

## Comparisons of Emotion Status and Pain Perception in Neurosurgical Patients before and after Surgery

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### ABSTRACT

**Background:** "Comparisons of Emotion Status in Neurosurgical Patients of the Before and After Surgery Attendance in Kerman Shahid Bahonar Hospital." This article seeks to evaluate changes in affect and pain scores as a function of neurosurgery in a sample of adults diagnosed with disc herniation, brain tumor and neuralgia, or spinal canal stenosis and spondylolysis.

**Methods:** 46 patients were recruited from neurosurgical patients suffering several kinds of psycho cognitive and emotional status, before and after surgery in Kerman Shahid Bahonar Hospital. The following psychometric assessments were applied: The Hospital Anxiety and Depression Scale (HADS) and McGill Pain Questionnaire (MPQ).

This study was to evaluate the variation effect of physical treatment and operation on the perception of the patients' pain and their emotional state, so there was no psychological intervention along the research such as positive suggestion or cognitive behavioral therapy.

**Results:** Results suggest significant changes from pre-surgery to post-surgery on multiple outcome measures, including affect (anxiety and depression) and pain dimensions (sensory, affective, and evaluative). Patients had a particular reduction in terms of their states of pain perception, anxiety and depression scores after operation. Anxiety shows significant positive correlations with dimensions of MPQ in sensory, affective, miscellaneous, total rating and word chosen but depression only shows significant positive correlations with dimensions of affective and pain total rating.

**Interpretation:** The researchers have concluded that the main problems for such patients are both emotional distress and physical symptoms. The outcomes of this study show that patients have more emotional function, it could be relevant to their culture in nature. This paper have collected data on pain and emotional functioning before and after surgery for pain tolerance related to problems and are tracking outcomes of their surgical procedures.

**Keywords:** anxiety, depression, Neurosurgical patients, emotion, pain, HADS, MPQ, Iran

### Introduction

The experience of pain is known virtually to all mankind apart from those unfortunate individuals who have congenital insensitivity to pain. The experience combines sensory qualities, indicating the exact location of damage, an unpleasant emotional state, and related "pain behavior" such as avoidance [1]. Pain is an unpleasant sensation caused by noxious stimulation of the sensory nerve endings. It is cardinal symptom of inflammation and is valuable in the diagnosis of many disorders and conditions [2].

Pain is not only a physiological event but also a psychological state associated with unpleasant sensory and emotional experience resulting from actual or potential tissue damage. "Pain is primarily a signal that body tissues have been damaged, and serves to promote the avoidance of further damage by avoidance of the situation or agent causing pain" [1].

The description above indicates that pain serves an adaptive function, but this may only be true of acute pain conditions. In chronic pain states - for instance in the case of terminal cancer pain - the pain has ceased to serve a useful function: it has become maladaptive.

Fear, Anxiety and Depression with Pain: It seems plausible to propose that personality characteristics do not interact with pain in isolation. Neurotic individuals suffer high levels of anxiety [3], and depression may also be a feature. Both of these emotions, and that of fear, are relevant as factors that vary between individuals in their response to pain.

Patients often describe having fear of pain. This may be fear of the pain itself, avoidance of activity for fear of pain, fear of being alone, fear of the unknown and fear related to procedures, equipment and treatment [4-5-6-7]. Swinkels-Meewisse et al., (2006) recently conducted a study of fear of pain in 615 individuals from a primary care setting, each of whom was having an acute episode of back pain. The interaction between pain and anxiety in the setting of somatic illness is widely recognized and it was noted above that people who are anxious are more sensitive to pain than calm people [8].

Findings from clinical studies have shown that patients scoring high on pain-related anxiety and fear measures report high levels of attention to pain sensations [9- 10] and over predict the amount of pain they will experience during a physical examination [11]. They also score higher on self-report measures of disability and depression [12].

Moreover, memory of fear and anxiety carries over from one pain experience to the next. Thus the anticipation of pain and memory for actual pain and discomfort create considerable difficulties for helping patients to manage their anxiety [13]. Uncertainty about the ability to cope and the uncertain effect of treatment may arouse anxiety. Perception of self-efficacy and the presence or absence of support from others may also be important factors.

The findings of Arntz et al. (1991, 1993) suggest that the main effect of anxiety is that it either attracts one's attention to pain or distracts one from it. From this viewpoint the effect

of anxiety on pain perception may depend more on the resulting focus of attention rather than anxiety per se [14-15].

