of patients there were no patients with a feature specifier "catatonic". In Bonn and Vienna the following differences of frequency were noted ($\chi^2 = 54.952$, df = 2, $p < 0.001$): atypical patients were found more frequently in Vienna (74.5 % [70.3–78.7 %]) than in Bonn (43.3 % [34.2–52.4 %]; $\chi^2 = 47.957$, df = 1, $p < 0.001$), while melancholic patients were found more often in Bonn (35.3 % [26.6–44 %], Vienna: 11.5 % [8.4–14.6 %]; $\chi^2 = 42.579$, df = 1, $p < 0.001$). No significant differences in connection with the feature specifier were found between men and women in Vienna ($\chi^2 = 1.432$, df = 2, $p = 0.489$) or in Bonn ($\chi^2 = 1.432$, df = 2, $p = 0.489$).

Pharmacotherapy

As outlined in Table 3, 44.1 % [40.2–48 %] of our patients were treated with an additional pharmacotherapy during light therapy Viennese SAD patients took additional medication significantly more often (47.6 % [42.8–52.4 %]; $\chi^2 = 6.780$, df = 1, $p = 0.009$) than patients in Bonn (36.3 % [29.5–43.1 %]). Selective serotonin reuptake inhibitors (SSRIs) were prescribed more often in Vienna than in Bonn (26.9 % [22.7–31.1 %] in Vienna in comparison to 2.6 % [0.3–4.9 %] in Bonn; $\chi^2 = 49.401$, df = 1, $p < 0.001$). However, tricyclic antidepressants were prescribed more often in Bonn (21.6 % [15.8–27.4 %] versus 6.9 % [4.5–9.3 %]; $\chi^2 = 27.730$, df = 1, $p < 0.001$). Viennese patients were recommended

Table 3 Additional antidepressant medication of SAD patients in Bonn and Vienna during light therapy

	Total (%)	Bonn (%)	Vienna (%)
Patients with medication	44.1	36.3[1]	47.6[1]
SSRIs	19.3	2.6[2]	26.9[2]
Tricyclic antidepressants	11.5	21.6[3]	6.9[3]
Other antidepressants	4.8	1.6[4]	6.2[4]

Differences between patients in Bonn and Vienna: [1] $\chi^2 = 6.780$, df = 1, $p = 0.009$, [2] $\chi^2 = 49.401$, df = 1, $p < 0.001$, [3] $\chi^2 = 27.730$, df = 1, $p < 0.001$, [4] $\chi^2 = 6.144$, df = 1, $p = 0.013$

SSRIs selective serotonin reuptake inhibitors

to take "other antidepressants" (mainly newer substances, e. g., reboxetine) more often than those in Bonn (6.2 % [2.9–6.2 %] to 1.6 % [0.0–3.4 %]; $\chi^2 = 6.144$, df = 1, p = 0.013). Of the patients, 4.5 % [2.9–6.2 %] were treated with lithium as a mood stabilizer. No significant difference was observed between Bonn and Vienna in the use of lithium ($\chi^2 = 2.707$, df = 1, p = 0.10). Other mood stabilizers (carbamazepine and valproate) were used for only 2 % [0.9–3.1 %] of the patients. Patients from Bonn were treated with other mood stabilizers more often than Viennese patients (5.5 % [2.3–8.7 %] to 0.5 % [0.0–1.2 %]; $\chi^2 = 16.368$, df = 1, $p < 0.001$). No significant differences were found between the sexes in the use of antidepressant treatment ($\chi^2 = 3.266$, df = 4, p = 0.514) or mood stabilizers ($\chi^2 = 0.853$, df = 2, p = 0.653).

Comorbidity

Women had a comorbid psychiatric disorder more often than men (42.7 % [38.2–47.2 %] versus 19 % [12.4–25.6 %]; $\chi^2 = 25.553$, df = 1, $p < 0.001$). The occurrence of PMDD (premenstrual dysphoric disorder) in 42.2 % [36.9–47.5 %] of all women in our research project is held responsible for this difference. PMDD affected female patients from Bonn more frequently (52.1 % [42.1–62.1 %]) than it did SAD patients in Vienna (38.3 % [32.2–44.4 %]; $\chi^2 = 5.382$, df = 1, p = 0.020). However, no standardized diagnostic instrument for assessment of PMDD and no prospective daily ratings, as required for the diagnosis of PMDD according to DSM IV research criteria were used in Bonn opposed to Vienna.

Discussion

This sample of SAD patients (n = 610), using the same methodology in Bonn and Vienna for this research project, is one of the most extensive available in the literature (n = 610). The sex ratio of f:m = 3.4:1, which we found, is similar to results found in other research projects in Europe, North America and Australia. The results of those projects varied from 3.5:1 to 9:1 (Boyce and Parker, 1988; Booker and Hellekson, 1992; Terman et al. 1989; Thompson and Isaacs, 1988; Wirz-Justice et al. 1989). Only in Asia did the sex ratio seem to be lower at 1.2:1 to 1.9:1 (Okawa, 1996; Sakamoto et al. 1993; Takahashi et al. 1991). The ratio of women to men was lower in patients suffering from bipolar affective disorder (1.5:1) than for unipolar depressives (5.0:1), a finding which has already been observed by Weissman et al. (1984) in a group of non-seasonal depressed patients.

