Indian Journal of Physiotherapy and Rehabilitation Science

IJPTRS VOL1 (2) Oct-Nov-Dec 2022 pp 39-54 EISSN 2583-4304

Access this article online

Website:https://www.ijptrs.com/index.php
URL:https://www.ijptrs.com/article_issue_5.php
DOI:https://www.ijptrs.com/assets/pdf/pdf5issue2.pdf

1MPT, Ph.D.; dnbid71@gmail.com, Senior Lecturer, Sarvajanik College of Physiotherapy, Rampura, Surat, India (Corresponding Author)
2MPT, Ph.D.; Assistant Professor, Department of Physiotherapy, University of Hail, Kingdom of Saudi Arabia
3BPT; Physiotherapist, Surat, India
Corresponding author: Bid Dibyendunarayan Dhrubaprasad[1]

Submission on: 21-12-2022
Revised: 29-12-2022
Publish: 31-12-2022

BIOPSYCHOSOCIAL FACTORS AND THEIR ASSOCIATION WITH SYMPTOMS OF CHRONIC LOW BACK PAIN

Bid Dibyendunarayan Dhrubaprasad[1], SD Shahanawaz[2], Kaitra Dhara[3], Trivedi Jay[3], Ankita Dhanani[3], Urvi Parmar [3]

Abstracts

Background: Low back pain (LBP) is a significant public health issue. LBP causes psychosocial distress and dysfunction in individuals**.**

Objectives: This study intended to observe the prevalence of pain, disability, depression, and fear-avoidance beliefs among chronic low back pain patients (CLBP). Also, we attempted to find out the association of these outcome measures with CLBP symptoms.

Methodology: A cross-sectional study was conducted among CLBP patients from various physiotherapy clinics and orthopedic hospitals in Surat; from October 2018 to February 2019. A total of 250 CLBP patients completed the following questionnaire: Demographics & personal data questionnaire, Fear-avoidance beliefs Questionnaire-Gujarati version (FABQ-G), Oswestry Disability scale - Gujarati version (ODI-G), Zung's Depression Scale (ZSDS), and SF-12. Also, the pain level was noted on a numerical pain rating scale.

Results: The average pain scores of the patients in the Organic, Amplified Organic, and Non-Organic groups were 4.57, 5.00, and 4.80 points, respectively, with no significant difference among the groups (p = 0.29). The average disability scores of the patients in the Organic, Amplified Organic, and Non-Organic groups were 12.08, 15.27, and 16.40 points, respectively, with no significant difference among the groups (p = 0.29). The average Fear-avoidance beliefs score of the patients in the Organic, Amplified Organic, and Non-Organic groups were 42.63, 45.72, and 51.80 points, respectively. Patients classified into the Non-Organic group experienced the most FABs out of all three groups (p = 0.007). The average HRQoL (SF-12) PCS scores of the patients in the Organic, Amplified Organic, and Non-Organic groups were 38.81, 39.62, and 34.96 points, respectively, with no significant difference among the groups (p = 0.99). The average HRQoL (SF-12) MCS scores of the patients in the Organic, Amplified Organic, and Non-Organic groups were 49.08, 45.56, and 46.31 points, respectively, with no significant difference among the groups (p = 0.99). The average depression scores of the patients in the Organic, Amplified Organic and Non-Organic groups were 38.06, 40.11, and 44.60 points, respectively, with no significant difference among the groups (p = 0.29).

Conclusion: All the outcome measures showed a mild to moderate association. Pain, PCS, and MCS showed no difference across pain diagram groups. FABs and disability scores were slightly higher in the Amplified organic group. Depression was also marginally more elevated in the amplified-organic group. We need studies from multiple centers with larger CLBP samples to confirm the reproducibility and validity of these data in other populations.

Keywords:
Chronic low back pain, Fear-avoidance beliefs, disability, depression, and pain

Introduction

Low back pain (LBP] is present nearly everywhere in society. Many published guidelines for diagnosing and managing CLBP are available. Up to 30% of individuals who report LBP have recurrent or persistent symptoms.

