

# PERFORMANCE BASED ASSESSMENT AND ITS ASSOCIATION WITH PAIN AND DISABILITY IN PATIENTS WITH CHRONIC LOW BACK PAIN

## Abstract

**Abstract Background:** Since 1990, the global burden of disability associated with low back pain is increasing continuously in all the age groups. The disability rate was highest in the age 50-54 in 2019. Working age group (20-65 years) people had the highest burden of disability about 70%. The prevalence and people living with LBP have been increasing continuously until the age of 80-89 years the greatest number of people with LBP globally are currently in the 50-54 year age group. Global Burden of Disease studies have defined LBP as “pain in the posterior aspect of the body from the lower margin of the twelve ribs to the lower gluteal folds with or without pain referred into one of the lower limbs that last for at least one day. Persistence of pain/symptoms for more than 3 months is defined as chronic. Appropriate tools for measuring mobility and activities of daily living was recently characterized as a priority for research by an international task force on back pain. Timed tests of activities such as walking, sit-to-stand task, and repeated trunk flexion have been examined in patients with back pain and shown to have what we consider acceptable reliability, and to be sensitive to change over time. Decreased mobility of the trunk often is considered a Manifestation of low back pain includes decreased mobility of trunk and limitations of activities like, bending, twisting, stooping, crouching, lifting, dressing, picking up objects from floor. Research states that performance based tests used in patients with low back pain is used in determining functioning and activity limitations. The most common outcome measure used in chronic low back pain is ODI, a self-reported questionnaire.

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## **Aim and Objectives**

- To determine the level of physical activity in Low back pain patient.
- To determine the association of physical performance assessment with pain and disability in patient with chronic low back pain.

**Methodology:** The scales were handed over to the patients suffering from chronic Low back pain consisting of all the 3 questionnaires. Low back Disability level was assessed by ODI – Oswestry Disability Scale, Back Performance was assessed by PSQI – Back Performance scale, and Pain was measured by NPRS – Numerical Pain Rating Scale. The consent was taken from the patients and the details of the study were also explained to them initially. All the data were analysed. ( $p < 0.05$ ).

**Outcome Measures:** Back Performance assessment, Pain, Low back disability Level.

**Results:** A total of 100 data were collected and were analyzed. It was seen that there is a negative correlation of back performance with pain and disability. With increase in pain and disability there is reduction in performance. Also there is altered perception in individuals with chronic low back pain, which was analyzed in the study with the reports of all the 3 scales.

**Conclusion:** There is overall reduction in performance based assessment of patients with chronic low back pain. There is alteration in perception and execution in patients with chronic low back pain. Outcome measures should be performance based rather than self-reported, so as to assess the real picture of patients prognosis and outcome of any treatment.

**Keywords:** Chronic Low back Pain, Pain and Disability

## I. INTRODUCTION

Global Burden of Disease studies have defined low back pain (LBP) as “pain in the posterior aspect of the body from the lower margin of the twelfth ribs to the lower gluteal folds with or without pain referred into one or both lower limbs that lasts for at least one day.<sup>1</sup> Persistence of pain in low back area for more than 3 months is defined as chronic.<sup>2</sup> Intervertebral disk prolapse, degenerative disk disease, facet joint dysfunction, Sacroiliac joint dysfunction, Spinal stenosis, Spondylolisthesis, osteoarthritis and deformity are the common low back pain conditions.<sup>1</sup> Individual factors, Psychological factors or socio-professional factors lead to chronicity of pain. The socio-professional factors are often much more influential than the physical factors.<sup>2</sup>

Chronicity of disease leads to an increase in physical disabilities such as decline in health, decreased strength, reduced muscle endurance, flexibility, and mobility, as well as deterioration in motor control, causing postural instability in a variety of situations in daily life.<sup>1</sup> The incidence of chronic degenerative diseases, namely chronic musculoskeletal pain, particularly in the lumbar region, is one of the most common complaints in individuals over age 60, and leads to functional limitation and greater physical dependence.<sup>3</sup>

Since 1990 the global burden of disability associated with LBP has been increasing in all age groups between and was greatest in the 50-54 age group in 2019. The years lost in disability was 70% in working aged people (20-65 years). People living with chronic low back pain and the prevalence of LBP has been continuously increasing in all age groups from 1990 to 2017. There is a steep increase in the prevalence of chronic low back pain in the age group 180-89 years, the greatest number of people with LBP globally are currently in the 50-54 year age group. The overall increase in the burden of LBP is likely to be driven by ageing and an increasing population, however there may be other contributing factors. It is estimated that fewer than 1 in 3 people living with chronic LBP have associated substantial restriction of participation in work, social activities, and self-care activities for 6 months or more (high-impact LBP). Although less than 28% of people with LBP have severe disability, they account for 77% of all disability caused by low back pain.<sup>1</sup>

