Linking chronic pain and depression


Abstract

Background Patients experiencing chronic pain often seem to develop depression. Much research has been carried out into the potential biological, social and psychological links between the two.

Conclusion Despite the quantity of research, this review of the literature reveals that few firm conclusions can be drawn from our knowledge to date.

Observation in clinical practice suggests a relationship between chronic pain and depression, but what is the evidence for a direct link between chronic pain and the development of depression? In an attempt to answer this question in biological, social and psychological terms, the author carried out a literature review. A search of MEDLINE and CINAHL, from 1990 up to and including 1999, was carried out using ‘chronic pain’ and ‘depression’ as key words.

Biological links

Literature reviews citing empirical evidence from the 1980s were the main source searched for evidence to support a biological link between chronic pain and depression. Adams et al (1994) in their review of personality characteristics in chronic back pain patients, suggest neurotransmitters might provide a link between chronic pain and depression, and cite work by Ward and Bloom (1982) and Adams and Shaw (1993) to back up this suggestion. They do not, however, provide details of the work carried out by the researchers they cite, so they fail to provide convincing evidence of a link.

Creamer and Hochberg (1998), in their literature review, use an example from Harrington et al (1993) to support a biological basis for the link between chronic pain and depression. Harrington et al (1993) studied 14 patients over a two-week period, collecting serum assays of soluble interleukin-2 receptors. They found that joint inflammation co-varied directly with interleukin-2 receptor levels but was not related to mood disturbances. However, increases in mood disturbance were linked with decreases in interleukin-2 receptor levels and increases in reported pain. This study provides preliminary evidence that depression might cause increases in reported pain, without any physical changes in disease, by a change in interleukin-2 receptor levels. The research is limited, however, by the small number of patients studied, and the researchers would need to repeat the study with a larger sample to provide convincing evidence.

In his literature review, Covington (1991) discusses biochemical similarities between pain and depression using extensive literature from the late 1970s and 1980s. He concludes that the neurochemical links between pain and depression indicate that these conditions share some pathophysiology, but does not establish a common cause.

Romano and Turner (1985) found the amount and action of serotonin and noradrenaline to be abnormal in depression. These same neurotransmitters have also been implicated in the modulation of pain perception. They conclude, however, that specific neurochemical mechanisms that consistently operate in either chronic pain or depression have not been identified, and the extent to which these overlap in the two syndromes is even less...

Key words

- Depression
- Pain

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Elizabeth Gray BSc(Hons), RN, is Ward Sister, Glenfield General Hospital, Leicester.
clear. At that time, Romano and Turner believed that advances in the understanding of physiological mechanisms of pain and depression would yield good evidence of links. However, this literature review has not identified further published research on the subject.

Geisser et al (1993) attempted to provide evidence to support Field’s neurobiological model (1991). The model proposes that depression influences pain perception via a pain modulating system in the periaqueductal grey area. Geisser et al (1993) used a ‘cold pressor test’ on chronic pain patients to determine pain threshold and pain tolerance. They found that pain threshold and pain tolerance were unrelated to the 21 Item Beck depression inventory scores, although they claim partial support for the neurobiological model, despite limited evidence. One of the main limitations of this study acknowledged by Geisser et al (1993) is that they only tested one type of pain. It could be that this type of pain is not modulated by opioid receptors, the main point in Field’s theory (1991).

Overall, there is limited evidence to demonstrate a biological link in the pain and depression pathways, although it has been shown that the action of certain neurotransmitters is altered by both chronic pain and depression, suggesting a theoretical link. Published studies have been unable to provide convincing evidence as to the exact nature of this link.

Some authors have suggested that there might be gender differences, which could help explain the relationship between chronic pain and depression. Creamer et al (1999) studied community volunteers with chronic knee pain. They found that women have greater depression and anxiety scores than men. However, the differences were only significant for anxiety and, due to the self-selecting nature of the sample, it is not possible to generalise about the results. Novy et al (1996) considered chronic pain patients and found that depression scores were not significantly different for men and women. They found, however, that men and women express different depressive symptomatology, which might account for the hypothesis that gender affects the link between chronic pain and depression: there is no evidence to support this hypothesis.