Our patients showed first symptoms on average at the age of 29.8; when diagnosed (11.3 years later) they were on average 41.1 years old and had had 9.0 depressive episodes. Either our patients were not able to remember all their episodes in the interview or the probability of showing symptoms in subsequent years is smaller than 1 (in our group 80 %). Apart from the seasonal deficit of light and individual genetic disposition, psychosocial or coping factors (e. g., travel to a brighter environment) could possibly modulate the probability of occurrence of a depressive disorder and its intensity. These results are in accordance with other SAD samples, showing the occurrence of first symptoms in the 3rd or at the beginning of the 4th decade of life (Boyce and Parker, 1988: 21 years; Rosenthal et al. 1984: 27; Rosenthal et al. 1987: 22; Takahashi et al. 1991: 23; Thompson and Isaacs, 1988: 24; Wirz-Justice et al. 1986: 27; Wirz-Justice et al. 1989: 32) and the age of diagnosis being 10–18 years later in the 4th or at the beginning of the 5th decade (Boyce and Parker, 1988: 39 years; Rosenthal et al. 1984: 37; Rosenthal et al. 1987: 38; Takahashi et al. 1991: 36; Thompson and Isaacs, 1988: 42; Wirz-Justice et al. 1986: 42; Wirz-Justice et al. 1989: 44).

In Bonn and Vienna there was no difference with regard to the age of onset, but the diagnostic latency differed. Viennese patients consulted a doctor familiar with the diagnosis of SAD on average 2.6 years earlier than patients in Bonn. Viennese SAD patients were examined around 5 years later than those in Bonn. Thus, the difference in diagnostic latency may be explained by an increase of awareness of this disorder during those years by both doctors and patients.

Already in 1915 Kraepelin observed seasonal mood swings in manic-depressive patients, and in line with this finding hypomanic phases have also been described in the spring time for patients with SAD, winter type (Rosenthal et al. 1984). Of the patients in our sample, 21.7 % suffered from bipolar-II-affective disorder. Another 1.3 % fulfilled the criteria for bipolar-I-affective disorder. Earlier research studies found substantially higher rates of bipolar patients (Rosenthal et al. 1984; Rosenthal and Wehr, 1987; Thompson and Isaacs, 1988; Wirz-Justice et al. 1986). By using the DSM-IV criteria, newer studies like ours were able to demonstrate lower rates of bipolar patients with a preponderance of unipolar depression (Allen et al. 1993; Lam et al. 1997; Lingjaerde and Reichborn-Kjennerud, 1993; Sakamoto et al. 1995; Thalen et al. 1995).

In our sample the average GSS of 15.4 was similar to other studies (Lingjaerde and Reichborn-Kjennerud, 1993: 14.3 ± 3.8; Wehr et al. 1987: 15.8 ± 3.9). Women exhibited a higher GSS than men (15.6 versus 14.8). This gender difference is well known in the literature (Kasper et al. 1989b). However, a direct comparison with our study population is not possible since Kasper et al. (1989b) examined a representative sample of the general population, while we studied a sample of SAD patients seeking treatment. Viennese patients had a higher GSS in comparison to patients from Bonn (15.8 to 14.6). Also patients from Vienna had a longer time period in fall-winter when they felt worst (4.1 months) than those from Bonn (3.6 months).

In our sample the greatest number of patients felt worst in November and December. We compared our data with a sample of SAD patients described by Terman

et al. (1988). Interestingly, patients in North America report feeling worst more frequently in January and February (Fig. 1). The same was found in the general population (Kasper et al. 1988b). Statistical analysis confirmed the obvious differences in the distribution ($\chi^2 = 88.260$, df = 8, $p < 0.001$). Knowing the nadir of well-being over the winter season may be of scientific and therapeutic relevance: Lam et al. (1995) reported that the largest responses to antidepressants were in the most markedly depressed patients. Future studies should investigate whether similar results are obtainable with light therapy.

