Depression Associated with Chronic Pain: Incidence, Characteristics, and Long-term Outcome

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(Received for publication on June 26, 1989)

Abstract

Of 98 consecutive patients admitted to a pain management program for patients with nonmalignant chronic pain, 34 were definitely depressed, 20 were probably depressed, and 44 were not depressed by research diagnostic criteria (RDC). At the time of admission, no characteristic differences were observed among the three study groups except for, by definition, the presence of a RDC diagnosis of major depression (definite or probable) and an associated increase in Hamilton depression scale score and a group of MMPI scale scores. There was a 98% improvement rate for depression by participation of the patients in a non-pharmacologic program for nonmalignant chronic pain; there were no differences in frequency of depression among the three study groups at the time of dismissal. This progress was maintained at long-term follow-up (average, 11.6 months): 87 of 98 patients (88.8%) remained nondepressed.

Key words: pain management, nonpharmacologic program, research diagnostic criteria, Hamilton score

The issue of the relationship between chronic pain and depression is of clinical concern and research interest. The reported incidence of depression in patients with chronic pain varies significantly (Table 1). Pilling and associates, by means of a single psychiatric consultation interview, found depression in 64% of medical-surgical...
Table 1 Incidence of Depression

<table>
<thead>
<tr>
<th>Author (yr)</th>
<th>Method</th>
<th>Population</th>
<th>Incidence, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilling et al. (1968)⁰²</td>
<td>Unstructured interview</td>
<td>Medical-surgical consultation</td>
<td>64</td>
</tr>
<tr>
<td>Maruta et al. (1976)⁰⁸</td>
<td>Chart review</td>
<td>Psychiatric patients</td>
<td>39</td>
</tr>
<tr>
<td>Blumer et al. (1981)¹</td>
<td>Projective tests</td>
<td>Pain clinic patients</td>
<td>83</td>
</tr>
<tr>
<td>Large (1980)⁵</td>
<td>Unstructured interview</td>
<td>Patients with chronic pain</td>
<td>31</td>
</tr>
<tr>
<td>Pilowsky et al. (1982)¹⁴</td>
<td>Depression questionnaire</td>
<td>Patients with chronic pain</td>
<td>10</td>
</tr>
<tr>
<td>Kramlinger et al. (1983)³</td>
<td>Research diagnostic criteria</td>
<td>Pain management center patients</td>
<td>25-64</td>
</tr>
</tbody>
</table>

patients with chronic pain. Maruta and associates,⁸ in a chart review, encountered dismissal diagnoses of neurotic depression in 39% of psychiatric inpatients with chronic pain. Blumer and Heilbronn¹ reported that 83% of patients with chronic pain showed definite depression, as measured by projective tests. Large,⁵ by means of single-physician, nonstructured clinical interviews, encountered depression in 31% of patients with chronic pain. On the basis of a 57-item depression questionnaire, Pilowsky and associates¹⁰ found a 10% incidence of depression in patients with chronic pain. Using specific research diagnostic criteria (RDC) for major depression,¹⁴ Kramlinger and associates³ reported 25% of patients with chronic pain were definitely depressed and 39% were probably depressed.

Description and proposed theory of depression in patients with chronic pain have also varied significantly, reflecting inadequate understanding of pain-associated depression. Bradley² reported a series of 35 patients with chronic pain; each had “endogenous” depression, which implies underlying biochemical changes. The concept of masked depression⁶ and depression-spectrum disorder¹ follows a similar line of thought. Large⁵ noted that endogenous depression predominates but either endogenous or reactive depression may be seen. It was Sternbach¹¹ who emphasized that chronic pain is usually associated with reactive depression, which some people prefer to call secondary depression.¹⁵

In an effort to treat these patients, antidepressants have been a natural choice, and their efficacy has been reasonably well established for a certain group of painful conditions.¹²,¹⁶,¹⁷ However, long-term resolution of this pain-associated depression by participation of the patient in a nonpharmacologic program for management of chronic pain is less well documented.¹⁸

This study examined the incidence, characteristics, and long-term outcome of de-
pression in patients with nonmalignant chronic pain who completed a pain management program.

