ABSTRACT

Introduction: The effect of duration, severity, response to treatment, family and social interactions with chronic pain and depression have been studied extensively. But, none of the studies have ever reported any association of the character of chronic pain particularly neuropathic pain with depression. The aim of this study is to find out the association of neuropathic pain with depression. We analyzed the possible association of neuropathic pain with depression.

Materials and methods: A prospective analysis of 250 patients, aged 18 to 65 years of either sex suffering from chronic pain for more than 3 months' duration with an average pain score of 4/10 or more on numerical rating scale (NRS) and moderate to severe depression diagnosed using PHQ-9 scale, were included in the study. Neuropathic character of pain was diagnosed using painDETECT tool. We analyzed the possible association of neuropathic pain with depression.

Results: In 3.2% of patients were found to be suffering from neuropathic pain, 19.6% patients were non-neuropathic or nociceptive pain and 77.2% patients were suffering from mixed type of pain where neuropathic pain may be present. The average depression score on PHQ-9 scale was 14.58 ± 3.72. In 58.4% of patients the depression was moderate, 30.4% of patients the depression was moderately severe and 11.2 % of patients were suffering from severe depression. On analysis of data, we have found that there is no statistically significant association between neuropathic pain and depression (p = 0.8).

Conclusion: We did not find any statistically significant correlation between neuropathic pain and depression.

Keywords: Chronic pain, Depression, Neuropathic pain, PainDETECT tool, PHQ-9 scale.

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INTRODUCTION

Pain is defined as unpleasant sensory or emotional experience, i.e., associated with actual or potential tissue damage or described in terms of such damage.1 The definition itself emphasises on the emotional aspects associated with pain. Pain has affective components, such as anxiety, depression, sadness, mood disorder, disturbed sleep, irritability, decreased concentration, loss of appetite, etc.2,3

In a survey conducted by World Health Organization (WHO), the prevalence of chronic pain in India in the primary care patients was estimated to be 19%.4 However, its prevalence in the general population have been reported as 20–40%.5,6 The most common association of pain is with depression which has been extensively studied.7,15

Studies have also being conducted utilizing the neuroimaging in order to find out the complexity of pain and depression network.16–20 The prevalence of depression in patients with chronic pain is reported to be between 18 and 85% depending on the conducted studies.22–26 Longitudinal studies have also reported that depression is a risk factor for the development of chronic pain.15 The prevalence of depression in primary care set up in India is estimated to be 21–40%.21 The prevalence of chronic pain in patients treated for depression is reported to be between 51.8 and 59.1%.8,10 A longitudinal cohort study with a 1 year follow-up of the patient’s baseline pain, severity and duration has reported a significant association with depression.15

Fishbain et al.22 have reported a significant correlation between degree of depression and severity of pain. Gerrits et al.23 have also found that severity, multiple locations of pain and its duration are the risk factors for the development of depression. Various studies have shown that depression adversely affects the response of treatment in chronic pain patients.24,26 Chronic pain and depression when co-exist together effects functional abilities, personal, social as well as professional life.26

With that background we can say that various studies22–26 have been conducted to find out the effect of duration, severity, response to treatment, and family and social interactions of chronic pain and depression. But, none of the studies have tried to correlate the character of chronic pain with depression or have reported a common occurrence of depression in patients with neuropathic pain.
So, we laid down the hypothesis that neuropathic type of pain (diagnosed using painDETECT tool) is associated more with depression [diagnosed using the patient health questionnaire (PHQ-9) scale].

**MATERIALS AND METHODS**

Prospective analyses of 250 patients with chronic pain were included in this study. We defined chronic pain as pain persisting for more than 3 months in an individual.27

We have included the patients with the following criteria:

**Inclusion Criteria**

- Aged 18–65 years of either sex
- Duration of pain ≥ 3 months of musculoskeletal origin
- Pain score on numerical rating scale (NRS) ≥ 4 (details of NRS scale is given below)
- Depression score of >9 diagnosed using PHQ-9 scale (details of PHQ-9 scale is given below).

**Exclusion Criteria**

- Patients is on any antidepressant drugs
- Patients with cancer pain
- Diabetes
- Cardiovascular diseases
- Other psychological diseases.