### Social links

Some authors have investigated the possibility of a social link between pain and depression. Most of these studies have been in the form of cross-sectional cohort studies, which can only give a ‘snapshot’ impression of the links between pain and depression. Averill et al (1996) found a significant relationship between marital status and depression in their sample, indicating that single status was associated with increased depressive symptomatology. However, Trief et al (1995) disagreed, finding that marital status did not significantly relate to depression in chronic pain patients. Both these studies used the Beck depression inventory to measure depression, and used samples of chronic pain patients. The sample size was different in each study, with Trief et al (1995) analysing a relatively small number of participants (n=48).

Trief et al (1995) also state that people who lived alone or had no family were excluded in the final analysis; so, although they suggest that depressed and non-depressed chronic pain patients did not differ on marital status, a significant proportion of single people would have fallen into the excluded sample.

Because no information is given on this group (n=22), it is not possible to tell whether they would have been equally distributed between the depressed and non-depressed groups. Averill et al (1996) are not specific in distinguishing between depressed and non-depressed patients, and do not give actual Beck depression inventory scores in the results. They state that single people generally had a higher inventory score, indicating a higher degree of depression.

Herr et al (1993) compared older chronic back pain patients with younger patients. They found no significant relationship between marital status and depression. They also used the Beck depression inventory, but used a score of ten, rather than the score of 15 used by Trief et al (1995), to distinguish between depressed and non-depressed patients. This might be significant, as it is suggested that physical symptoms not related to depression might score positively on the Beck depression inventory (Williams and Richardson 1993).

From these studies it is not possible to draw firm conclusions on whether marital status influences the relationship between chronic pain and depression. It could be that the relationship is more complicated than marital status alone, and that quantity and quality of social contacts in general would have a greater influence on the link between pain and depression. Roberts et al (1996) seem to provide support for this idea in their study of the effects of social support on pain and depression in patients with end-stage joint disease. Faucett (1994) found that the severity of depression is associated with the quality of the patient’s close relationships, regardless of the type of painful disorder or severity of pain, and conflict with others about pain made a significant contribution to the severity of depression.

the incidence of depression in chronic pain patients.

Some studies have investigated the influence of education on the relationship between chronic pain and depression. Averill et al. (1996) found that lower levels of education were associated with higher depression scores, whereas Trief et al. (1995) found that depressed patients were more likely to have reached a higher level of educational achievement.

The difficulties in comparing these two particular studies were discussed earlier, and no other study was found that attempted to link educational levels with depression score. Averill et al. (1996) used a larger sample size, so are less likely to have reached their conclusion by chance, but overall there is no convincing evidence to show that education level mediates the relationship between pain and depression.

Averill et al. (1996) state that employment is an important role for adults, and the loss of this role can have serious psychological effects. They found that unemployment was associated with higher depression scores. Arnstein et al. (1999) and Trief et al. (1995) also found that depression was more likely to be present in chronic pain patients who were unemployed. Taken together, these studies suggest that unemployment strengthens the relationship between chronic pain and depression.

Many authors have suggested that the level of disability might influence the relationship between chronic pain and depression. Arnstein et al. (1999) investigated the influence of depression on self-efficacy, which refers to personal judgements of how well a person believes they can perform specific behaviours in particular situations (Bandura 1997). They concluded that individuals with chronic pain might become depressed in part, because they have curtailed their leisure and work activities.

From their literature review, Herr and Mobily (1992) concluded that depressed chronic pain patients consistently report lower levels of functioning than non-depressed pain patients. Smedstad et al. (1997) carried out a longitudinal study and found that the level of disability was linked with the level of depressive symptoms one year later. This literature provides fairly convincing evidence that the co-existence of chronic pain and depression leads to higher levels of disability.

**Psychological links**

The degree to which psychological factors are responsible for pain or pain amplification is controversial (Creamer and Hochberg 1998), and a number of authors have attempted to investigate the relationship between depression and chronic pain by considering psychological factors.

Fifield et al. (1998) investigated whether a history of depression had any effect on the level of pain reported by patients with current chronic pain. They found that in those patients showing symptoms of depression at the time of the study, chronic pain was rated as more severe among those who had a history of depression. However, this was not consistent across the sample; patients who showed no symptoms of depression at that time reported similar levels of pain severity, regardless of whether they had a history of depression. These results suggest that, if depression and chronic pain co-exist, then reported pain severity is likely to be high, particularly in those patients who have a history of depression.