Biological, psychological, social and societal factors are associated with low back pain and disability. These factors seem to be important in low- and high-income societies. Older age, poor general health, increased psychological or psychosocial stress, worse baseline functional disability, sciatica, and the presence of compensation are associated with disability and high societal cost. Social determinants of health with moderate to large effects on poor LBP disability outcomes include “socioeconomic deprivation,” low income, unemployment, and occupational factors (manual lifting, working overtime, and lack of supporting staff).<sup>4</sup>

Literature suggests that patients with chronic low back pain reduced quality of life which is determined by different socio-demographic parameters.<sup>5</sup> Reduction in Pain and improvement in ADLs are one of the most common expectations of patients with chronic low back pain and the indicators of successful treatment outcomes. Bodily pain, limitation of physical activities, and role limitation due to physical health are frequently occurring problems in this group of patient.<sup>6</sup> Such areas of health should be assessed by the use of measurement tools.<sup>7</sup>

Self-report questionnaires have been developed to assess pain and daily functioning in patients with back problems. Pain is a symptom that depends on the response of the person experiencing it and can be assessed by self-report measures. Such measures are also important because they indicate how patients perceive their daily functioning, and the measures can be used to examine perceived change over time. Self-report measurements also are simple to obtain. Observation, however, is often considered the most replicable method of assessing functional performance.<sup>7</sup>

The International Classification of Functioning and Disability (ICF) developed by World Health Organization which includes the dimensions of impairment, activity (limitation), and participation (restriction) is used to determine the impact of back pain on performance. Traditional physical tests tend to address impairments. Postural aberrations, decreased muscle force, and range of motion which are measured by impairments may not be good indicators of musculoskeletal dysfunction and disability.<sup>7</sup>

There is priority for developing appropriate tools for measuring mobility and activities of daily living by an international task force on back pain. Timed tests of activities such as walking, the sit-to-stand task, and repeated trunk flexion have been examined in patients with back pain and shown to have what we consider acceptable reliability, and to be sensitive to change over time. low back pain is manifested by decreased mobility of the trunk and alteration in activities such as bending, twisting, stooping, crouching, lifting, dressing, and picking. Functioning and activity limitations in chronic low back pain is predicted best by performance based tests.<sup>7</sup>

Difficulties in daily functioning experienced by patients with low back pain can be assessed by self-report instruments. The information yielded by these instruments is, however, based on the patient's cognition, influenced by experience and lifestyle, and may not necessarily reflect capability or how well the patient actually performs. There is often a mismatch between objective observation and self-assessment of function.

The most common outcome measure used in chronic low back pain is ODI, a self-reported questionnaire.<sup>8</sup> But the most important fact here is the perception of an individual with chronic low back pain. Is the perception i.e. what they perceive is what they can actually perform or achieve, that's a gap to be fulfilled. This may help us is coming up with developing more of performance based questionnaires to assess the outcome in patients with chronic low back pain. The need for performance based tool is very important because patients presents with movement loss and except to regain so that they can be independent in their ADLS. In case of self-reported tools another factor which may lead to false prognosis to the patients and therapists is the cognitive level of the patient, language, understanding etc.

Till the best of my knowledge, very few studies have been done to find this association. So this study will focus on physical performance assessment with its association on disability and pain in patients with chronic low back pain.

Many literatures have stated about the big burden of chronic Low back pain on the health care system. Millions of money is been spend on it either in form of surgery or in form of rehabilitation. The most common outcome measure used in chronic low back pain is ODI. It is a self-reported questionnaire and is used to predict the condition by time. But it is

also important to know the actual potential of the patient, by using performance based scale to determine whether the perception of the patient is true or false. So this study will focus on performance based assessment and find its association with disability and pain in patients with chronic low back pain. The aim of the study was to study the Physical Performance assessment in patients with chronic low back pain. The objective of the study was to determine the association of Physical Performance assessment with pain and disability in patients with chronic Low back pain.