The character of pain of these patients was diagnosed into nociceptive, mixed and neuropathic using painDETECT tool. It is a self-report questionnaire which consist of seven sensory descriptors items and two items related to the spatial 1 (radiation) and temporal characteristic of patient individual pain pattern. Its sensitivity is 85% and specificity is 80% respectively. Sensory descriptors are scored on a 0 (no symptom) to 5 (strongest symptom) scale. Radiation is scored as present “+2” or absent “0”. Temporal characteristics are scored as persistent pain with slight fluctuations “0”, persistent pain with pain attacks “–1”, pain attacks without pain between them “+1”, and pain attacks with pain between them “+1”. We have to add up the total score. If the total score is less than 12, neuropathic component is unlikely. In between 13 and 18 neuropathic component can be present. If score is greater than 18, neuropathic component is likely.28

**NRS scale:** Patient is asked to indicate the current intensity of his pain on a scale which has “0” at one end which corresponds to “no pain” and “10” at the other end which corresponds to “worst pain imaginable”. A score of 1–3 indicates mild pain, 4–6 indicates moderate pain and 7–9 indicates severe pain.29

**PHQ-9 scale:** It consists of nine questions and they have their answers in the respective columns as “not at all” which corresponds to 0, “several days” which corresponds to 1 “more than half the days” which corresponds to 2 and, “nearly every day” which corresponds to 3. We need to add together column scores to get a total score. The interpretation of total score and severity of depression is as follows: 0–4 none, 5–9 mild, 10–14 moderate, 15–19 moderately severe, 20–27 severe.30

Data were collected in the MS excel sheet. Medcalc ® v12.5 and IBM Statistical Packages for Social Sciences (SPSS) version 22 were used for statistical analysis. Kruskal-Wallis test (for non-parametric) and univariate analysis of variance (ANOVA) (for parametric) test were used for analyzing difference between groups appropriately. Results were presented as mean and percentage. p < 0.05 is considered as statistically significant.

**RESULTS**

A total of 250 patients, comprising of 162 (64.8%) female and 88 (34.2%) male were there in the study group who were suffering from chronic pain and depression. The mean age group was 45.49 ± 11.44 years with a minimum of 18 years and maximum of 65 years. The mean duration of chronic pain was 4.72 ± 4.98 years with a maximum duration of 25 years. Table 1 represented the relationship of duration of chronic pain with depression. In our study, patients with a duration of chronic pain for 12 to 60 months were maximally depressed (Table 1 and Graph 1).

Average pain score in numeric rating scale ranged from a maximum of 10 and minimum of 4, with the mean score of 7.272 ± 1.56 (Table 2 and Graph 2). In our study,
Table 3: Character of pain with severity of depression

<table>
<thead>
<tr>
<th>Pain</th>
<th>Moderate depression</th>
<th>Moderately severe</th>
<th>Severe depression</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-neuropathic or nociceptive pain</td>
<td>27 (10.8%)</td>
<td>16 (6.4%)</td>
<td>6 (2.4%)</td>
<td>49 (19.6%)</td>
</tr>
<tr>
<td>Neuropathic pain</td>
<td>5 (2%)</td>
<td>1 (0.4%)</td>
<td>2 (0.8%)</td>
<td>8 (3.2%)</td>
</tr>
<tr>
<td>Mixed or possibility of neuropathic pain</td>
<td>114 (45.6%)</td>
<td>59 (23.6%)</td>
<td>20 (8%)</td>
<td>193 (77.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>146 (58.4%)</td>
<td>76 (30.4%)</td>
<td>28 (11.2%)</td>
<td>250 (100%)</td>
</tr>
</tbody>
</table>

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Graph 1: Percentage distribution of depression severity with increasing duration of pain

Graph 2: Comparison of the NRS scores between three groups (M, MS, S) based on depression severity

Graph 3: Distribution of depression severity among the three different pain groups

the relation between severity of pain and depression were statistically not significant. p-value was 0.939.