LBP is a frequent cause of physical limitations and absence from work and is associated with various somatization disorders. [1-8]Studies have shown that the disability credited to LBP symptoms presents a weak correlation with pain intensity. [1-3, 6, 8, 9] Many factors are linked with a disability, such as cognitive, affective, social, and environmental factors, and they may influence a patient's desire to question the pain they experience. [2-4, 6, 8, 10, 11] Thus, a bio-psychosocial approach could offer an alternative understanding of chronic pain and its impact on the ability of the patient to function. [1-3, 6, 8, 9]

Depression and anxiety are the two most common psychological disturbances seen in patients. Depression or anxiety, and psychological distress frequently accompany CLBP symptoms. [12, 13] Scant data are available on depression and anxiety in the CLBP population.

Fear-avoidance Behaviors

The Fear-Avoidance Model includes pain-related fear. [14] The Fear-Avoidance Model has been used to explain the development of unfavorable pain experiences and behaviors. [15]

Classification of LBP Patients Based on Pain Diagrams

Ransford [16]showed a group of patients with a high correlation between symptoms and image findings respecting the sensitive and motor radicular paths and a group with scattered, amplified, migratory and non-anatomic pain without correlation with the image findings. However, clinical experience shows that we usually have a third group transitioning between those groups, with signs and symptoms explained by the images but associated with amplified or exaggerated paths out of the anatomic distribution. Therefore, Trocoli, T O and Botelho R V classified the patient's symptoms as representative of an organic disease [Organic-ORG), of organic disease with behavioral-cognitive expansion (Amplified Organic-AO), or as representative of psychosomatic manifestations (Non-Organic-NO).[17] They correlated each of these symptom groups with the levels of anxiety, depression, and kinesiophobia.

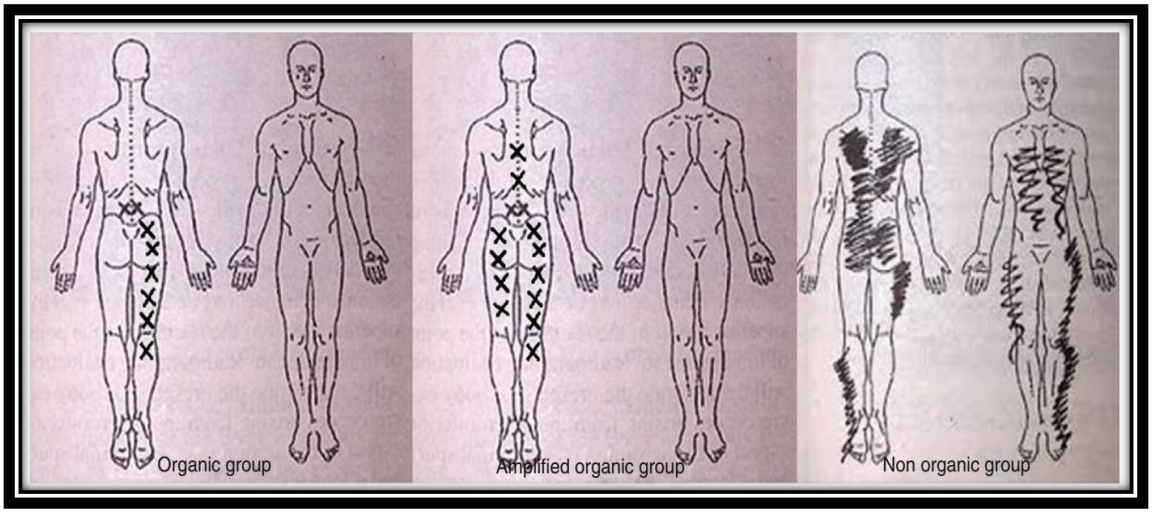


Figure 1: Representation of patients' symptoms according to the pain diagram groups

MA Sagheer, MF Khan, and S Sharif [18]concluded that individuals with CLBP were at high risk of experiencing anxiety and depression. This risk was higher for females. Trocoli, TO, and Botelho RV [17]stated no association between the groups and anxiety and depression. However, there was a positive correlation between kinesiophobia and the Organic group.

