
Seasonal variations in depression and osteoarthritis

CONRAD M. HARRIS, M.ED, FRCGP

Senior Lecturer, Department of General Practice, St Mary's Hospital Medical School, London

SUMMARY. Seasonal variations in consultations for depression and osteoarthritis were discovered in the 1980 morbidity data of five London practices with a total of 32,524 patients. Depression showed a bimodal pattern similar to that described from hospital data and national suicide statistics, but not previously recorded from general practice. Osteoarthritis also showed a bimodal pattern, with peaks in spring and autumn; this came as a surprise and needs confirmation from other studies. It may reflect the known tendency of rheumatic symptoms to become worse when relative humidity and other climatic variables are at their most changeable.

The number of patients recorded in the year as having both osteoarthritis and depression was significantly smaller than would have been expected by chance. This finding is probably due to selective attention in the consultation, since it is unlikely that one condition protects a patient from getting the other.

Introduction

DESCRIBING the natural history of diseases is a form of research with a long tradition in medicine and one for which general practice is well suited. There have been few studies of seasonal variation in the presentation of chronic illnesses, perhaps because no single general practitioner sees enough patients to demonstrate reliably patterns that may be quite subtle. The advent of collaborative research and computerized morbidity recording has changed the situation radically.

This paper presents findings from the total morbidity records of a group of London practices about two common conditions: depression and osteoarthritis. The seasonal variation of depression has previously been documented from hospital data and from national suicide statistics, but never before from general practice. Osteoarthritis is worth studying because popular belief about the timing of exacerbations does not agree with what can be deduced from research into the effects of climatic variables on this condition.

Depression

As long ago as 1838 Esquirol commented on the high incidence of suicide in spring and early summer.¹ In 1951 Swinscow demonstrated the same phenomenon using the Registrar General's statistics for England and Wales for 1921-48, and showed that in Australia the peak occurred from September to November.² Takahashi found that in 16 countries in the northern hemisphere suicide was commonest in the spring.³ In these reports there was no suggestion of a bimodal distribution, but in 1948 McKinlay, using Scottish figures for 1911-40, had noted not only a maximum incidence in spring and early summer, but also a small peak in November.⁴ Eastwood and Peacocke published data from Ontario in 1976 that indicated bimodal peaks for suicide, hospital admissions for depression and the use of electroconvulsive therapy (ECT).⁵ Suicide was commonest in males in May and October and in females in March and October; depression was most often seen in spring and autumn—psychotic depression in the former season and neurotic depression in the latter; while ECT was given most often in May and from November to January.

Using a different approach, Williams and Dunn in 1981 analysed the prescriptions dispensed by retail pharmacists on a monthly basis for the period 1969-75.⁶ They discovered a four monthly cycle for antidepressant prescriptions with peaks around February, May and October; the pattern for tranquillizers was similar.

Climatic conditions have also attracted attention, particularly humidity. Warm dry winds such as the Föhn in Switzerland, the Chinook in California and the Sharav in the near East have been said to cause depression, lassitude and irritability, possibly as a result of a high concentration of positive ions in the atmosphere. Symonds and Williams⁸ and Walter⁹ showed that hospital admissions for mania were most frequent in August and September (confirming an observation about this condition made 2,500 years earlier by Arataeus),¹⁰ while Mawson and Smith¹¹ gave a context to the finding by demonstrating an inverse correlation between the number of admissions for mania and the relative humidity, which was highest in the winter. They could detect no relationship between relative humidity and depression, nor between barometric pressure and either depression or mania.

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Table 1. Number of consultations per working day for certain conditions by month for 1980.

Condition	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	ICD-9 Codes included
All conditions	316.7	321.2	352.4	331.9	338.6	322.1	305.3	275.8	295.2	317.7	335.0	312.8	—
Depression	14.1	13.0	12.8	11.6	14.0	13.9	10.6	10.0	11.3	12.3	13.6	13.6	300.4, 309.0, 309.1, 311
Anxiety	9.7	8.7	10.8	9.0	9.9	10.0	7.0	8.2	8.6	7.1	8.3	6.7	300
Arthritis— Osteo- and Unspecified	7.9	6.6	7.8	9.1	9.9	7.3	7.0	8.3	8.7	8.7	8.8	6.6	715-716
Disorders of Back and Neck	10.0	9.4	10.3	10.7	10.4	9.0	9.3	8.7	9.9	9.3	9.9	8.4	720-724, 737

Osteoarthritis

The belief that rheumatic symptoms are influenced by the climate goes back at least to the time of Hippocrates. Kellgren and colleagues observed in 1953 that symptoms were most frequent in cold wet weather,¹² and a study from Egypt in 1966 recorded that maximum attendances at the Karmous Clinic occurred in December.¹³ Valkenburg's data from Brabant indicated that the symptoms of localized osteoarthritis were most evident in the winter and spring, those of disc degeneration in the spring, and those of generalized osteoarthritis in July and August.¹⁴