**Method**

The study population consisted of 100 consecutive patients who were admitted to a pain center for management of chronic pain between March 1982 and July 1983, completed the program, and, at the time of dismissal, agreed to participate in a follow-up study. The details of the pain-center program have been published previously; it is a 3-week in patient program intended to help the patient and the family cope with pain more effectively, to reduce intake of medication to a minimum, to teach self-treatment methods, and, if possible, to reduce pain. Admission criteria include pain problem for 6 months or longer, no related malignant disease, no specific medical or surgical treatment applicable, no litigation pending, and acceptance of the treatment program by the patient. Treatment consists of behavior modification, physical rehabilitation measures, medication management, education, group discussion, biofeedback-relaxation techniques, participation of family members, and supportive psychologic treatment.

On admission, the following information was recorded: personal data (age, sex, marital status, education, and pertinent family history), pain history (location, duration, severity, and neurologic and orthopedic diagnoses), RDC diagnosis for major depression (Appendix I), and scores on the Minnesota Multiphasic Personality Inventory (MMPI), Shipley-Hartford scale, and Hamilton rating scale for depression. The duration of hospitalization ranged from 11 to 35 days, with a mean of 24.1 days. On dismissal, the following information was recorded: pain severity, standardized rating of the patient's response to treatment (Maruta, T., Swanson, D. W. and McHardy, M. J., unpublished data), RDC rating, and Hamilton scale score. All of the admission and dismissal Hamilton scale and RDC ratings were done by the same psychologist, who has extensive training under the supervision of the investigator.

From 3 to 21 months (mean, 11.6 months) after dismissal from the program, the patient was interviewed by telephone, with the use of the RDC. Because the interview was by telephone, the interviewer could not ascertain "psychomotor agitation or retardation" (category B, no. 4, RDC). As a means of maximizing the frequency of diagnoses of depression and of minimizing the significance resulting by chance, four instead of five of the symptoms listed in category B were required for definite and three for probable diagnosis of depression. The follow-up telephone interviews were conducted by a research assistant who has extensive training under the supervision of the investigator.

At the completion of the study, the data sets of two patients were incomplete, leaving data from 98 patients for the analysis. The Department of Medical Statistics
and Epidemiology, Mayo Clinic, provided assistance for the data analysis of the study.

**Results**

Of the 98 patients studied, 38 were men and 60 were women. Their ages ranged from 15 to 64 years, with a mean of 44.5 years. Eighty patients were married, 11 were single, and 7 were divorced or separated. Educational level varied from 7 to 24 years, with a mean of 13.2 years ($\pm$ 3.0). Seventy-eight patients had pain mainly in the back or extremities or both, 8 had pain in the face or head, 8 had pain specifically in the abdomen or perineum, and 4 had pain in the “total body.” None of the patients had medical-neurologic-surgical diagnoses that could explain the magnitude of the pain complaints.

Thirty-four patients were definitely depressed, 20 were probably depressed (total of 54 patients depressed), and 44 were not depressed as defined by the RDC for major depressive disorder (Table 2).

The mean ages of the definitely depressed, probably depressed, and nondepressed groups were 44, 47 and 44 years, respectively. The definitely depressed group contained 17 women and 17 men, and 28 of them (82%) were married; the probably

