Association Between Depression and Acute Pain in Adults Attending a Tertiary Care Hospital in Bhubaneswar

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ABSTRACT

Background: Recent burden on health care organization due to acute pain and simultaneous rise in the depression cases have been ringing alarms among the medical professionals.

Aims: This study was taken up with a hypothesis that acute pain and depression are inter-linked and any acute painful condition leads to some behavioural and psycho-somatic effects which needs to be detected at the earliest possible.

Settings and Designs: This relationship was established by designing a cross-sectional study where four most common causes of acute pain (i.e. post-labour, post-caesarean, postoperative, dental conditions) were studied in 70 subjects each and compared with 70 subjects of control group who presented to a tertiary care hospital in Bhubaneswar, without any painful condition or underlying depression.

Materials and Methods: Various pain scales (Visual Analogue Scale- VAS, Verbal Rating Scale – VRS, Box Scale) were used to assess the degree of pain while Montgomery-Åsberg Depression Rating Scale (MADRS) was used to assess the level of depression in these subjects.

Statistical Analysis: Using SPSS version 16 software, the correlation coefficient was determined between the depression levels and acute pain.

Results: It was seen that the geriatric populations were more depressed, while the older adults perceived more pain. The females differed from males in their pain perception; they were more depressed and proved to be more tolerant to painful conditions such as post-partum acute painful conditions. Dental pain was found to be the second most reported painful condition after postoperative acute pain. A statistically significant strong correlation was established between depression and acute pain.

Conclusion: Thus the psychosomatic component of pain needs to be evaluated on a priority basis by health providers.

INTRODUCTION

Pain, per se, is a tremendous burden to the medical and health care system of developing countries such as India. According to a recent survey, the estimated deaths due to "epidemic of pain" each year is approximately 709,000; while untreated deaths due to pain is 661,000 [1]. However, these figures reflect only the physical pain, and psychological effects of pain would show double the estimated deaths. In developed countries, with the advent of pain management clinics, this burden has been greatly reduced. Our country, however, has started taking great strides in curbing this lacuna by setting up pain management awareness among the health professionals. Palliative care has taken over the responsibility of pain prevention and management [2].

Besides the intolerable "episodes" of physical pain, the country needs to focus on the psychosomatic side-effects too. In fact, the psychiatric departments are now over-burdened with cases of mental illness resulting from pain. Deaths due to chronic unbearable pain of cancer are well documented [3,4]. Scanty literature has been documented regarding mental dysfunction and acute pain caused by surgery, dental treatment, labour and childbirth, burns or cuts, and, or fractures [5]. These aspects of pain are often overlooked and finally results in development of a "neurotic triad" comprising hysteria, depression and hypochondriasis [6] finally leading to suicidal tendencies and even death [5].

The scenario changes when a depressed patient presents with pain symptoms [7]. This leads to inaccurate diagnosis in almost 50% of cases [8]. Many times the depression goes undetected in patients. The healthcare providers and the patient themselves are ignorant of the latent presence of depression when it is in milder stages, and even at times, in cases of major depression too. Thus the relationship between the two co-morbidities, i.e. acute pain and depression needs to be well established at an initial state of healthcare diagnosis. Many researchers have labeled them as "depression-pain syndrome" or "depression-pain dyad". Both the symptoms coexist, exacerbate each other, respond to common treatment and even share biological pathways and neurotransmitters [9,10].

Several studies have documented the association between depression and pain and it is noteworthy that, the risk of depression increases as a function of different aspects of worsening pain (e.g., severity, frequency, duration and number of symptoms) [11]. Patients with multiple pain syndromes are 3-5 times more susceptible to depression as compared to patients without any pain [12]. Simultaneously pain symptoms are associated with a 2-fold risk for increasing depression states in patients [13]. Previous studies have shown that as the severity of either condition increases, the association between them becomes stronger [12]. Consistent with the findings in primary care patients, depression is more profound when there are multiple pain complaints [8]. For example, patients with more than two pain complaints are six times more likely to be depressed. Few researchers have documented that more frequent and longer pain duration are associated with depression [14].

Considering the lacunae in the field of acute pain and its relationship with depression, the present study was designed with a primary objective of finding the association between acute pain and depression in different groups of patients (such as –postoperative, post-labour, post-caesarean section, dental surgery/dental pain) and to see whether the association is similar to those without any pain.