Similarly, pain may be accompanied by many psychological experiences such as distress, "hassles" and stress which relate to the impact of pain upon domestic and social life. It may not be the pain itself which causes the distress but rather the impact upon the person's lifestyle. Thus high ratings of anxiety and stress may be mistakenly ascribed to the pain condition alone. Sternbach (1986) reported that greater stress and more hassles are associated with more frequent and more severe pain [16].

Similar problems of interpretation apply to studies of depression in relation to somatic illness and pain. For example Tope et al. [17] point out that a diagnosis of major depression may be an

artefact of the somatic symptoms of the physical illness. They conclude that there is therefore a growing awareness of the need to recognize emotional factors in somatic illness.

A recent study by Kuch et al. [18] concluded that depression was a more significant emotional disorder in the context of pain. The authors studied 61 patients suffering persistent pain caused by road traffic accidents. The location and severity of the pain varied widely across the group of patients and was acknowledged by the authors to lend heterogeneity to the sample. The results showed that depression was associated with the frequency of the pain symptoms, but not the severity of the pain. Kuch et al. proposed that the results might reflect the fact that the patients found it more difficult to cope with frequently recurring symptoms because they had no respite from the pain. They concluded that their results reinforced the importance of considering the affective or emotional nature of "suffering" as part of the experience of persistent pain.

Lautenbacher et al. (1994) [19] confirmed the view of Kuch et al. by conducting a meta analysis and reported that depression constitutes a state of increased vulnerability to pain problems and changes the way one deals with such problems. They noted that chronic pain is frequently accompanied by depressive symptoms and sometimes leads to a full-blown depressive disorder. Interestingly, although these authors concentrated on psychopathological factors, they made no analysis to account for differences in the physical causes of the pain state.

The study by Beckham et al. (1994) [20] concludes that "the worst possible outcome when experiencing pain was associated with decreased functional status, increased psychological distress, depression, and avoidance of activity for fear of pain. Reinterpreting pain sensations in a positive way was associated with decreased depression." Magni G (1993) [21] suggests that chronic muscular pain has to be understood as an organic disorder made worse by psychological phenomena. He concludes that psychological reactions which occur as a consequence of muscle pain needs appropriate psychiatric treatment. It is significant that these common psychological reactions are depression and anxiety.

These findings suggest that psychological factors associated with, or contributing to, emotional disturbance should be accounted for when considering pain patients. Adams et al. (1996) [22] observe that one should note that "While a substantial body of literature does show that pain patients tend to be depressed, mechanisms linking pain to depression

are not well understood." It is interesting, however, to note that both pain and depression may be linked independently with inactivity and positivity.

### Overview and Rationale for the Present Study:

It is evident from the preceding review that there has been a considerable focus of research upon the role of psychological factors in the experience of acute pain. These factors have included emotional responses and the role of personality, cultural, patients' belief and social support about their pain. The subjective intensity of pain relates to different perceptions, meanings, attitudes, beliefs and emotional responses in different groups with different cultures and ideologies. Individual response to pain is influenced by a typical cultural pattern of beliefs about pain and how one should react to it. For example, in Eastern philosophy it is believed that those who suffer from pain and other difficult life events will derive spiritual value from the experience:

I am happy in the world because the world is fresh and pleasant due to Him.

Beloved is the whole universe, because it belongs to Him.

I drink poison with sweet satisfaction because the beautiful cupgiver is witness.

I bear pain with devotion because my healing is only from Him.

If my bloody wound gets not cured, that is fine.

Fine be that pain because my every treatment is from Him.

Sadi (1194-1291; Persian poet)

In other words, for some religious devotees, the experience of pain is to be borne as a recognition of devotion and acceptance. Recognition of the spiritual dimension and its function as a vital component of human well being has led to an increased interest in its effects upon perception of health and illness, yet very little progress has been made in identifying possible intervention methods for enhancing spirituality. Edwards (1984) [23] distinguishes 'bodily' pain from 'spiritual' pain, believing that the latter has been "seriously neglected in medical practice." It is a matter which has not been considered in any depth. One might also hypothesize that a significant determinant of response to pain might be cultural. The religious beliefs which patients have regarding their pain problem and the consequences of the implications of pain may have a direct influence on negative and positive thoughts in their impact on coping efforts. It is evident that there is considerable variation in response to pain. Some of that variation can be explained physiologically by inevitable differences between patients' sensory systems. Other variation is due to the cultural environment where one learns the 'acceptable' ways to respond to pain and its meaning in religious terms. Yet further variation is explained by differences in individuals' beliefs about pain and their past history of suffering and coping, or failure to cope.