### Table 2 Admission Profile

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Definitely depressed</th>
<th>Probably depressed</th>
<th>Nondepressed</th>
<th>Significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients, no.</td>
<td>34</td>
<td>20</td>
<td>44</td>
<td>NS</td>
</tr>
<tr>
<td>Age, yr</td>
<td>44</td>
<td>47</td>
<td>44</td>
<td>NS</td>
</tr>
<tr>
<td>Female/male</td>
<td>17/17</td>
<td>14/6</td>
<td>29/15</td>
<td>NS</td>
</tr>
<tr>
<td>Married, %</td>
<td>82</td>
<td>80</td>
<td>82</td>
<td>NS</td>
</tr>
<tr>
<td>Education, yr</td>
<td>13</td>
<td>13</td>
<td>13</td>
<td>NS</td>
</tr>
<tr>
<td>Age started working, yr</td>
<td>16</td>
<td>19</td>
<td>18</td>
<td>NS</td>
</tr>
<tr>
<td>Duration, mo</td>
<td>90</td>
<td>135</td>
<td>72</td>
<td>NS (0.10)</td>
</tr>
<tr>
<td>Loss of work due to pain, mo</td>
<td>31</td>
<td>20</td>
<td>22</td>
<td>NS</td>
</tr>
<tr>
<td>Compensation, %</td>
<td>38</td>
<td>40</td>
<td>45</td>
<td>NS</td>
</tr>
<tr>
<td>Litigation, %</td>
<td>8.8</td>
<td>10.0</td>
<td>6.8</td>
<td>NS</td>
</tr>
<tr>
<td>Family history of depression, %</td>
<td>44</td>
<td>30</td>
<td>43</td>
<td>NS</td>
</tr>
<tr>
<td>Pain level, 0–10</td>
<td>5.9</td>
<td>5.0</td>
<td>6.0</td>
<td>NS</td>
</tr>
<tr>
<td>Verbal IQ</td>
<td>116</td>
<td>115</td>
<td>116</td>
<td>NS</td>
</tr>
<tr>
<td>Abstract IQ</td>
<td>102</td>
<td>95</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td>Hamilton score</td>
<td>19.7±5.0</td>
<td>14.9±3.7</td>
<td>10.0±4.0</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

* P values from the analysis of variance for the continuous variables and from the $\chi^2$ test for categorical variables.
depressed group contained 14 women and 6 men, and 16 (80%) were married; the nondepressed group contained 29 women and 15 men, and 36 (82%) were married. These differences were not significant, nor were the mean years of education (13, 13 and 13 years) or age when the patients started working (16, 19 and 18 years). There were also no significant differences among groups regarding location of pain, mean duration of pain (90, 135 and 72 months), or loss of work due to pain (31, 20 and 22 months). Receipt of compensation (38%, 40% and 45%), pending litigation (8.8%, 10% and 6.8%), and family history of depression (44%, 30% and 43%) did not differ significantly among the groups.

On a scale of 0 (no pain) to 10 (maximum imaginable pain), the definitely depressed, probably depressed, and nondepressed groups had mean pain levels of 5.9, 5.0 and 6.0, respectively, at admission and 5.8, 5.1 and 5.2, respectively, at dismissal; the differences among the groups were not significant. The mean Shipley-Hartford scale scores for verbal IQ (116, 115 and 116) and abstraction IQ (102, 95 and 94) did not differ significantly among the definitely depressed, probably depressed, and nondepressed groups. In men, MMPI profiles were similar in all three groups, with no mean T scores on individual scales differing significantly from each other. In women, profiles were similar in all three groups but with a significant elevation of D (depression) scale (70, 68 and 58), Pt (psychasthenia) scale (66, 60 and 55), and Sc (schizophrenia) scale (67, 60 and 58) in depressed groups, all of which are traditionally associated with a presence of depression.

On admission, the mean (± SD) scores on the Hamilton rating scale of depression for the definitely and probably depressed groups were 19.7 (± 5.0) and 14.9 (± 3.7), respectively, whereas the score for the depression-free group was 10.0 (± 4.0). On admission, 65% of the patients with definite depression had a total Hamilton scale score of 18 (usual cut-off point for clinical depression) or higher, compared with 30% of probably depressed and 5% of nondepressed patients.

Of the 54 patients with an admission diagnosis of depression, 53 (98%) were not depressed and one was definitely depressed at the time of dismissal (Table 3). Of the 44 patients who were not depressed at the time of admission, 43 remained depression-free; 1 patient was rated definitely depressed. Stated differently, of the original 98 patients, 96 (98%) were not depressed at the time of dismissal; their mean Hamilton scale score was 5.9 (± 3.6).

Total Hamilton scale scores at dismissal did not differ significantly among the three groups (6.9, 5.7 and 5.1, respectively), indicating significant improvement in total Hamilton scores from the admission to the dismissal in all three groups. At dismissal, 79%, 90% and 98% of the definitely, probably, and nondepressed groups, respectively, had a total Hamilton score of 10 or less.