EJ Chung, et al suggested that screening for fear-avoidance beliefs may be helpful in the identification of patients at risk of psychosocial problems as well as pain intensity and physical impairment.[19] Hong JH et al. reported that patients with CLBP showed significant functional disability and significant impairment of psychological status with a low quality of life. [20]

Oliveira D Set al stated that anxiety, depression, and their interaction are associated with changes in pain disability at one-year follow-up. [21] VP Panhale, et al concluded that higher scores on the FABQ, 47% in physical activity and 27% in work component, indicate greater fear and avoidance beliefs. [22] A strong relationship exists between elevated fear-avoidance beliefs (FABQ) and activity limitation (BPS) in patients with CLBP.

So the study aimed to find the association between psychological factors and pain diagram classification.

METHODS

The present study is a cross-sectional study. We calculated the sample size of 246 Chronic Low Back Pain (CLBP) patients by using the prevalence rate of CLBP patients (P=20%) from published literature. [23] We collected data from 250 CLBP patients from various physiotherapy clinics and orthopedic departments in Surat, India and Hail, Saudi Arabia and as per inclusion and exclusion criteria.

Inclusion Criteria:

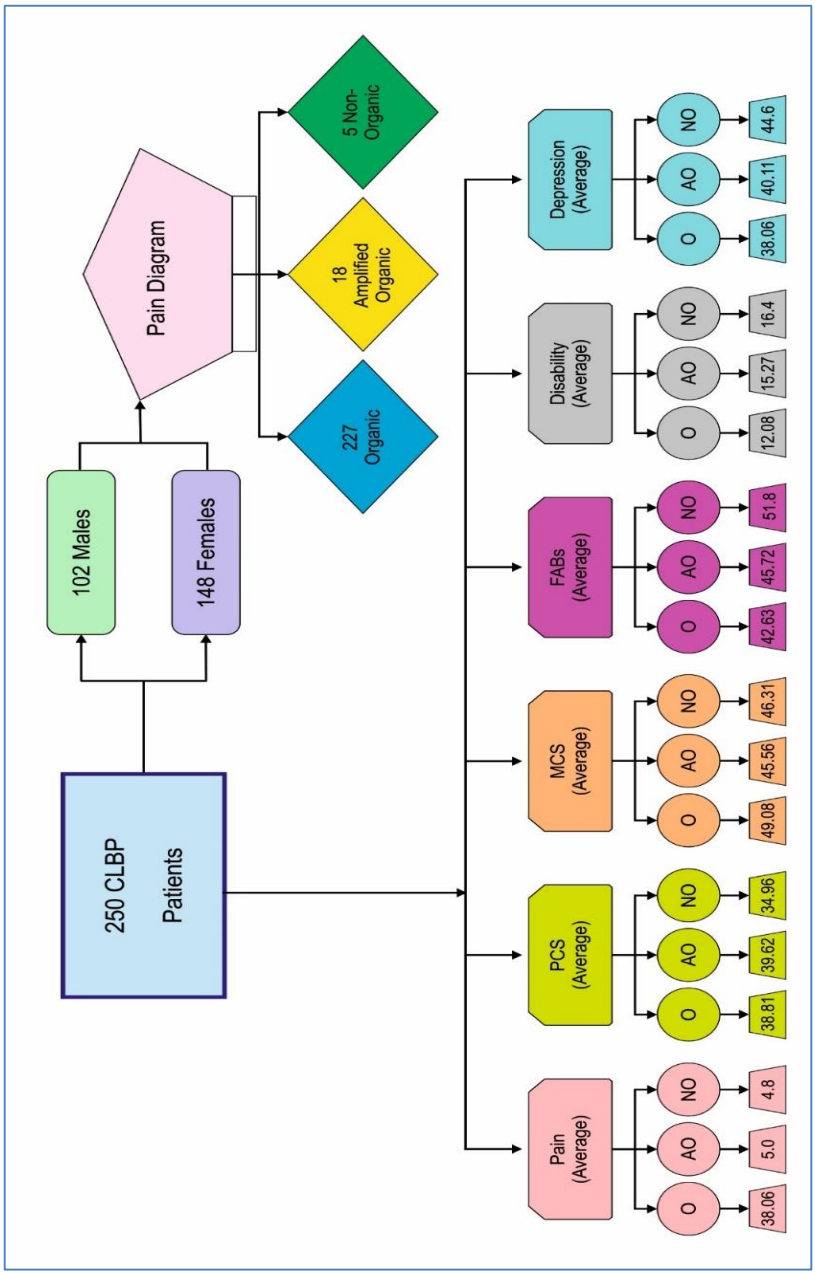
(a) Patients invited to participate were 20–70 old.
(b) CLBP was present for more than six months, and the average pain level on NPRS was 2 to 6.
(c) The patients were diagnosed with CLBP by a physician.