Total 3.2% of patients were found to be suffering from neuropathic pain, 19.6% patients were non-neuropathic or nociceptive pain and 77.2% patients were suffering from mixed type of pain where neuropathic pain may be present. The average depression score on PHQ-9 scale was 14.58 ± 3.72. In 58.4% of patients the depression was moderate, 30.4% of patients the depression was moderately severe and 11.2% of patients were suffering from severe depression (Table 3 and Graph 3).

On comparing the severity of depression and character of pain by using Kruskal-Wallis test, we have found out that there is no difference in severity of depression between the different pain groups, p value was statistically insignificant (p = 0.863).

DISCUSSION

Association of chronic pain and depression exist together. Studies have shown that pain results in the activation...
of primary and secondary somatosensory cortex which are responsible for the sensory-discriminative aspects of pain. On the other hand, activation of anterior cingulate cortex, prefrontal cortex, insular cortex, thalamus, amygdale, and nucleus accumbens results in the affective component of pain.

Studies\textsuperscript{31,32} have shown the activation of the same regions and circuits in depression also which makes them having an association with each other.

Recently, imagining studies have shown that the default mode network which consists of a set of regions in brain which are active at rest and deactivated when doing a task are altered in chronic pain as well as in depressed individuals which again sets an example for their association at molecular level\textsuperscript{33,34}.

Studies\textsuperscript{3,13} have been conducted in order to find out the prevalence of depression in chronic pain patients. Biar et al\textsuperscript{13} reported the prevalence of depression to be 1.5–100% where data were collected from pain clinic, dental clinic, surgical, orthopedic clinic, gynecologic clinic, primary care center, and surgical patients. Another online survey conducted by Chaturvedi et al\textsuperscript{3} reported that 50% of the psychiatrist who were involved in the study found the prevalence of depression in chronic pain patients to be more than 50–41.23% of the psychiatrist found it to be between 25 and 50%.

Various studies\textsuperscript{13,14} have demonstrated the chronic pain is a risk factor for the development of depression. Hilderink et al\textsuperscript{15} have reported a statistical significant correlation of severity and chronicity of pain with the onset of depression. There is a strong correlation of chronic pain with depression and \textit{vice versa}.\textsuperscript{35}

In our study, the prevalence was 100% as we have taken those patients whom we have diagnosed to be depressed on PHQ-9 scale. Whether pain was the risk factor or other social or psychological factors were responsible for it we did not try to find out that as that was beyond the scope of our study. In our study, the mixed type of pain which has got both neuropathic and nociceptive component was reported maximum by the patients according to the filled painDETECT pain questionnaire. And maximum number of patients were moderately depressed in their first visit to us according to the diagnostic algorithms given by PHQ-9 scale. However, there was no statistical significant correlation with the type of pain with the depression severity as assessed by PHQ-9 scale ($p = 0.86$).

Studies\textsuperscript{36-39} have also reported a higher prevalence of depression in women patients. In our study, we have also found out that a higher percentage of female (64%) were depressed at the time they visited us with complains of chronic pain. It is not only the gender but various social and biological factors also play an important role in predisposing the females to depression.\textsuperscript{40}

Studies conducted by Rosemann et al\textsuperscript{41} and Muñoz et al\textsuperscript{42} have reported that the severity of depression increases with the severity in the perception of pain. However, our study did not find any correlation between the two as the $p$-value came out to be 0.826.

As Doan et al\textsuperscript{43} have stated that long-time plastic changes are seen in CNS which are associated with depression and pain. And there is also emergence of various circuits and mechanism that are the reasons behind this neuroplasticity. And have been validated by some successful current therapeutic approaches as well. So, duration of pain also plays an important role in the development of depression. But, we have not tried to find out the association between the them.

**CONCLUSION**

The conclusion of our study is that there is no statistically significant correlation between neuropathic pain and depression. Thus, the chances of the presence of depression is same in all types of chronic pain whether it is nociceptive, mixed or neuropathic. There is no statistical significance between severity of pain and depression. Females were found to be more depressed than males. However, we suggest further studies in this regard with a large sample size and different inclusion and exclusion criterion.

**REFERENCES**

1. Available at: http://www.iasp-pain.org/Taxonomy#Pain (access: 08.03.2016).


