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## Significance of sub grouping patients with chronic low back pain in management decisions: A prospective study

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### Abstract

**Background:** The Quebec Task Force classification (QTF) was originally designed to help in making a clinical decision and to aid in determining the prognosis. However, the predictive validity and prognostic significance of the classification was debated.

We conducted the study to determine the discriminative and prognostic significance of the modified Quebec Task Force classification in chronic low back pain patients

**Materials & Methods:** 183 consecutive chronic low back pain (>7 weeks of continuous pain) patients in the age groups of 18-65 years who presented to a tertiary care centre in South India and followed up for a minimum of 6 months were included in the study. Patients were assigned to one of the four QTF categories after a detailed history and examination. Pain severity and functional disability were assessed using LBPRS and RMDQ respectively. The patients were then put on the common specific rehabilitation protocol and analgesics, and followed up every six weeks to look for compliance with the treatment. The scores (LBPRS, RMDQ) were noted again at 3 and 6 months. The comparison of scores was done among the 4 QTF categories at the time of presentation, at 3 months and at 6 months

**Result:** There were no significant differences in the distribution of age, sex, occupation or educational status among different QTF categories. Non-parametric tests using Wilcoxon Signed Rank test showed significant improvement in LBPRS and RMDQ scores with time in each category (p value <0.001). On LBPRS scale, QTF 1 improved the most from baseline after 6 months (42.3%). QTF 4 improved more (24.6%) compared to QTF 2 (21.58%) and QTF 3 (19.87%). On RMDQ scale, Category 1 and 4 improved more (20.35% and 20.82% respectively) compared to category 2 and 3 (11.81% and 9.1% respectively).

**Conclusion:** All the four QTF categories showed a significant improvement of pain and activity limitation from the baseline at the end of 6 months with the physiotherapy rehabilitation. However, patients with nerve root signs treated non-surgically had a better outcome compared to those with radiating pain with no nerve root involvement. Patients with radiation below the knee and negative nerve root signs had the worst outcome in terms of pain and activity limitation at the end of six months. It validates the QTF classification as a prognostic label in patients treated with physiotherapy.

**Keywords:** Quebec task force (QTF) classification, chronic low back pain, prognosis

### 1. Introduction

Low back pain (LBP) despite having a high prevalence, remains poorly understood and inadequately treated. It is a major cause of disability and an important driver of health care costs all over the world. It is already well established that patients with radiating pain to the leg have a poorer prognosis than patients with LBP alone [3]. This is reflected in the number of different management guidelines for LBP, which differentiate non-specific LBP, nerve root pain and serious spinal pathology. However, the current guidelines suggest that patients with radiating leg pain should be managed in the same way as those with non-specific LBP. The Quebec Task Force (QTF) report in 1987 suggested distinguishing between pain referral

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above, below the knee and those with nerve root pain [4]. Other studies [5, 6] have also shown that patients with positive neurological signs have more symptoms, higher psychological distress and more health care utilization than those without neurological signs/symptoms. Quebec task force classification system has received the widest review among various classification systems that could guide clinical management decisions or predict pain and disability, but it has some limitations. The predictive validity of the classification is debated. Classifying patients as described by the Quebec Task Force has shown associated differences on a number of clinical characteristics that display an increasing severity from patients with local low back pain, across the categories of leg pain above the knee and below the knee to patients with neurological signs [5]. These subgroups have also been reported to differ in outcomes of pain, activity limitation [7] and work loss [8]. The results of the outcome, however, are conflicting. Atlas *et al.* [7] stated that non-surgically treated patients with nerve root compression had greater improvement than those with pain symptoms alone after adjustment for baseline variables. O'hearn *et al.* in 1997, however, stated that patients with lower extremity pain had poorer outcomes after physical therapy treatments [9]. This accords with studies by Andersson *et al.* [10], Van der Weide *et al.* [11], Cherkin *et al.* [12], Loisel *et al.* [8], Nyiendo *et al.* [13] and Hill *et al.* [14]. Hill *et al.* stated that baseline factors accounted for differences between subgroups which is in contrast to the findings of Nyiendo *et al.* Kongsted *et al.* [15] in 2013 reported that patients with LBP + neurological signs had the most severe limitation at all time-points but improved the most. Overall, a number of conflicting studies have been reported in a quest to provide proper management of LBP patients by dividing them into subgroups. This study has been taken up to study the Modified Quebec Task Force classification of low back pain and its discriminative validity. It attempts to predict the changes in pain and disability on follow-up in different QTF categories. This study also tries to assess the efficacy of the common low back pain rehabilitation protocol in various subgroups of Quebec Task Force classification. To the best of my knowledge, such a study had not been done in a tertiary care centre in a rural setting in South India.