## II. METHODOLOGY

1. **Study Design:** Cross-sectional study design
2. **Sample Size:** 100.
3. **Sampling Method:** Convenient Sampling
4. **Settings:** Data would be collected from various hospital and outpatient clinics in Vadodara.
5. **Inclusion Criteria**
  - Pain at low back region for more than 3 months.
  - Age - 20-60 years.
  - Both Males and Females.
  - Participants diagnosed any low back pain conditions with no contraindication with Flexion and Extension movement as decided by the orthopaedic surgeon.
  - Herniated disk
  - Degenerative disk disease
  - Facet joint dysfunction
  - Sacroiliac joint dysfunction.
  - Spinal stenosis
  - Spondylolisthesis
  - Osteoarthritis and deformity
6. **Exclusion Criteria**
  - Not willing to participate.
  - Acute Low back pain or disorder.
  - Having contraindication in flexion and extension movement as decided by the orthopaedic surgeon.

## III. PROCEDURE

After getting approval from the ethical committee from the concerned institution participants were recruited from various hospitals and out patient's clinics of Vadodara. Participants diagnosed with any chronic low back disorder listed in the inclusion criteria diagnosed by the surgeon, was included in the study. He/she was explained about the study and informed consent was taken. Then the participants were asked to fill up the questionnaire of Oswestry Disability index (ODI), Numerical Pain rating Scale (NPRS) and will be asked some to fill the demographic details. Then the Participants were asked to perform certain tests (back performance scale) and how the participant performs, scoring was be done accordingly by the therapist. ODI scale is available in both English and Gujarati language. The advantage of this would be that participant will be reading the questionnaire and filling up the responses. If the participants are illiterate then the therapist will read it and ask the response from the participant.

All the scales used in the present study have good psychometric properties.(14,15,16,17,18,19,20)

#### IV. STATISTICAL ANALYSIS

1. Data analysis was done using SPSS version 23.0.
2. Descriptive analysis was used to analyse the demographic and Sociodemographic variables.
3. Shapiro-Wilk test was used to determine Normality of data.
4. Spearmans Correlation analysis was used to determine the association of back performance assessment with disability and pain.
5. 95% confidence interval was taken, significance level  $p < 0.05$ .

#### V. RESULTS

- A total of 100 samples were collected from various clinics, hospitals across Vadodara.
- The demographic and Sociodemographic details are mentioned in table 1

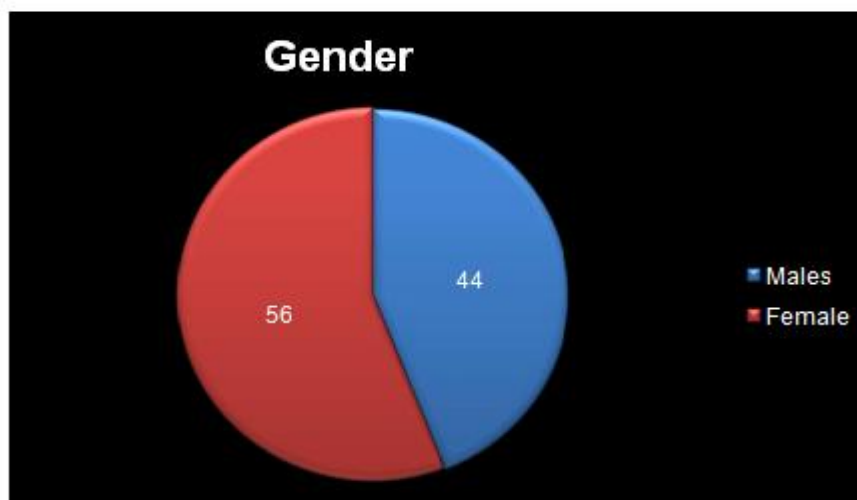
**Table 1: Demographic and Socio- Demographic characteristics of Participants**

Variables		N (%)	Mean $\pm$ SD
<b>Gender</b>	Males	44 (44)	
	Females	56 (56)	
<b>Age</b>	20-30	23 (23)	25.54 $\pm$ 3.25
	31-50	55 (55)	41.72 $\pm$ 5.97
	51-60	22(22)	55.95 $\pm$ 3.42
<b>BMI</b>	<18.5	3 (3)	
	18.5-24.9	52 (52)	
	25-29.9	36 (36)	
	>30	09 (9)	
<b>Occupation</b>	Working	69 (69)	
	Non- Working	31 (31)	
<b>Duration</b>			7.14 $\pm$ 3.87

(N- No of Participants, SD- Standard deviation, BMI- Body mass Index, % Frequency, Duration- months)

- In age group we have classified it as **20-30 as young adults**  
**31-50 as middle age adults**  
**And 51-60 as old adults.**<sup>21</sup>
- Analysis was done accordingly to the age group also.
- The **minimum age** participants from our study was of **21 years** and **maximum age was 60 years.**
- The **minimum BMI was 15.6** and the **maximum BMI was 33.41 kg/m<sup>2</sup>.**
- The **minimum duration of symptoms was 3 months** and the **maximum duration**

was 18 months.