It is well known that a large number of SAD patients suffer from so-called atypical vegetative symptoms of depression, i. e., symptoms that are not commonly found in non-seasonal depressive disorder. Atypical symptoms are also frequent in our patients; however, there are differences in our sub-samples in regard to the symptomatology: Viennese patients suffer more often from hypersomnia, daytime fatigue, increased appetite and carbohydrate craving while patients from Bonn more often show symptoms of fear and deterioration of their ability to work. The feature specifier according to DSM-IV (American Psychiatric Association, 1994) can be determined from the symptoms of the patient by using certain diagnostic algorithms. By using this method, patients are assigned to distinct symptomatic clusters. Already in the first group of 29 SAD patients described by Rosenthal et al. (1984), atypical symptoms predominated. Other studies with a larger number of participants also reported a high rate of patients suffering from the so-called reverse vegetative (i. e., atypical) symptoms (Oren and Rosenthal, 1992; Lam and Goldner, 1998). Our study indicates that atypical features also dominate in SAD patients in the German-speaking part of Europe. It is interesting though that patients from Bonn and Vienna have shown a different frequency of feature specifiers. Of Viennese patients, 74.5 % suffer from atypical depression, but only 43.3 % of patients from Bonn do so. Melancholic patients are much more frequent in Bonn (35.3 %) than they are in Vienna (11.5 %).

The different symptom profile, a markedly different frequency of depression subtypes (i. e., atypical vs. melancholic), as well as the differences in the GSS indicate that SAD patients in both cities differ in a clinically relevant way. The higher GSS in the Viennese sample could indicate that the sample consisted of more "typical" SAD patients than in Bonn.

Most probably the differences in our patients are due to a selection bias, resulting from different recruiting methods. The clinic in Bonn preferentially investigated therapy resistant patients, while the Viennese outpatient clinic had access to a rather unfiltered group of patients. The increased awareness of fall-winter depression in Vienna may have caused patients to seek treatment because of having heard about the atypical symptom profile in the media. The differences in the symptoms of the patients from both cities could also have therapeutic implications: it is known that patients with atypical symptoms are more likely to respond to light therapy than patients of the melancholic subtype (Terman et al. 1996; DeBattista and Schatzberg, 1994). A detailed diagnosis of the subtype of depression seems therefore helpful for an appropriate selection of the treatment method.

Regarding the psychiatric family history, one notices the relatively high percentage of SAD patients (40 %) who have first degree relatives suffering from depressive disorder. A positive family history for affective disorders is more frequent in SAD patients than in patients with depressive disorders without a seasonal component (Kasper and Kamo, 1990). This finding leads to the assumption that SAD could have a genetic background as a vulnerability factor.

Apart from light therapy many patients in our sample received an additive antidepressant medication. The differences between the antidepressant pharmacotherapy in patients from Vienna and Bonn are paradigms for treatment modalities in psychiatry that have changed over time. Patients in Bonn were examined approximately 5 years earlier than the ones in Vienna (Bonn: 1989–1992; Vienna: 1993–2001). An increase in the prescription of selective serotonin reuptake inhibitors (SSRIs; 2.6 % on 26.9 %) was especially evident, as well as a decrease of tricyclic antidepressants (21.6 % on 6.9 %), a finding that has already been described by Frey et al. (2000). Apart from this, the popularity of substances which we call "other antidepressants" has increased (1.6 % on 6.2 %): these are newer drugs with a different effect or chemical structure like, e. g., milnacipran, mirtazapine, nefazodone, reboxetine or venlafaxine. These substances have been successfully used as a psychopharmacological strategy in the treatment of SAD (Hesselmann et al. 1999; Hilger et al. 2001).

A high percentage of female SAD patients suffers from premenstrual symptoms (Praschak-Rieder et al. 2001), which can be diagnosed as PMDD (premenstrual dysphoric disorder) according to DSM-IV. In our study population this diagnosis affected 42.2 % of our female patients. The percentage in the sample from Bonn is higher (51.1 %) than in Vienna (38.9 %). This difference could be attributed to the fact that in the Viennese population strict diagnostic criteria were used and that patients were examined prospectively with standardized questionnaires throughout the time of two menstrual cycles.

The clinical and demographic characteristics of our sample of SAD patients are to a large extent in line with the findings obtained in epidemiological or clinical samples in the USA (Booker and Hellekson, 1992; Rosenthal et al. 1984; Rosenthal et al. 1987; Terman et al. 1989), Australia (Boyce and Parker, 1988), Norway (Lingjaerde and Reichborn-Kjennerud, 1993), Japan (Takahashi et al. 1991), England (Thompson and Isaacs, 1988) and Switzerland (Wirz-Justice et al. 1989). The differences demonstrated between the patients in the two centers, which can be viewed as changes in the clinical pattern over time, are most likely to be attributed

to the higher awareness of SAD in the Viennese population.

Our study, which comprises at present the largest European sample of SAD patients, can be used as an aid for orientation in seasonal depression, which has infrequently been the topic of research in recent years. Especially the high latency of about 10 years between the first depressive episode and the diagnosis of SAD still demonstrates a low degree of awareness in this area, which is a significant disadvantage since an effective treatment, light therapy, is available for this disorder. Our study could therefore stimulate everyday practice as well as research in the area of affective disorders resulting in a better understanding of the pathophysiology of those affected by seasonal affective disorder and its subsyndromal form.

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