Other secondary objectives of the study were –

1. To study the association between acute pain and depression with increasing degrees of depression in all subjects.

2. To study the association between acute pain and depression with increasing levels of pain in all subjects.

3. To determine the cause of acute pain which contributes to major depression levels among the different groups of patients.

4. To study if there is any gender difference to acute pain perception and depression.

5. To study if there is any variation in the relationship between acute pain and depression with varying age-groups.

MATERIALS AND METHODS

An observational cross-sectional study was designed after obtaining permission from the Institutional Ethics Committee. The sample size was estimated to be 350 subjects and the study was conducted during the period August-September 2014. The subjects were chosen from those attending the tertiary care unit- Pradyumna Bal Memorial Hospital, Bhubaneswar, Odisha. Written informed consent was taken from all the subjects volunteering for the study. Five different categories of patients were considered- postoperative (surgical patients undergoing various procedures except cardiac surgery and intracranial neurosurgery) post-labour, post-caesarean section, dental pain (caries, tooth extraction, dental surgery or any dental treatment with or without anaesthesia) and a control group. The control group consisted of subjects with minor illness without any pain such as psychiatric illness, skin disorders, etc. The subjects were considered for the study within 72 hours of surgery or delivery.

The subjects with history of steroids, anti-anxiety, anti-depressants, mood altering drugs and any other drug intake were excluded from the study. Persons receiving psychiatric treatment or who have been diagnosed as cases of depression previously were also excluded from the study. The subjects should not have been given any dose of analgesics prior to the study. The duration of pain was also documented. Measurement of pain was done by the subjects themselves by answering simple questionnaires such as Box scale, Visual Analogue Scale (VAS), Numeric Rating Scale (NRS), Verbal Rating Scale (VRS), Behavioural Rating Scale (BRS) [15]. These scales are freely available for assessment of pain perception. Each subject was guided step wise while filling the questionnaires and the response was cross-evaluated. Depression was estimated using the Montgomery–Åsberg Depression Rating Scale (MADRS) [16]. The subjects were categoried as normal/asymptomatic if MADRS score was 0-6. Similarly, the subjects were classified as mild depression with a score of 7-19, moderate depression with a score of 20-34 and severe depression if score is >34 [17]. All data were statistically analysed using SPSS Software version 16 (Chicago, Inc., IL, USA). Correlation coefficients were determined and a two-tailed p-value <0.05 was considered statistically significant.

OBSERVATIONS AND RESULTS

A total number of 350 subjects were included in the study with 70 subjects in each of the 4 categories of patients (postoperative, post-labour, post-caesarean, dental pain) and control group. All data were expressed as mean ±SD (standard deviation) and tested for normality. The mean characteristics of all the subjects are shown in [Table/Fig-1].

Females felt pain less as compared to males; however, they seemed to be more depressed than males as shown in [Table/Fig-2].

On applying one-way ANOVA test to the different age categories we can report that the geriatric population suffered most from depression as shown in [Table/Fig-3].

Among the four groups of cases, the postoperative subjects were most depressed and perceived more pain as compared to other groups. This can be depicted by [Table/Fig-4] and [Table/Fig-5]. The association between the depression (measured via MADRS score) and the various pain scales are shown in [Table/Fig-6].

The Box scale of pain measurement is considered the simplest and often used method of pain assessment. In this method, most of

	Range	Mean ± SD
Age (in years)	14-90	30.59 ± 13.771
Duration of pain (in hours)	1-72	31.94 ± 19.330
VAS	10-100	47.96 ± 15.968
Box scale	1-10	4.78 ± 1.598
VRS	2-4	3.20 ± 0.529
BRS	2-6	3.63 ± 1.028
MADRS	5-36	18.17 ± 4.823

[Table/Fig-1]: Mean Characteristics of all the subjects

|	Males (n=71)	Females (n=209)	t-value
VAS	54.93 ± 10.539	45.60 ± 16.805	43.918*
Box scale	5.45 ± 1.053	4.55 ± 1.687	43.628*
VRS	3.31 ± 0.575	3.16 ± 0.509	48.462*
BRS	3.93 ± 1.138	3.53 ± 0.971	29.097*
MADRS	18.15 ± 5.025	19.27 ± 4.766	51.127*

[Table/Fig-2]: Difference in gender perception to pain and depression
*p-value <0.0001 (highly statistically significant)