Exclusion Criteria:

(a) Having systemic disease and specific conditions such as neoplasm, fractures, spondylolisthesis, spondylolysis, spinal stenosis, ankylosing spondylitis, previous low back surgery
(b) Taking medication for specific psychological problems
(c) Being pregnant or having hypertension
(d) Receiving conflicting or on-going co-interventions;

The following data collection tools or questionnaires were used:
(a) Demographics & Personal Data,
(b) NPRS [24]
(c) FABQ-G: It is a 16-item, self-reporting questionnaire in which each item is graded on a 7-point Likert scale of strongly disagree to agree strongly. The FABQ score is calculated by adding up individual item scores. A higher total score indicates a higher level of fear-avoidance beliefs. The FABQ has demonstrated high levels of internal consistency (Cronbach's alpha= 0.88) and test-retest reliability (r= 0.95). [9] For ease the use, the original FABQ is translated and validated for Gujarati-speaking subjects with CLBP.
(d) SF-12: The short form 12-item survey demonstrated good internal consistency reliability, construct validity, and responsiveness in patients with back pain. [25-27](e) ODI: This instrument is widely used to evaluate functional disability associated with back pain.

Figure 2: Flowchart of CLBP patients included with the distribution in each group and the scores of Pain, PCS, MCS, FABs, Disability, and Depression



Procedure

The investigators prepared the data collection sheet by including demographic data and other questionnaires to collect the data. The data collection sheet was distributed among 250 CLBP patients according to the inclusion and exclusion criteria. Consent was taken, and the study's objective was explained to the CLBP patients. All the relevant instructions were given to fill out the questionnaire. Data were collected in 30-40 minutes' sessions from each CLBP patient. Data collection was completed in 4 months, from October 2018 to January 2019.

Statistical Analyses

Descriptive analysis was done as frequencies for categorical variables; and mean and standard deviation for continuous variables. A bivariate Pearson moment correlation was done among the outcome variables. All study analyses were conducted using SPSS 20.0, IBM, Armonk, NY, USA, with 95% confidence interval (CI) limits and a p-value at <0.05 as statistically significant. The present study included 102 males (40.8%) and 148 females (59.2%). Table-1 shows the general demographic characteristics of the participants.

Table 1: Demographic Characteristics of CLBP Patients (N=250)

Variable	Mean	Standard Deviation (SD)
Age	43.06	13.26
Height (feet)	5.40	0.36
Weight (Kg)	65.67	11.31
Pain (NPRS)	4.57	1.13
PCS	38.79	7.68
MCS	48.77	9.29
FABQ-G-Total	43.03	17.62
FABQ-G-Work	20.78	9.93
FABQ-G-PA	13.67	5.52
ODI-Total	12.40	6.56
ZSDS-Total	38.34	8.70

Table 2: (a) to (j): Demographic Characteristics of CLBP Patients according to pain diagrams

(a) Gender

Subjects Characteristics		Frequency	Percentage
Organic	Male	95	41.9
	Female	132	58.1
	Total	227	100
Amplified Organic	Male	6	33.3
	Female	12	66.7
	Total	18	100
Non-Organic	Male	1	20
	Female	4	80
	Total	5	100

(b) Occupation

Subjects Characteristic		Frequency	Percentage
Organic	Computer Professionals	14	6.16
	Other professionals	54	23.79
	Housewives	98	43.17
	Bank Employees	14	6.16
	Laborers	22	9.69
	Businessman/ woman	13	5.72
	Students	12	5.28
	Total	227	100
Amplified Organic	Computer Professionals	5	27.77
	Other professionals	3	16.66
	Housewives	5	27.77
	Bank Employees	1	5.55
	Laborers	0	00
	Businessman/ woman	4	22.22
	Students	0	00
	Total	18	100
Non-Organic	Computer Professionals	1	20
	Other professionals	0	00
	Housewives	2	40
	Bank Employees	0	00
	Laborers	0	00
	Businessman/ woman	2	40
	Students	0	00
	Total	5	100