This conclusion would seem confirming by evidence reviewed above that depression is a common emotional concomitant of pain and is associated with increased vulnerability to pain [14-15]. Similarly, coping behavior in pain is influenced by many factors internal and external to the patient and these should also be included in a study of personality and pain perception [e.g. 24-25].

An obvious factor that should also be included as a poten-

tial independent variable relevant to pain and distress is that of social support. The factor was shown in the literature review above to have a significant influence upon the response to perception of pain and might interact with the factors of personality and coping.

This study concerned with two factors that may influence patients' experience of pain. The study will focus upon the role played by psychological status in patients' perception of pain that patients may adopt in order to live with their pain.

The issue is of importance because it will be shown that there is evidence to support the hypothesis that the experience of pain may be made worse when the patient has involved with a surgery. Moreover, anxiety and depression are known to influence the extent to which pain affects patients in their daily activities and emotional function. While these factors have, to a certain degree, been examined in previous research, it will be shown that some uncertainties remain as to their influence. It is intended that the present study may provide a further degree of understanding the emotional functioning and pain perception before and after surgery procedure in different culture. A recent review of the literature on the validity of the HADS clearly indicates that it is a well-performed questionnaire in assessing the symptom severity and caseness of anxiety disorders and depression in both somatic, psychiatric and primary care patients and even in the general population. The HADS is a popular instrument among researchers from different nations and it is estimated that since 1996 to 2002 the number of HADS papers that have been published has increased almost fourfold [26]. The McGill Pain Questionnaire also provides quantitative information that can be treated statistically, and is sufficiently sensitive to detect differences among different methods of pain relieve which work with Persian pain patients [27].

## Material and Methods

All new attendants were requested to complete the questionnaires on their first time enrolling for treatment and operation in the Hospital (If the questionnaires were completed only a few days prior to surgery, then patients' anxiety levels might be expected to be high and once surgery is completed then anxiety might be expected to fall). In the second phase of the study questionnaires were given to patients before discharge from Hospital. The study received approval from the Ethical Committee of Kerman Medical University and all new attendees to the Hospital were invited to participate on the basis of informed consent. Their general practitioners were also informed of their involvement in the study and then requested to complete the MPQ and HADS questionnaires. This study was carried out during September 2003 and March 2005. The aim of this study was to evaluate the variation effect of physical treatment and operation on the perception of the patients' pain and their emotional state, so there was no psychological intervention along the research such as positive suggestion or cognitive behavioral therapy. In this research the data arised from McGill Pain Questionnaire (MPQ) [28]; and the Hospital Anxiety and Depression Scale (HADS) after translating to Persian language.

The reliability and validity of the questionnaires were assessed respectively [29-30]. In this study the internal consis-

tency of the HADS as measured by the Cronbach's alpha coefficient has been found to be 0.81 for the anxiety subscale and 0.84 for the depression subscale indicating a satisfactory reliability. The data were analyzed by paired T-test to determine the significancy before and after operation. Pearson Correlation Coefficient to find the relations were applied and there is an interaction effect at the time of the before operation assessments.

All new attendees 46 patients; Male: female 25:21 (54%: 46%); Age 41.87 (range 22-77) who were operated in Shahid Bahonar Hospital entered as research sample. Their general practitioners were also informed of their involvement in the study and their language was Persian. There are three diagnostic categories, the most common diagnosis being that of Disc Herniation (n=21, 45/7%) and the second most common being due to Brain Tumor, Neuralgia and Hydrocephalus (n=18, 39/1%). Spinal Canal Stenosis and Spondylolisthesis formed the third most common diagnosis (n=7, 15/2%). These diagnostic categories are more homogeneous rather than heterogeneity in nature in literature review of neurosurgical studies and patients suffering the same condition in their emotional status because it is likely that this will reduce variability which may obscure the effects of independent variables of interest.

## Results

It is hypothesized that the operation will show significant benefits and if operation appears to have any significant effect upon the patients' physical and emotional experience of pain. This section of the results considers differences between the patients before and after operation, at the time of administration and when the patients have the medical treatment by an operation in hospital. The results will provide an answer to whether operation and medical treatment has any beneficial effect on the after treatment time of patients when compared to before or not. These levels of emotional changes might be expected to be a period of treatment rather than the effect on after discharge from hospital or later of long life.

### Emotional State

#### Anxiety

Anxiety shows significant positive correlations with dimensions of MPQ in sensory, affective, miscellaneous, word chosen ( $p < 0.05$ ) and total rating ( $p < 0.01$ ), but depression only shows significant positive correlations with dimensions of affective, sensory and pain total rating ( $p < 0.05$ ) (Table 1). Table 2 shows the groups' mean scores on HADS anxiety. It is evident that patients show a decrease in mean anxiety from the first to second time.