	14-25years (n= 149)	26-45years (n= 90)	46-65years (n=36)	66-90years (n=5)
VAS	43.56 ± 16.11	50.22 ± 14.06	59.17 ± 13.60	58.00 ± 8.36
Box scale	4.32 ± 1.60	5.01 ± 1.60	5.92 ± 1.36	5.80 ± 0.83
VRS	3.10 ± 0.47	3.20 ± 0.56	3.53 ± 1.50	3.60 ± 0.54
BRS	3.44 ± 0.90	3.67 ± 1.02	4.28 ± 25	4.00 ± 1.22
MADRS	17.79 ± 4.03	17.53 ± 4.65	20.53 ± 6.82	24.00 ± 5.09

[Table/Fig-3]: Difference in pain perception and depression across various age groups
*p<0.0001 (highly statistically significant) on applying one-way ANOVA between the groups
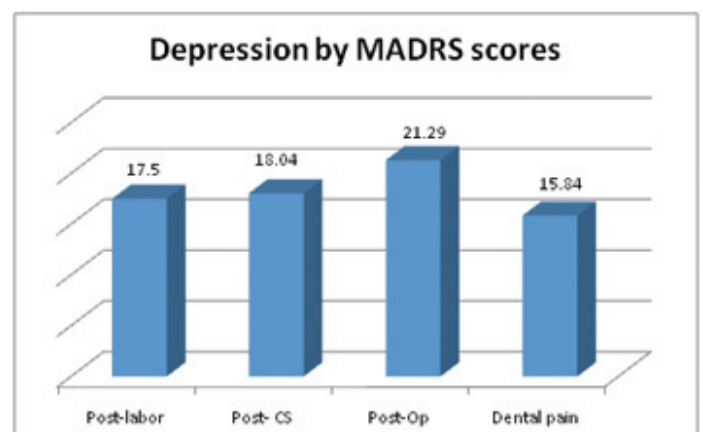
[Table/Fig-4]: Depression compared in the different categories of cases
*p<0.0001 (highly statistically significant) on applying one-way ANOVA between the groups

	Post-labour (n= 70)	Post-CS (n= 70)	Postoperative (n=70)	Dental pain (n=70)
VAS	38.71 ± 1.88	40.71 ± 13.33	61.43 ± 12.65	51.00 ± 10.51
Box scale	3.81 ± 1.55	4.10 ± 1.36	6.14 ± 1.26	5.04 ± 1.04
VRS	2.97 ± 0.48	3.09 ± 0.37	3.70 ± 0.49	3.03 ± 0.45
BRS	3.24 ± 0.85	3.37 ± 0.70	4.63 ± 1.13	3.29 ± 0.64

[Table/Fig-5]: Variation in the pain scales among the different groups of cases
*p<0.0001 (highly statistically significant) on applying one-way ANOVA between the groups

the cases reported a pain scale of 6 (25.4%) followed by scale of 5 (23.6%), scale of 4 (18.2%) and scale of 3 (16.1%). The extremes of the scale were represented by 0.7% of total subjects.

On categorizing the subjects based on MADRS depression scores into mild, moderate and severe depression levels, it was evident that pain was increased with respect to increasing depression as shown in [Table/Fig-7].

Plotting a graph between the duration of pain and the level of depression, it is seen that at about 24 hours and at about 48 hours after start of pain, the depression levels are at a peak (shown in [Table/Fig-8]).

|	Correlation coefficient
MADRS and VAS	r = 0.861*
MADRS and Box Scale	r = 0.852*
MADRS and VRS	r = 0.874*
MADRS and BRS	r = 0.909*
MADRS and duration of pain	r = 0.795*

[Table/Fig-6]: Association between depression and acute pain scores
*p<0.0001 (highly statistically significant)

	Mild depression (n= 183)	Moderate depression (n=94)	Severe depression (n=3)
VAS	44.43 ± 14.43	54.15 ± 16.48	75.0 ± 21.21
Box scale	4.43 ± 1.14	5.37 ± 1.71	7.5 ± 2.12
VRS	3.08 ± 0.49	3.39 ± 0.53	4.0 ± 0.0
BRS	3.37 ± 0.75	4.10 ± 1.27	5.0 ± 1.41