(c) Employment Status

Subjects Characteristics		Frequency	Percentage
Organic	Yes	88	38.76
	No	121	53.30
	Retired	18	7.92
	Total	227	100
Amplified Organic	Yes	5	27.78
	No	12	66.67
	Retired	1	5.55
	Total	18	100
Non-Organic	Yes	2	40
	No	2	40
	Retired	1	20
	Total	5	100

(d) Marital Status

Subjects Characteristics		Frequency	Percentage
Organic	Married	187	82.4
	Not Married	36	15.9
	Widowed	4	1.8
	Total	227	100
Amplified Organic	Married	16	88.9
	Not Married	2	11.1
	Total	18	100
Non-Organic	Married	5	100
	Total	5	100

(e) Smoking Status

Subjects Characteristics		Frequency	Percentage
Organic	Smoking	22	09.7
	Not Smoking	205	90.3
	Total	227	100
Amplified Organic	Smoking	2	11.1
	Not Smoking	16	88.9
	Total	18	100
Non-Organic	Not Smoking	5	100
	Total	5	100

(f) Education Level

Subjects Characteristics		Frequency	Percentage
Organic	Postgraduate and Above	25	11.01
	Graduate	50	22.02
	12^{th} Pass	82	36.12
	10^{th} Pass and less	70	30.83
	Total	227	100
Amplified Organic	Postgraduate and Above	1	5.56
	Graduate	4	22.22
	12^{th} Pass	5	27.78
	10^{th} Pass and less	8	44.44
	Total	18	100
Non-Organic	Graduate	2	40
	12^{th} Pass	2	40
	10^{th} Pass and less	1	20
	Total	05	100

(g) Diagnostic Label for CLBP

Subjects Characteristics		Frequency	Percentage
Organic	Disc Prolapse	45	19.83
	Lumbar Spondylosis	33	14.53
	Non-specific LBP	78	34.36
	Lumbar Radiculopathy	55	24.22
	Lumbar Spondylolisthesis	11	4.86
	Sciatica	5	2.20
	Total	227	100
Amplified Organic	Disc Prolapse	5	27.77
	Lumbar Spondylosis	2	11.11
	Non-specific Low Back Pain	10	55.56
	Lumbar Spondylolisthesis	1	5.56
	Total	18	100
Non-Organic	Non-specific Low Back Pain	5	100
	Total	5	100

(h) Medication Uses

Subjects Characteristics		Frequency	Percentage
Organic	Pain Killers	85	37.4
	Muscle Relaxants	19	8.4
	NSAIDs	3	1.3
	No Medications	120	52.9
	Total	227	100
Amplified Organic	Pain Killers	8	44.4
	Muscle Relaxants	1	5.6
	NSAIDs	1	5.6
	No Medications	8	44.4
	Total	18	100
Non-Organic	Pain Killers	2	40
	NSAIDs	1	20
	No Medications	2	40
	Total	5	100

(i) Duration of CLBP in Months

Subjects Characteristics		Frequency	Percentage
Organic	6-12 months	110	48.45
	13-24 months	46	20.27
	25-36 months	36	15.87
	>36 months	35	15.41
	Total	227	100
Amplified Organic	6-12 months	4	22.22
	13-24 months	6	33.33
	25-36 months	7	38.89
	>36 months	1	5.56
	Total	18	100
Non-Organic	6-12 months	1	20
	13-24 months	2	40
	25-36 months	1	20
	>36 months	1	20
	Total	5	100

(j) Oswestry Disability Index (ODI-Gujarati) and ODI- Arabic Categories

Subjects Characteristics		Frequency	Percentage
Organic	Minimum Disability	195	85.9
	Moderate Disability	22	9.7
	Total	227	100
Amplified Organic	Minimum Disability	16	88.9
	Moderate Disability	2	11.1
	Total	18	100
Non-Organic	Minimum Disability	3	60
	Moderate Disability	2	40
	Total	5	100