Ratings of overall treatment outcome were based on improvement in attitude,
Table 3  Dismissal and Follow-Up Profile

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Definitely depressed</th>
<th>Probably depressed</th>
<th>Nondepressed</th>
<th>Significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients, no.</td>
<td>34</td>
<td>20</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>Dismissal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain level</td>
<td>5.8</td>
<td>5.1</td>
<td>5.2</td>
<td>NS</td>
</tr>
<tr>
<td>Hamilton score</td>
<td>6.9</td>
<td>5.7</td>
<td>5.1</td>
<td>NS</td>
</tr>
<tr>
<td>Treatment outcome (success rate, %)</td>
<td>86 (definite and probable combined)</td>
<td>88</td>
<td>80</td>
<td>NS</td>
</tr>
<tr>
<td>Patients, no.</td>
<td>54</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression-free, %</td>
<td>98</td>
<td>98</td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Follow-up</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression-free, %</td>
<td>85</td>
<td>93</td>
<td></td>
<td>NS</td>
</tr>
</tbody>
</table>

* P values from the analysis of variance for the continuous variables and from the $\chi^2$ test for categorical variables.

medication reduction, and physical functioning as observed by the clinical staff at the pain center (kappa coefficient = 7.6). Both depressed (definite and probable) and nondepressed groups made moderate improvement in all three areas; the differences were not significant, with overall success rates of 86%, 88% and 80%, respectively.

At long-term follow-up, 46 of the 54 patients who were depressed at the time of admission remained not depressed and 8 were depressed (4 definite and 4 probable). In contrast, of the 44 patients without depression, 41 remained nondepressed and 3 patients were depressed (2 definite and 1 probable). In the 2 groups combined, 11 (11.2%) patients were depressed (6 definite and 5 probable) and 87 (88.8%) were not depressed at the time of long-term follow-up.

Discussion

This study confirms the association between chronic pain and depression. In our previous study of 100 patients admitted consecutively to our pain center for management of chronic pain, the rate of depression (definite and probable combined) was 64%; in the present study, the incidence was 54 of 98 (55%). Considering the wide range of incidence of depression reported in patients with chronic pain, these numbers are strikingly similar.

Undoubtedly, the reported incidence of depression depends on the criteria used for diagnosis of depression as well as the population studied. For example, the diagnostic criteria used by Pilowsky and associates were stringent and similar to the RDC
for definite endogenous major depression. Even though not investigated in the present study, our previous study\(^3\) showed a 5% incidence of definite endogenous major depression in patients with chronic pain, which was close to the incidence reported by Pilowsky et al. In contrast, the criteria used by Blumer and Heilbronn\(^1\) were broad, which may be a partial explanation for the higher incidence of depression reported in their study, along with the difference of the population studied.

At the time of admission, no characteristic differences were observed between the three study groups except for, by definition, the presence of RDC diagnosis of major depression (definite or probable) and an associated increase of total Hamilton scale score and a group of MMPI scale scores in definitely and probably depressed groups. With a 98% improvement rate of depression by participation of the patients in a nonpharmacologic program, there were no differences in frequency of depression and the Hamilton scores among the three study groups at the time of dismissal. Overall outcome also was not affected by the presence of depression.

Explanations for both the observed similarity among the groups and the resolution of depression are open to speculation. As was discussed elsewhere,\(^3\) the similarity among the groups may result from various factors: a relatively minor effect of depression compared with the powerful distinctive nature of the pain experience and a similar premorbid personality, life situation, degree of sophistication, and coping mechanisms.

As an explanation of improvement of depression, we also considered several factors:\(^3\) 1) acceptance of pain, 2) mastery of pain, 3) improved understanding of chronic pain with more realistic planning, 4) expectation of a changed milieu at home resulting from family participation in the pain management program, 5) increased physical activity, 6) withdrawal from the effects of analgesics and sedatives, 7) happiness about leaving the rigor and stress of the pain center, and 8) alteration of an underlying biochemical process by some combination of the aforementioned physical and psychologic factors.

The results of the present study reject the possibility of factor no. 7 above, which was called the “leaving-the-concentration-camp” effect by some of our colleagues;\(^18\) of the 54 depressed patients identified on admission, 46 (85%) became nondepressed by the time of dismissal and remained so at the time of follow-up.