[Table/Fig-7]: Depression categories and acute pain scales
*p<0.0001 (highly statistically significant) on applying one-way ANOVA between the groups
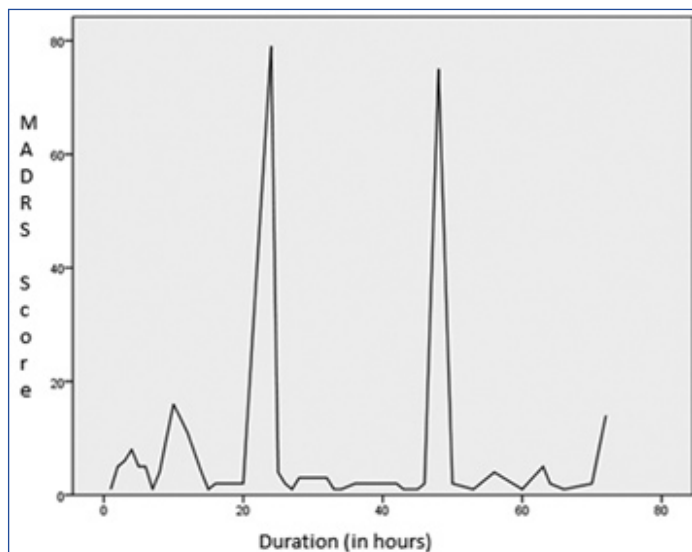
[Table/Fig-8]: MADRS scores plotted against duration of pain (in hours)

DISCUSSION

A total of 280 subjects were recruited for the present cross-sectional study to find the association between acute pain and depression in four different and most common causes of acute pain. Dental pain is a very common cause of acute pain which is at times unbearable. The psychosomatic impact of the various conditions was assessed using an easily comprehensible, self-rating, highly senstive Montgomery–Åsberg Depression Rating Scale (MADRS) which is commonly employed by psychiatrists to measure the severity of depressive episodes in patients with mood disorders. Various scales of acute pain measurements were used, as any single scale might not be an accurate predictor of degree of pain. The subjects were chosen from those attending a tertiary care unit to focus on the upper and middle class socio-economic people. Since depression is more prevalent in the upper strata of socio-economic class [18], this subset of population was included in this study.

Subjects with a wide range of age groups were incorporated in the study so as to see if there are any changes in pain perception and depression levels with increasing age. It was seen that the geriatric population were more depressed than the other age groups [19]. However, the older adult's population (45-60 years) perceived more pain. Poor self-rated health is more often viewed as a concomitant phenomenon of depression rather than an independent risk factor for increased depression. There are several reasons to expect that age plays a role in the relationship between pain and depression. Older people tolerate pain more than the younger population and also it has been hypothesized that with advancing age the "experience of pain" does not change but the "experience of discomfort" becomes normative [19].

The subjects were assessed for depression and acute pain in the first 72 hours of surgery or onset of pain. This was considered pivotal for the study to see the levels of depression during the initial period of pain, without any medicinal management. A control group of 70 subjects without any painful conditions and without any depressive illness were compared with the cases to prove the fact that acute pain and depression are co-morbid states and the onset is also simultaneous. No underlying depression was seen in the control group as expected.

Gender difference to pain perception was quite evident by the fact that females reported less pain than males. It is believed that women may have different pain beliefs and may experience depression as a more socially acceptable reaction to pain than males do [19]. The female population was more in this study due to inclusion of post-labour and post-CS patients. The females have accepted the belief that they have higher rates of pain endurance during child-birth, irrespective of the parity. Thus, these categories of subjects showed much lesser perception of pain as compared to other categories of subjects. But, the degree of depression occurring in females is an alarming issue as many women tend to suppress their depression leading to mortality due to suicides [20]. A contributing factor might be the lack of attention to the mental status of women, especially in Eastern Odisha, where they are more or less neglected.

Acute pain score was highest reported in postoperative patients followed by dental pain, post-CS and post-labour. Onset of pain prior to the surgery, which gets aggravated by anaesthesia and blood loss during the surgery, may be contributing factors for the increased perception of acute pain. This pain is more profound after 24 hours and 48 hours of surgery, after which it shows a gradually decreasing trend. Dental pain which is often ignored by medical practitioners is another common cause of acute pain, but it does not contribute to moderate or severe depression. The patient assumes that dental pain is a very short-term acute pain and would be relieved sooner with medications or attention. This might be a possible explanation. Post-CS acute pain causes more depression than the post-labour pain due to surgical intervention in case of caesarean section.

Acute pain is always known to be associated with some behavioural changes and psychotic effects. Thus the VRS scale has the strongest association with depression scores by MADRS, followed by other pain scales. With increasing pain scale, there is no strong linear relationship with depression, opposite to the fact that with increasing levels of depression, the acute pain perception is also decreased. However, some studies have shown controversial results, stating that pain and depression share a linear relationship with each other [11]. This might be the result of the previous studies considering both acute and chronic pain while our study incorporates only cases of acute pain.