Experimental studies by Hollander and Yeostros, controlling temperature, airflow rates, barometric pressure and air ionization suggested that exacerbation of arthritic symptoms occurred within hours of the onset of a combination of a fall in barometric pressure and a rise in relative humidity, and that it was the changes in these variables rather than their levels which were important.¹⁵ Later work by Reginato and colleagues confirmed, both for rheumatoid arthritis and osteoarthritis, the importance of rapid climatic change in exacerbating the symptoms.¹⁶

In 1974, Rose published a study of 76 patients in which 12 meteorological factors were monitored.¹⁷ Exacerbation of symptoms was significantly associated with the occurrence of rain (though not with the amount of rain) and with a high relative humidity recorded at 09.00 hours, the symptoms preceding the climatic variable. She observed a quite separate circadian rhythm, with maximal exacerbation at 06.00–07.00 hours which she could not explain; she suggested that it should be studied in relation to changes in the electric potentials of the atmosphere and of the earth's magnetic field, both of which have been reported to have similar rhythm except when disturbed weather throws the former out of phase.

Method

Five London practices, in Kensington, Chelsea and Westminster or in Camden and Islington, collaborated with the Department of General Practice of St Mary's Hospital Medical

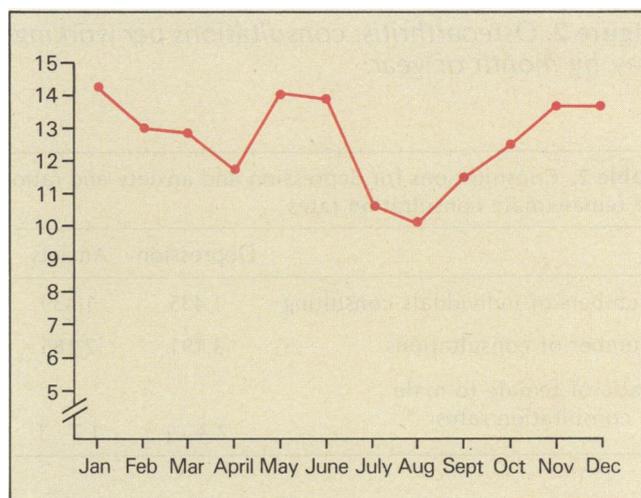


Figure 1. Depression: consultations per working day by month of year.

School between 1979 and 1981 to collect data about all their patients and consultations. The data used in this study relate to 1980; at the mid-point of the year the practices had 32,524 registered patients, with the excess of young adults and high ratio of females to males that is typical of London's West End. Up to two diagnoses could be recorded at each consultation. These diagnoses were not based on agreed criteria; they were coded according to the Ninth Revision of the *International Classification of Diseases (ICD-9)*.¹⁸

The numbers of consultations in each month, overall and for specific conditions, were computed; then each total was divided by the number of days in that month, excluding Saturdays, Sundays and bank holidays. This produced the number of consultations per working day per month, and effected some standardization for the differing lengths of the months.

Results

During the year 1980 there were 80,893 consultations, including 3,874 with temporary residents; 101,277 diagnoses were recorded and 20,818 individuals consulted at least once.

The number of consultations per working day for depression, anxiety, osteoarthritis and unspecified

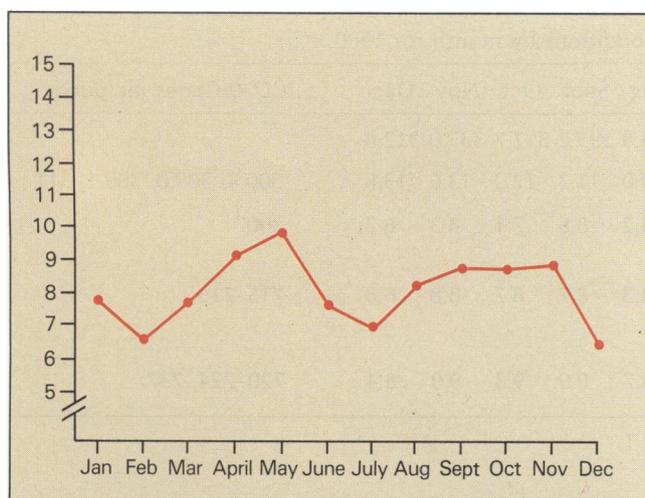


Figure 2. Osteoarthritis: consultations per working day by month of year.

Table 2. Consultations for depression and anxiety and ratio of female:male consultation rates.

	Depression	Anxiety
Numbers of individuals consulting	1,435	1,439
Number of consultations	3,191	2,185
Ratio of female to male consultation rates	2.3 : 1	1.7 : 1

arthritis and for disorders of the back and neck are shown in Table 1. The distribution of consultations for depression and osteoarthritis are shown in Figures 1 and 2 respectively. Both conditions are clearly bimodal: depression has its peaks in May/June and November/December/January, while osteoarthritis has peaks in April/May and September/October/November.