**Graph 1: Gender Distribution**

**Table 2: Different Low Back Pain Conditions and Number of Participants in each Condition**

Categories	Frequency	Percentage
Lumbar Spondylosis	15	15%
Lumbar Disk Prolapse	50	50%
Lumbar Spondylolisthesis	10	10 %
Mechanical Low back Pain	15	15 %
Lower Cross Syndrome	10	10%

**Table 3: Analysis of outcome measures**

Variables	Min	Max	Mean $\pm$ SD
NPRS on Activity	1	10	5.63 $\pm$ 2.13
ODI	26.90	90	70.81 $\pm$ 10.40
BPS	0	15	8.03 $\pm$ 3.78

(NPRS- Numerical pain rating Scale, ODI- Oswestry disability index, BPS- Back performance scale)

- In NPRS, higher the score worse is the pain of the patient.
- In ODI, higher the score percentage, more the disability and pain and wore the condition of patient.
- In BPS, higher the score worse is the condition of patients or performance related to back.
- The aim of the study is to determine performance based assessment in patients with chronic Low back pain.

**Table 4: Summary of BPS Scores**

<b>BPS Score</b>	<b>No: of Individual</b>
0	3
1	3
2	3
3	7
4	3
5	6
6	5
7	5
8	11
9	7
10	7
11	10
12	10
13	10
14	5
15	5

Table 4 states that there are more no of individual in worse conditions of back pain in terms of back performance and few individuals having good back performance.

**Table 5: Interpretation of ODI Scores**

<b>Scores</b>	<b>Interpretations</b>	<b>No: of Individuals</b>
0-20%	Minimal Disability	37
21-40%	Moderate Disability	34
41-60%	Severe Disability	20
61-80%	Crippled Disability	9
81-100%	Bed Ridden	0

So when we analyse table 5, it is seen that majority of individuals are having minimal to moderate disability (37+34=71). 71 individuals are having only mild to moderate disability .29 individuals are having severe to crippled disability.

Now to analyse the perception of individuals of chronic low back pain we compared table 4 and 5 (the ODI scores and BPS scores).



**Table 6: Comparison of Scores of BPS and ODI**

<b>BPS SCORE</b>	<b>No: of Individual</b>	<b>Scores</b>	<b>No: of Individuals</b>
0	3	0-20% Minimal Disability	37
1	3	21-40% Moderate Disability	34
2	3	41-60% Severe Disability	20
3	7	61-80% Crippled Disability	9
4	3	81-100% Bed Ridden	0
5	6	-	-
6	5	-	-
7	5	-	-
8	11	-	-
9	7	-	-
10	7	-	-
11	10	-	-
12	10	-	-
13	10	-	-
14	5	-	-
15	5	-	-

- From the table it is seen that (low BPS score means better is the mobility of back and performance and in ODI less percentage of scores means minimal disability).
- In ODI which is a self-reported questionnaire there are more individuals in minimal and moderate disability and in BPS there are more individuals in more score means less mobility and back performance.
- So the Response has an Inverse relationship of ODI with BPS. So there is a difference in perception of individual which can be proved by performance based outcome.
- Performance based outcomes can lead to a better prognostic factor and can better assess outcomes when compared with self- reported questionnaires.
- The objective of the study was to compare BPS scores with pain and disability.
- Shapiro-Wilk test was used to assess the distribution of data and the results came as Skew distribution of data.
- So to determine the association of BPS with pain and disability Spearman's correlation analysis was used.

**Table 7: Spearmans Correlation of Back Performance scale with Pain (NPRS)**

<b>Spearmans Correlations</b>		
		<b>NPRS (Pain)</b>
<b>Back Performance scale</b>	<b>Correlation coefficient</b>	<b>-0.891</b>
	<b>Significance Value</b>	<b>0.00*</b>

**(P<0.05)\***

**Table 8: Spearmans Correlation of Back Performance scale with Disability (ODI)**

<b>Spearmans Correlations</b>		
		<b>ODI (Disability)</b>
<b>Back Performance scale</b>	<b>Correlation coefficient</b>	<b>-0.711</b>
	<b>Significance Value</b>	<b>0.00*</b>

**(P<0.05)\***

- The association of BPS with pain (NPRS) showed a strong negative correlation and the data were statistically significant. As the pain intensity increases, the performance related measurement of back reduces. Pain affects movement and thereby reduces the mobility of back.
- There was a moderate negative correlation between ODI and BPS and the data were statistically significant.
- When compared the BPS with age there was a weak to moderate negative correlation and the data were not statistically significant.