Other studies (Casten et al. 1995, Creamer et al. 1999, Krause et al. 1994, Rajala et al. 1995) have also found that when depression and chronic pain co-exist, the reported pain severity and disability is higher than for those chronic pain patients who show no symptoms of depression. Creamer et al. (1999) in a cross-sectional cohort study, found that other factors in addition to structural changes visible on an anteroposterior X-ray might contribute to the reporting of knee pain. Krause et al. (1994) found a higher level of reported pain behaviour among depressed chronic pain subjects. However, this was not supported by observation of pain behaviours in these patients.

Rajala et al. (1995) studied 55-year-old Finnish people. They found that musculoskeletal pains were common among this population, and even more common among the depressed population than in the non-depressed participants. Creamer and Hochberg (1998) also conclude that psychological factors explained some of the variation in pain reporting among individuals with knee osteoarthritis. One explanation for the increased severity of pain could be that the pathophysiological effects of anxiety or depression include increased muscle tension that might be painful (Creamer and Hochberg 1998). Covington (1991) concludes that fear of injury in chronic pain patients produces disability as it leads to a cycle of immobility and physical decline.

Overall, the literature appears to support the conclusion that psychological factors influence pain severity and disability reported by patients with chronic pain and depression.

**Discussion**

This review of the literature identified many articles by authors who have investigated the relationship between chronic pain and depression. A large proportion of these attempt to discuss whether depression causes chronic pain, or chronic pain causes depression. Because most of the studies are cross-sectional, it is impossible to conclude

**REFERENCES**


whether depression or chronic pain came first in patients experiencing both conditions. The patient’s self-report is unreliable because the onset of chronic pain and depression happens over time, and the patient’s focus on their illness tends to determine which condition they believed started first.

Magni et al (1994) carried out one of the few longitudinal studies to determine this relationship. They found support for both hypotheses, in that depression is able to predict chronic pain, and chronic musculoskeletal pain can predict depression. Clinically it is probably not important to determine whether depression or chronic pain is the underlying problem, as the treatment of one condition, if successful, is likely to lead to improvement in the other condition.

The literature seems to support a relationship between chronic pain and depression, although the exact nature of this relationship is not clear. It seems that biological, social and psychological factors all influence the relationship between chronic pain and depression.

Many of the studies use similar methodology to investigate the relationship between depression and chronic pain. However, they vary in their criteria for analysing the extent of depression. The Beck depression inventory is a common scale used to assess depression in these studies, but Williams and Richardson (1993) conducted a cross-sectional study to determine what the inventory measures in chronic pain.

They suggested that physical symptoms that are normally considered to be characteristic of depression might, in the chronic pain patient, be viewed as secondary to the pain and therefore unrelated to mood disorder. They found that despite the high proportion of patients who produced Beck depression inventory scores in the depressed range, the overall frequency of endorsement of items having a cognitive or affective depressive content was considerably lower than expected in a mildly to moderately depressed population.

Williams and Richardson (1993) conclude that caution should be used in interpreting total Beck depression inventory scores as a straightforward measure of depressive severity in the chronic pain population. They also state that an inventory score of 13 has been recommended for identifying depression in chronic pain patients. This is in conflict with some of the studies reviewed, for example, Herr (1993). Williams and Richardson (1993) cast doubt on the validity of many of the studies investigating chronic pain and depression, so the results need to be viewed with caution.

**Conclusion**

The incidence of depression in chronic pain patients might be overestimated in the literature due to the overlapping symptomatology of chronic pain and depression. However, it seems logical that depression can be a problem in chronic pain patients, and that pain might be a manifestation of depression.

There is evidence that chronic pain and depression share similar physiological pathways, although to date there has been no convincing evidence of a direct physiological link between the two conditions.

Social and psychological factors appear to mediate the severity of chronic pain and depression. When the two conditions co-exist the severity of both conditions appears to increase.

**Implications for practice**

- Nurses should be aware that there does appear to be a link between chronic pain and depression
- Successful treatment of one condition might lead to improvement in the other