Table 2 shows the numbers of individuals who consulted, the numbers of consultations, and the ratio of female to male consultations for depression and anxiety. The consultation rate for depression was 50 per cent higher than for anxiety, and the female:male consultation rate was higher for depression. These findings agree with the results of most other studies.

Table 3 shows the consultation rates per 1,000 patients for depression and osteoarthritis according to age and sex of patients.

Depression and arthritis are both especially common in patients over the age of 50 years and in females (Table 3). Both conditions appear to have circadian rhythms that produce exacerbation in the early morning and to have annual rhythms with peaks in May and November. An analysis was therefore made to see how much overlap there was between the two sets of patients (Table 4). This showed that significantly fewer patients in the older group were recorded as having both de-

Table 3. Consultations for depression and osteoarthritis by sex in patients under or over 50 years of age.

Number of individuals consulting per 1,000 patients	Depression	Osteoarthritis
<i>Age < 50 years</i>		
Males	18	3
Females	48	3
Regardless of sex*	35	3
<i>Age ≥ 50 years</i>		
Males	113	84
Females	210	209
Regardless of sex*	175	164

* These figures are not exactly midway between the male and female figures because the males are less likely to consult at all for the conditions than females, so the 'average' is weighted towards the females.

pression and osteoarthritis over the year than would be expected by chance.

Discussion

The main problem in diagnosing depression as it presents in general practice concerns the categorization of mixed states of depression and anxiety. In this study much of the difficulty was avoided, because the doctors were allowed to record both conditions if both were thought to be clinically significant. The distribution curves of the two conditions are quite different: that for anxiety is best described as a fluctuating horizontal line in the first six months of the year, followed in the second six months by a similar line at a lower level. Despite the absence of agreed diagnostic criteria, this body of data appears to confirm that the seasonal pattern of depression derived from other sources can be demonstrated in general practice too.

These results cast no new light on the question of the relationship of relative humidity to depression. It would require a large collaborative study between psychiatrists and general practitioners, with rigorously defined diagnostic criteria, to confirm the assertion that psychotic depression mainly accounts for the first peak in the year (and therefore perhaps for the timing of suicides) while neurotic depression largely produces the second peak.

The bimodal curve for osteoarthritis was a surprise result. Like other doctors whose opinion was sought, the author had previously assumed that arthritic patients consulted most often in the winter months. The studies quoted in the Introduction suggest that patients with osteoarthritis should suffer most when relative humidity and other climatic variables are at their most changeable; they might be expected therefore to consult their doctors most frequently in the spring and autumn, as they are seen to do in Figure 2.

The data in Table 1 for the seasonal distribution of consultations for disorders of the back and neck (mainly

Table 4. Association between depression and osteoarthritis in patients aged 50 years or more.

	Total number of patients aged 50 years or more	With depression	With osteoarthritis	With both conditions	Significance
Males	3,088	349	259	17	$P < 0.02$ ($\chi^2 = 6.33$)
Females	5,566	1,167	1,163	102	$P < 0.001$ ($\chi^2 = 131.9$)

low back pain and cervical spondylosis) present a pattern similar to that of osteoarthritis, though not as clear cut. Symptoms arising in the apophyseal joints of the spine (which, like the limb joints, are diarthrodial) are common in general practice and come under this heading.

What conclusions might be drawn from these studies of seasonal variation? Four features dictate caution: the data are drawn from only one year; the population is comparatively small; the variation, though clear, is not great; and the diagnoses were made without agreed criteria. Despite these shortcomings, the findings are worth recording.

The presentation of depression is shown to follow a pattern already recognized from other evidence; this seems, however, to be the first occasion on which the pattern is revealed in data from general practice. The variation for osteoarthritis must be regarded with more reserve, because it has not apparently been noted before. Until the finding is confirmed by other studies, it should be seen only as posing an interesting question. There do at least seem to be theoretical grounds for taking the question seriously.

The analysis of the overlap between patients recorded as having depression and those recorded as having osteoarthritis demonstrated a highly significant negative association between the two diagnoses, especially in females. A patient recorded as having either depression or osteoarthritis in the year was much less likely to be recorded as having the other condition than would be expected by chance—on the face of it, a surprise finding.

The nature of the data does not allow any conclusions to be drawn, but common sense suggests that having osteoarthritis is unlikely to protect a patient against becoming depressed or vice versa. It is much more probable that when one condition is the centre of discussion in the consultation, the other may be ignored even if it is present. Either the doctor or the patient may be chiefly responsible for this happening, but it is clearly the doctor's duty to recognize it and to take whatever steps seem most appropriate.

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Address for correspondence

Dr Conrad Harris, Department of General Practice, St Mary's Hospital Medical School, Lisson Grove Health Centre, Gateforth Street, London NW8 8EG.