**Table 9: Spearmans Correlation of Back Performance scale with Age**

<b>Spearmans correlations</b>		
		<b>Age</b>
<b>Back Performance scale</b>	<b>Correlation coefficient</b>	<b>-0.56</b>
	<b>Significance Value</b>	<b>0.627</b>

**(P<0.05)\***

**Table 10: Back Performance Scale in different age groups**

<b>Age Group</b>	<b>Min</b>	<b>Max</b>	<b>Mean ± SD</b>
20-30	0	14	7.68±4.20
31-50	1	15	8.17±3.83
51-60	3	15	8± 3.2

**Table 11: Back Performance assessment in different age groups and its association with pain and disability**

Variable	NPRS (21-30)	ODI (21-30)
Back Performance Scale		
Correlation coefficient	-0.75	-0.50
Significance Value	0.04*	0.918
Variable	NPRS (31-50)	ODI (31-50)
Back Performance Scale		
Correlation coefficient	-0.81	-0.82
Significance Value	0.00*	0.04*
Variable	NPRS (51-60)	ODI (51-60)
Back Performance Scale		
Correlation coefficient	-0.91	-0.50
Significance Value	0.00*	0.00*

(P<0.05)\*

## VI. DISCUSSION

The study aimed to assess the performance based assessment in patients with chronic low back pain and the objective was to find the association of the performance based assessment with Pain and disability. A total of 100 samples were collected and the data were analysed.

The participants were asked to perform certain task which checked the mobility of back through a scale called back performance scale. They were asked to report the pain through NPRS scale. The disability was measured by Oswestry disability index. It was seen from the data that there were more individual's who's score in ODI were showing minimal to moderate disability. But when the scores were compared with BPS it showed worse. So these data suggested an inverse relationship between the scores of ODI and BPS. So there might be an alteration in perception of individuals with chronic low back pain.

A study done by Benedict Martin Wand<sup>22</sup> et al stated that there is distorted in body perception in individuals with chronic low back pain. Pain and disability is directly proportional to the level of perceptual disturbance. The disturbed perception is also responsible for increase in pain, psychological distress, fear avoidance and tissue sensitivity. This could be a reason because of which the patients can think of performing an action but not execute it.

The objective of the study was to compare the performance based assessment with and disability. When comparing pain with BPS there was a strong negative correlation

between them and the data were statistically significant. Pain always has an inverse relationship with movement. More the pain less the movement. Strand LI<sup>7</sup> et al in his study concluded that pain in low back is responsible for reduction in mobility and which in turn reduces the performance of low back.

When BPS was compared with ODI there was a moderate negative correlation and the data were statistically significant. Pain leads to mobility deficits and vice versa. Thus a vicious cycle is initiated and that leads to alteration in performance assessment of low back pain.<sup>7</sup>

When BPS was correlated with age there was a moderate negative correlation and the data were not statistically significant. One reason could be no any assessment of home and work environment was taken and another any pre-existing condition assessment was also not included. Studies states with increase in age do the mobility deficit and thus affects the performance.<sup>23</sup>

BPS when compared with pain and disability by the age groups, there was a strong negative correlation with pain and a moderate negative correlation with ODI in young age group. But one thing which is important to note here is the unequal distribution of participants in the different age groups. More the pain less the movement and more the disability. But one thing which should be considered is ODI is a self-reported questionnaire while BPS is performance based outcome. What the patients plans or thinks (Cognitive functions) will not exactly match the perception or the reality or the execution.<sup>(7,23)</sup>

When BPS was compared with pain and ODI in middle adult and older adult age group (31-50) - (51-60), there was a strong negative correlation. The possible explanation could be pain is inversely associated with mobility impairment and the pain tolerance level reduces with age and pain is directly proportional with disability. The healing power, reduces with age, degenerative changes starts and there by further increasing pain leading to mobility deficit and thereby limiting performance of low back.<sup>(7,23)</sup>

## **VII. CONCLUSION**

There is overall reduction in performance based assessment of patients with chronic low back pain. There is alteration in perception and execution in patients with chronic low back pain. Outcome measures should be performance based rather than self-reported, so as to assess the real picture of patient's prognosis and outcome of any treatment.

## **VIII. LIMITATIONS**

1. Smaller sample size.
2. Occupational analysis, home environment analysis and assessment of pre-existing comorbidities could be taken.

## **IX. FUTURE RECOMMENDATIONS**

1. Study with a larger sample size.
2. Assessment of work environment, home environment and any other pre-existing comorbidity shall be taken into consideration.

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