Is a nonpharmacologic program for management of chronic pain a good antidepressant? The answer is definitely yes for depression associated with chronic pain. The sustained recovery rate of 85% exceeds that in reports of treatment of depression with antidepressant agents. Questions remain, however. What is depression associated with chronic pain? What is the nature of the therapeutic efficacy of a nonpharmacologic program for management of chronic pain on depression associated with chronic pain?

Part of the explanation comes from the way the RDC for major depression were constructed. On close examination of the individual items of the RDC for major de-
pression (Appendix I), which is a list of observable symptoms of depression without theoretical implications, it is obvious that ongoing presence of pain accompanied by lowered self-esteem or physiologic dysfunction, or both, is fully capable of fulfilling many of the criteria for major depression independent of the feeling of “depression.” When the patient learns to cope with pain and enjoy life in spite of pain, lowered self-esteem and some of the physiologic dysfunctions are likely to lift, leaving the patient less “depressed” according to the RDC for major depression.

In order to better understand and manage depression associated with chronic pain, further studies are indicated. In the meantime, the findings of this study question the necessity of antidepressant medication in patients with depression associated with pain who are treated in this type of management program for chronic pain.

Appendix I

Major Depressive Disorder (A through F are required for the episode of illness being considered.)

A. One or more distinct periods with dysphoric mood or pervasive loss of interest or pleasure. The disturbance is characterized by symptoms such as the following: depressed, sad, blue, hopeless, low, down in the dumps, “don't care anymore,” or irritable. The disturbance must be prominent and relatively persistent but not necessarily the most dominant symptom. It does not include momentary shifts from one dysphoric mood to another dysphoric mood (e.g., anxiety to depression to anger), such as are seen in states of acute psychotic turmoil.

B. At least five of the following symptoms are required to have appeared as part of the episode for definite and four for probable depression (for past episodes, because of memory difficulty, one less symptom is required).

1. Poor appetite or weight loss or increased appetite or weight gain (change of 1 pound a week over several weeks or 10 pounds a year when not dieting).
2. Sleep difficulty or sleeping too much.
3. Loss of energy, fatigueability, or tiredness.
4. Psychomotor agitation or retardation (but not mere subjective feeling of restlessness or being slowed down).
5. Loss of interest or pleasure in usual activities, including social contact or sex (do not include if limited to a period when delusional or hallucinating). (The loss may or may not be pervasive.)
6. Feelings of self-reproach or excessive or inappropriate guilt (either may be delusional).
7. Complaints or evidence of diminished ability to think or concentrate (e.g., slowed thinking) or of indecisiveness (do not include if associated with marked formal thought disorder).
8. Recurrent thoughts of death or suicide or any suicidal behavior.

C. Duration of dysphoric features at least 1 week beginning with the first noticeable change in the subject's usual condition (definite if lasted more than 2 weeks, probable if 1 to 2 weeks).

D. Sought or was referred for help from someone during the dysphoric period, took medication, or had impairment in functioning with family, at home, at school, at work, or socially.

E. None of the following which suggest schizophrenia is present:

1. Delusions of being controlled (or influenced) or of thought broadcasting, insertion, or withdrawal.
2. Nonaffective hallucinations of any type throughout the day for several days or intermittently throughout a 1-week period.
3. Auditory hallucinations in which either a voice keeps up a running commentary on
the subject’s behaviors or thoughts as they occur or two or more voices converse with each other.

4. At some time during the period of illness the patient had more than 1 month when he or she exhibited no prominent depressive symptoms but had delusions or hallucinations (although typical depressive delusions such as delusions or guilt, sin, poverty, nihilism, or self-deprecation or hallucinations with similar content are not included).

5. Preoccupation with a delusion or hallucination to the relative exclusion of other symptoms or concerns (other than typical depressive delusions of guilt, sin, poverty, nihilism, or self-deprecation or hallucinations with similar content).

6. Definite instances of marked formal thought disorder accompanied by either blunted or inappropriate affect, delusions or hallucinations of any type, or grossly disorganized behavior.

F. Does not meet the criteria for Schizophrenia, Residual Subtype.

References