## 2. Materials and Methods

The present study was conducted in the department of Orthopaedic surgery in JIPMER, a tertiary care centre in south India between October 2013 and June 2015. The patients who were present to the outpatient department with complaints of low back pain and satisfying the inclusion and exclusion criteria were included in the study after taking informed consent.

### 2.1 Inclusion criteria

Age group: 18 to 65 years Chronic low back pain patients (>7 weeks of continuous pain) Patients without neurological deficits/with mild static neurological deficits

### 2.2 Exclusion criteria

Pregnancy Previous spinal surgeries Progressive/severe neurological deficits No informed consent Compliance cannot be assured Surgically curable causes of low back pain and

patient are willing for surgery Abnormal x ray findings (other than non-specific degenerative changes) or ESR >20 mm/hr The severity of low back pain was measured using the pain domain of the Low Back Pain Rating Scale (LBPRS). Disability because of low back pain was calculated using the Roland Morris Disability Questionnaire (RMDQ). After completing the history and examination, patients were advised plain x rays (anteroposterior and lateral) of the lumbar spine and blood was collected for calculating the erythrocyte sedimentation rate. If abnormalities in x rays (other than degenerative changes on lumbar imaging which are considered non-specific as they correlate poorly with symptoms) or erythrocyte sedimentation rate (>20 mm/hour) were detected, patients were excluded from the study and investigated for specific causes of low back pain.

Patients were then placed into one of the four QTF categories as follows

### MODIFIED QTF CLASSIFICATION:

Category 1: Local LBP only

Category 2: LBP + pain above knee

Category 3: LBP + pain below knee

Category 4: LBP with signs of nerve root involvement (LBP + NRI)

They were put on the common rehabilitation protocol. The patients were advised to follow every 6 weeks to check for the progression of symptoms clinically and for the compliance with the rehabilitation protocol. The patients were advised to report earlier in the case of worsening of neurological deficits. The compliance with the rehabilitation protocol was assessed by asking the patient to demonstrate the exercises in front of the investigator and enquiring the attendants about the patient's compliance separately. The patients were evaluated at 3 months and at 6 months. Patients whose pain symptoms varied at a later presentation (change category according to Quebec Task Force classification) were included in the category at the time of his first presentation at the time of analysis.

## 3. Results

The present study was a prospective study conducted in JIPMER, a tertiary care centre in south India from October 2013 to June 2015 with a follow-up period of 6 months.

209 consecutive and consenting patients presenting with chronic low back pain to the department of Orthopaedics were recruited after satisfying the inclusion and exclusion criteria, out of which 183 patients who were followed up for a minimum of 3 months were included for analysis. Among them, 172 patients (82%) were followed up for 6 months. None of the baseline characteristics (age, sex, educational status and occupation) measured had shown a significant difference in the distribution among various QTF categories.

The comparison of LBPRS scores is done adjusting the score of QTF 1 category to fit comparison with other categories. The mean LBPRS score at the time of presentation was 30.05 +/- 9.19 in category 1, 34.09 +/- 6.84 in category 2, 37.33 +/- 7.9 in category 3, and 48.36 +/- 7.36 in category 4. There was an increasing severity of pain from category 1 to category 4 as measured by LBPRS scores. At any point in time, QTF 4 category had the highest severity of pain.

**Table 1:** LBPRS scores in varrious QTF categories at presentation, 3 months and 6 months

LBPRS	QTF Cat			
	Cat I	Cat II	Cat III	Cat IV
Presentation	30.05±9.2	34.09±6.84	37.33±7.90	48.36±7.37
3 months	21.56±8.6	29.23±6.70	33.31±10.22	41.38±8.74
6 months	17.32±8.07	26.73±7.47	29.91±9.75	36.47±10.2
Change (% Improvement from baseline)				
3 months	8.4(28.3)	4.9(14.25)	4(10.76)	7(14.47)
6 months	12.7(42.3)	7.4(21.58)	7.4(19.87)	11.9(24.6)
P value from baseline				
3 months	<0.001**	<0.001**	<0.001**	<0.001**
6 months	<0.001**	<0.001**	<0.001**	<0.001**

The differences in LBPRS scores among the QTF categories at all points of time (at presentation, 3 months and 6 months) were statistically significant (p-value <0.001).

Non-parametric tests using Wilcoxon Signed Rank test showed significant improvement in LBPRS scores with time in each category of QTF classification with P values <0.001.