This analysis is much preferable to multiple T-tests and provides the following measures:

a) Main effect of time on anxiety - to assess whether anxiety changes over time regarding to the operation.

The main effect of time was significant, indicating that, overall, anxiety reduced significantly for patients after operation ( $T=9.22$ ,  $df=45$ ,  $p < 0.01$ ).

It revealed a significant effect of time of test, confirming

that after operation showed a reduction in depression scores over time ( $T=8.52$ ,  $df=45$ ,  $p<0.01$ ).

**Depression**

Table 2 shows mean scores on depression for the patients at the two assessment periods. T-test revealed a significant effect of time of test after operation, confirming that the result showed a reduction in depression scores over time ( $T=7.52$ ,  $df=45$ ,  $p<0.01$ ).

As in the case of anxiety scores above, the scores on depression were also considered as a function of the proportion of patients falling within the low to severe categories, and these are shown in Table 2.

**Pain Scores**

Table 2 shows the Patients' mean scores on the McGill Pain Questionnaire as a function of the first and second testing period. As in the case of the scores on the emotional variables above, t-test was applied to the data. The following results were found for the various dimensions of the McGill Pain Questionnaire.

i) Total Pain Scores - There was the main effect of time ( $T=9.88$ ,  $df=45$ ,  $p<0.001$ ) and the interaction of the time before and after operation.

ii) Sensory Pain Scores - As in the case of total scores, only the main effect of time interaction were significant ( $T=10.25$ ,  $df=1.45$ ,  $p<0.01$ ).

iii) Evaluative Pain Scores - It show a marked decline in the emotional nature of their pain experience over time, as confirmed by the significant interaction ( $T=4.44$ ,  $df=1.45$ ,  $p<0.004$ ).

iv) Affective Pain Scores - The study group show a further significant reduction in their affective experience of pain over time as confirmed by the significant interaction ( $T=8.41$ ,  $df=1.45$ ,  $p<0.003$ ).

v) Miscellaneous and Word Count Dimensions - Analysis of these more general assessments of the impact of pain confirm that the result show a marked and significant reduction

in their scores when compared to the before operation ( $T=6.53$ ,  $df=1.45$ ,  $p<0.008$ ).

**Discussion**

The results show that anxiety and depression are often considered as modifiers to sensory stimulations so that both physical and emotional stimuli produce relatively stronger responses in such patients. Anxious patients are known to react more strongly to pain [31] and this is compounded by the fact that they often seem to have lower pain tolerance [32] and to anticipate more pain [33].

More accurate knowledge about the association between anxiety and pain, and also about the means of assessing anxiety in a clinical setting would be of use to the clinician. Unfortunately, research can be hampered by poor definition of the term and the use of assessments of anxiety which fail to distinguish between the emotional disorder and possible physical symptoms. Anxious and phobic patients are well known to cite fear of loss of control as contributing to heightened emotional state [34]. Pain evokes fear. Avoidance of a feared situation is reasonable and often protective in acute pain [35]. If they are given a belief that they have more control of their pain, even if this belief is an illusion, it can often be of benefit to them. It has been reported that anxiety is often inadequately assessed by questionnaires because some intense emotions remain unconscious and the possibility of denial is not addressed [36-37-38]. Patients who deny their feelings typically do not acknowledge feeling apprehensive, but their emotions remain active at an unconscious level. Thus assessments of preoperative anxiety may not always be reliable when they tap only consciously experienced emotions.

The emotional reactions of pain patients and physical symptoms need to be viewed in context. According to Skevington (1993) [39], the type of psychological disorder expressed by those with organic diseases with painful symptoms is arguably different from the qualities of the same disorder found in a psychiatric population. Moreover, "they may

Table 1. Correlations between the HADS and MPQ

MPQ	Pain Sensory	Pain Affective	Pain Evaluative	Pain Miscellaneous	Pain Total Rating	No. of words chosen	Anxiety	Depression
Affective	.443†							
Evaluative	.223	.217						
Miscellaneous	.577†	.500†	.232					
Total Rating	.925†	.670†	.400†	.767†				
No. of words chosen	.583†	.591†	.258	.585†	.830†			
Anxiety	.301*	.316*	.222	.391*	.459†	.350*	Anxiety	
Depression	.311*	.379*	.118	.181	.338*	.209		.592†

Correlations between scores on the Hospital Anxiety and Depression Scale (HADS) and McGill Pain Questionnaire (MPQ) at the time of the before operation.