This study is unique as, in India, especially in eastern Odisha region, there has been no documented literature regarding pain and depression co-morbidity states. Moreover, many previous works have been done on chronic pain and its relationship with depression. However, very scanty literature could be collected on

acute pain and its association with depression. Wide range of age groups, different categories of causes of acute pain, usage of more than one form of pain scale adds to the strength of this study.

LIMITATIONS

However, this study has its limitations, one of which is the fact that the subjects might have underlying depression even before the onset of painful morbidity state, and it would have been aggravated by the acute pain condition. A prospective study could be taken up to follow-up the subjects beyond the 72 hours period to assess the pattern of depression with respect to pain management by medication and other non-medical ways. Also, the effect of analgesics on depressive states can be studied in future follow-up studies.

CONCLUSION

To conclude, acute pain and depression co-exists and forms an alarming issue which needs urgent addressable attention by our health care practitioners. Palliative care and pain management clinics need to be established in more numbers and psychosomatic approach to treatment should be incorporated while treating any disease condition presenting with acute pain. Also, the psychosomatic component of pain physiology needs to be studied in further details.

REFERENCES

[1] http://www.treatthepain.org/india.html (Accessed on 20/05/2014).
[2] http://www.newyorker.com/tech/elements/an-epidemic-of-pain-in-india (Accessed on 22/05/2014).
[3] Tang NK, Crane C. Suicidality in chronic pain: a review of the prevalence, risk factors and psychological links. *Psychol Med.* 2006;36(5):575-86.
[4] Cheatle MD. Depression, Chronic Pain, and Suicide by Overdose: On the Edge. *Pain Med.* 2011;12(Suppl 2):S43–48.
[5] Carr DB, Goudas LC. Acute Pain. *The Lancet.* 1999;353(9169):2051-58.
[6] http://en.wikipedia.org/wiki/Pain (Accessed on 20/05/2014)
[7] Bridges KW, Goldberg DP. Somatic presentation of DSM III psychiatric disorders in primary care. *J Psychosom Res.* 1985;29:563-69.
[8] Katon W, Sullivan MD. Depression and chronic medical illness. *J Clin Psychiatry.* 1990;51(suppl-6):3-11.
[9] Gallagher RM, Verma S. Managing pain and comorbid depression: a public health challenge. *Semin Clin Neuropsychiatry.* 1999;4:203-20.
[10] Biller P, Abbott FV. Putative mechanisms of actions of antidepressant drugs in affective and anxiety disorders and pain. *J Psychiatry Neurosci.* 2001;26:37-43.
[11] Bair JM, Robinson RL, Katon W, Kroenke K. Depression and pain co-morbidity. *Arch Intern Med.* 2003;163:2433-45.
[12] Von Koroff M, Dworkin SF, Le Resche L, Kruger A. An epidemiologic comparision of pain complaints. *Pain.* 1988;32(2):173-83.
[13] Kroenke K, Price RK. Symptoms in the community: prevalence, classification and psychiatric comorbidity. *Arch Intern Med.* 1993;153:2474-80.
[14] Wang SL, Llu HC, Fhu JL, Llu CY, Wang PN, Lu SR. Comorbidities of headache and depression in the elderly. *Pain.* 1999;82(3):239-43.
[15] Jensen MP, Karoly P. Self-report scales and procedures for assessing pain in adults. In: Turk DC, Melzack R, eds. Handbook of pain assessment. New York: Guilford Press, 1992:135-51.
[16] Herrmann N, Black SE, Lawrence J, Szekely C, Szalai JP. The Sunnybrook Stroke Study: A Prospective Study of Depressive Symptoms and Functional Outcome. *Stroke.* 1998;29(3):618–24.
[17] Williams JBW, Kobak KA. Development and reliability of a structured interview guide for the Montgomery-Asberg Depression Rating Scale (SIGMA). *The British Journal of Psychiatry.* 2008;192(1):52–58.
[18] Muntaner C, Eaton WW, Miech R, O'Campo P. Socioeconomic position and major mental disorders. *Epidemiol Rev.* 2004;26(1):53–62.
[19] Geerlings SW, Twisk JW, Beekman AT, Deeg DJ, vanTilburg W. Longitudinal relationship between pain and depression in older adults: sex, age and physical disability. *Soc Psychiatry Psychiatr Epidemiol.* 2002;37:23-30.
[20] Piccinelli M, Wilkinson G. Gender differences in depression. *Br J Psychiatr.* 2000;177:486–92.

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