QTF category 1 patients improved the most after 6 months (42.3% improvement from baseline) followed by QTF category 4 patients who improved 24.6% from the baseline. QTF 3 patients improved the least with 19.87% improvement from baseline and QTF 2 patients improved 21.58% from the baseline. These differences in improvement from baseline were statistically significant with p-value <0.001. These values

were calculated using ANOVA test for calculation of differences between groups and student t-test for calculation of differences within the groups.

Patients in category 4 had the most severe functional limitation on RMDQ with a mean of 16.57±/3.13 at the time of presentation. The next more severe limitation was in patients with radiating pain below knee with a mean of 14.5±/3.68. category 2 patients had a mean of 13.3±/4 and category 1 patients had a mean of 11.36±/3.11.

Category 4 had the highest functional limitation as measured by RMDQ scores at the time of presentation and at 3 months. At 6 months, however, category 3 and 4 had high activity limitation compared to the other two groups.

**Table 2:** RMDQ scores in various QTF categories at presentation, 3 months and 6 months

RMDQ	QTF Category			
	Cat I	Cat II	Cat III	Cat IV
Presentation	11.36±3.11	13.30±4.00	14.50±3.68	16.57±3.13
3 months	10.31±3.21	12.44±3.88	13.27±4.20	15.11±3.58
6 months	8.21±4.35	11.73±4.25	13.18±4.97	13.12±3.99
Change (% Improvement baseline )				
3 months	1.05(9.24%)	0.86(6.46%)	1.23(8.48%)	1.46(8.81%)
6 months	3.15(20.35%)	1.57(11.81%)	1.32(9.10%)	3.45(20.82%)
P value from baseline				
3 months	0.006**	<0.001**	0.007**	0.010**
6 months	<0.001**	<0.001**	<0.001**	<0.001**

At 6 months follow-up, Category 4 patients improved the most with 20.82% improvement from a baseline mean score followed by category 1 patients with 20.35% improvement from baseline. Category 2 and 3 patients had less improvement compared to other categories. Category 3 patients were the least improved among the 4 categories with 9.1% improvement from baseline followed by category 2 patients with 11.81% improvement. Category 3 had no significant improvement in the functional limitation on RMDQ after 6 months. Other 3 categories had significant improvement in functional limitation after 6 months with p-value <0.001. Category 1 was least affected by activity limitation oth at baseline ans at the end of 6 months. The comparison of RMDQ scores between the groups was done using ANOVA test, and comparison of scores within the group was done using the Student t test.

**4. Discussion**

We found that all the subgroups of patients showed significant improvement in symptoms at the end of 3 and 6 months with the physical rehabilitation. Patients in category 4 scored more in terms of pain severity than category 3 which in turn scored more than 2 and category 1 had the least score at the end of 6 months. However, in terms of percentage improvement from baseline, QTF category 1 patients improved the most after 6

months (34.28% improvement from baseline). QTF category 4 patients improved 24.6% from the baseline which was more when compared to the improvement in QTF categories 2 and 3. QTF 3 patients improved the least with 16.98% improvement from baseline and QTF 3 patients improved 19.87% from the baseline. Significant differences were found in the QTF categories irrespective of age, sex and educational status. Di Fabio *et al.* in his non-randomised study reported outcomes post physiotherapy intervention where patients with LBP and leg pain improved but still scored higher on LBP disability at 1 month and at discharge compared to patients with LBP alone. Nyiendo *et al.* presented pain and disability outcomes after interventions and reported that patients treated by chiropractors and physicians improved overall with those of LBP and leg pain below the knee improving less than patients with LBP alone or with leg pain to the knee.

We found increasing degree of activity limitation at baseline from category 1 to category 4. Hill *et al.* and Ben Debba *et al.* found that patients with LBP with radiation below the knee in the secondary care setting tended to be more severely affected than those with pain with radiation above the knee. Alice Kongsted *et al.* stated that patients with pain below knee revealed higher leg pain intensity and more activity limitation but little differences in other parameters. Atlas *et al.* assessed the discriminative validity of the QTF categories in a chronic