\* =  $p < 0.05$ ; † =  $p < 0.01$

comprise the largest group of disabled persons of all the psychophysiological disorders, and perhaps of all the psychiatric classifications" [40].

**Table 2. Mean Anxiety and Depression scores and dimensions of MPQ at before and after the operation, respectively.**

McGill Pain Scores	Mean (S. D.)	
	Before Operation	After Operation
Sensory	21.04 (6.70)	9.11 (5.07)
Affective	4.76 (2.51)	1.02 (1.50)
Evaluative	2.54 (1.83)	1.43 (1.13)
Miscellaneous	6.02 (3.36)	2.89 (2.36)
Total Pain Rating	34.52 (11.11)	14.43 (8.92)
Number of Word Chosen	15.37 (4.12)	7.37 (3.79)
HADS Anxiety	12.63 (3.37)	8.43 (2.60)
HADS Depression	10.41 (3.41)	8.57 (2.29)

Mean Anxiety scores (and standard deviations) from the Hospital Anxiety and Depression Scale (HADS) and McGill Pain Questionnaire at the time of the before and after operation.

The emotional reactions are also more complex than may be conveyed by the concepts of 'anxiety' and 'depression' alone. Miller (1990) [41] asserts that "Feelings of hopelessness, helplessness, and despair are common, as are multiple visits to various physicians and clinics. With each new treatment, the patient experiences a resurgence of hope, which is followed by disappointment and eventually increasing resentment and bitterness toward the treating physician". These levels of emotional changes might be expected to be a period of treatment rather than the effect on after discharge from hospital or later of long-life. When the prospect of pain is life-long in nature it is associated with significant psychological problems and imposes severe emotional, physical, economic and sociologic stresses on the patient [42].

At the time when patients completed the post-operative questionnaires, in this study, they have experienced a resurgence of hope; this means that operation has reduced the emotional status. Perhaps if the questionnaires are repeated three months after the surgery, it can be used to evaluate the emerged helplessness and hopelessness. Researchers have concluded that the main problem for such patients is emotional distress rather than physical symptoms. Therefore one implication of this might be that psychological intervention may be more effective than the conventional "medical" treatment administered in the Hospital and clinic environment. The outcomes of this study show that patients have more emotional function, it could be relevant to their cultural and family affection in nature. Culture has an important influence on perception of, and response to, experimental and acute pain. The source of social comparison is home and family, where adults transmit to children the values and attitudes of their cultural or ethnic group [43]. The broader social context of pain, including cultural perceptions and assumptions about the pain experience, is also receiving increased research attention [44]. Pain may be accompanied by many psychological experiences and significant elevations on meas-

ures of psychological distress [45] and it can be associated with distress, "hassles" and stress which relate to the impact of pain upon domestic and social life. It may not be the pain itself which causes the distress but rather the impact upon the person's lifestyle. Thus high ratings of anxiety and stress may be mistakenly ascribed to the pain condition alone. Sternbach [46] reported that greater stress and more hassles are associated with more frequent and more severe pain. This result is consistent with several previous reports [47-48-49] there were no age differences in levels of anxiety and depression. Gagliese L et al (2000) reported that the Patient-controlled analgesia use was not hindered by age differences in beliefs about post-operative pain and opioids. Younger and older patients attained comparable levels of analgesia and were equally satisfied with their pain control [47]. Although it was noted in the literature review that many previous studies have used similar heterogeneous samples, it would have been methodologically sounder to recruit patients from only one diagnostic category because the resulting homogeneous sample would be likely to reduce inter-subject variation in the measures. Given that one of the aims of the research was to determine whether the operation was beneficial to patients, it seems logical to sample from the range of cases typically seen. Analysis confirms that there are no significant differences between the diagnostic categories on these measures. Therefore the sample of study seems to be more homogeneous in nature in this study.

Patients reported significantly lower levels of distress and lower levels of pain at the time after their operation compared to the time before their operation. The questionnaire was administered after the study group had attended the hospital. It is also evident that operation itself has an influence during the treatment because the patients showed reduction in their scores on anxiety, depression, emotional distress and pain from the first to second questionnaire. In summary, the patients in this sample have more emotional status than the population norm. They also report considerably greater degrees of emotional distress when compared to population norms. Their most common source of emotional function is prior to surgical intervention.

The limitation of this study was difficult in recruiting the control group, because there were no interventions designed throughout the study.

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