population and concluded that baseline functional status assessed by back-specific Roland scale or the generic SF-36 was not strongly associated with QTF category. However, he used 6 categories of QTF classification and found a severe profile for patients with sciatica than those with spinal stenosis. Significant differences in baseline activity limitation using the RMDQ was found across the 4 subgroups by Alice Kongsted *et al.* with category 4 having the most severe profile. We found that the QTF category 1 had the least activity limitation at any time point. Pairwise comparisons using independent t-test showed that there was no significant difference (2 tailed) between category 2 and 3 at baseline whereas significant differences were observed between category 1 and 2 and between category 3 and 4. This is similar to the findings of Alice Kongsted *et al.* In terms of outcomes, we found improvement in the functional status in all categories of QTF classification by the physical rehabilitation protocol. At 3 months follow-up, in terms of percentage improvement, we found that category 1 had the most improvement followed by category 4. However, at 6 months follow-up, we found that QTF category 4 patients improved the most among all QTF categories followed by category 1. Category 2 and 3 had the least improvement in terms of percentage improvement from baseline. Nyiendo *et al.* and Ben Debba *et al.* reported that patients with LBP alone (category 1) and LBP with radiating leg pain to thigh (category 2) were relatively similar in terms of outcomes, whereas Selim *et al.* [18] reported similar outcomes in measures of pain and functional disability for patients with leg pain radiating to the thigh (category 2) and below the knee (category 3). We did not find significant differences in the RMDQ scores between category 2 and 3 at baseline. This is similar to the findings of Kongsted *et al.* who found in his study that category 2 and 3 patients did not differ significantly in terms of activity limitation at any time point. Category 4 patients improved more on RMDQ scores (activity limitation) measured as percentage improvement from baseline compared to the other groups. Category 1 patients were the least affected of all the groups in terms of mean RMDQ scores at any time point but showed significant improvement with physical rehabilitation in 6 months compared to category 2 and 3. This finding has been observed in previous studies by Atlas *et al.* who first reported the greater improvement in functional limitation of patients managed non-surgically as the QTC category increased from 2 to 4. Loisel *et al.* found that QTF categories 3 and 4 presented a worse prognosis than QTF 1 and 2. They had lower functional status and higher pain level at the one-year follow-up assessment. However, Loisel *et al.* combined category 1 and 2, and category 3 and 4, which might account for the differences. Alice Kongsted *et al.* also found larger improvement in category 4 patients compared to those in other categories.

## 5. Summary and Conclusions

### 5.1 Summary

Our study was conducted in a tertiary care centre in South India and attempted to assess the pain, disability and global perceived effect in chronic low back pain patients belonging to various subgroups of the modified QTF classification. We assessed the ability of the modified QTF classification to distinguish among various subgroups of patients. We followed them with a common rehabilitation protocol and investigated if the sub-grouping of patients using the modified QTF classification had any prognostic implications. 183 patients, who followed up for a minimum of 3 months were included in the study and were assigned one of the four QTF categories

(LBP alone in category 1, LBP with radiation above knee in category 2, LBP with radiation below knee in category 3, LBP with radiation below knee + nerve root signs in category 4) based on the symptoms and signs at presentation. There were no significant differences in the baseline characteristics like age distribution, gender, educational status and occupational status in the four categories of the QTF classification. Significant differences were observed in the assessment of pain severity using the pain component of LBPRS in the four QTF categories. Category 1 had the least severe and category 4 had the most severe pain intensity at all points of time. Significant differences were also noted in the pain intensity between category 2 and category 3 with category 3 more severely affected. Assessment of activity limitation using RMDQ showed that category 4 patients had the most severe functional limitation at baseline evaluation. Category 1 had the least severe activity limitation based on the mean RMDQ scores. However, no significant difference was found between category 1 and 2 at baseline evaluation. Similarly, there was no significant difference in the activity limitation between category 2 and 3. Comparing the issue of prognosis at 6 months follow-up, category 1 had improved the most on pain severity scale using LBPRS followed by category 4. Category 2 and 3 had less improvement after 6 months on LBPRS scores with category 3 having the least improvement. Category 1 and 4 had more improvement in the functional limitation using RMDQ compared to category 2 and 3. Category 3 had the least improvement in mean RMDQ scores from baseline at 6 months follow-up. Category 1 had the greatest percentage improvement in the mean analgesic score from baseline followed by category 4. Category 2 and 3 had lesser improvement compared to category 1 and 4.

There were limitations to our study. The data was essentially a tertiary hospital based data. It may not represent the extent of its application to the community and other level hospital care systems as the population may not be representative. It may be possible that patients with LBP alone are presented much later than patients with LBP with nerve root signs. Loss of follow up of patients and unequal distribution of the study population into the four categories might have influenced the outcome.

### 5.2 Conclusions

The modified QTF classification can be used for differentiating patients on the basis of pain severity or functional disability at the time of initial evaluation with increasing severity of pain and functional limitation from category 1 to category 4.

With regard to prognosis, all the four QTF categories showed a significant improvement of pain and activity limitation from the baseline at the end of 6 months with the rehabilitation with physiotherapy. However, patients with nerve root signs treated non-surgically had a better outcome compared to those with radiating pain with no nerve root involvement. Patients with radiation below the knee and negative nerve root signs had the worst outcome in terms of pain and activity limitation at the end of six months.

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