Table 3: According to Pain Diagram Groups Demographic Characteristics of CLBP Patients (N=250)

According to the Pain diagram		Mean	SD
ORGANIC GROUP	PCS	38.81	7.62
	MCS	49.08	9.05
	FABQ-G-Total	42.63	17.46
	FABQ-G-WORK	20.53	9.85
	FABQ-G-PA	13.46	5.47
	ODI-TOTAL	12.08	6.45
	ZSDS-TOTAL	38.06	8.34
	NPRS	4.57	1.13
AMPLIFIED ORGANIC GROUP	PCS	39.62	8.47
	MCS	45.56	11.26
	FABQ-G-Total	45.72	14.72
	FABQ-G-WORK	23.22	8.86
	FABQ-G-PA	15.16	4.85
	ODI-TOTAL	15.27	6.48
	ZSDS-TOTAL	40.11	11.83
	NPRS	5.00	1.08

NON ORGANIC GROUP	PCS	34.96	7.69
	MCS	46.31	12.21
	FABQ-G-Total	51.80	32.29
	FABQ-G-WORK	23.40	16.90
	FABQ-G-PA	18.00	8.48
	ODI-TOTAL	16.40	9.63
	ZSDS-TOTAL	44.60	11.28
	NPRS	4.80	1.30

Table 4: Pearson Correlation among the PCS, MCS, FABQ-G-Total, FABQ-G-Work, FABQ-G-PA, ODI-G-Total, and ZSDS-Total Scores (N=250)

	NPRS	PCS	MCS	FABQ-G-Total	FABQ-G-W	FABQ-G-PA	ODI-Total	ZSDS-Total
NPRS	1	-.257**	-.145*	.249**	.146*	.341**	.419**	.237**
		.000	.021	.000	.021	.000	.000	.000
PCS		1	.142*	-.247**	-.169**	-.271**	-.452**	-.298**
			.025	.000	.007	.000	.000	.000
MCS			1	-.124*	-.144*	-.025	-.316**	-.454**
				.050	.023	.694	.000	.000
FABQ-G-Total				1	.933**	.801**	.562**	.133*
					.000	.000	.000	.036
FABQ-G-W					1	.599**	.516**	.080
						.000	.000	.206
FABQ-G-PA						1	.457**	.117
							.000	.064
ODI-G-Total							1	.462**
								.000
ZSDS-Total								1
**. Correlation is significant at the 0.01 level (2-tailed).								
*. Correlation is significant at the 0.05 level (2-tailed).								

Discussion

This is the first known study in Gujarat, India. That reports the association of pain, disability, depression, and FABs in patients with CLBP. Many studies established the relationship between pain, depression, disability, health-related quality of life, and

FABs in patients with CLBP. The main aims of this study were to replicate the relationship of these outcome measures in CLBP patients in the Indian or, more precisely, Gujarat scenario. The present study included 250 CLBP patients comprising 102 (40.8%) males and 148 (59.2%) females in the age range from 20 to 70 years, and the average age was 43.06 years. The average pain intensity for the whole group of patients was 4.8 points on the NPRS: None of the patients experienced severe pain (8–10 points), 82.4% experienced moderate pain intensity (4–7 points), and 17.6% experienced mild pain intensity (0–3 points). The organic group's mean FABQ-G Total score was 42.63, the FABQ-G-Work mean score was 20.3, and the FABQ-G-Physical activity mean score was 13.46. The amplified organic group's mean FABQ-G Total score was 45.20, the FABQ-G-Work mean score was 23.22, and the FABQ-G-Physical movement mean score was 15.16. The non-organic group's mean FABQ-G Total score was 51.80, the FABQ-G-Work mean score was 23.40, and the FABQ-G-Physical activity mean score was 18.00.

The FABQ-G physical activities score was classified as low fear (0–14 points) or high fear (15 points or more). FABQ-G Work subscale score was classified as low fear (0–33 points) or high fear (34 points or more). [22, 28]In the present study, 53.6% of patients of CLBP out of 250 patients had low fear on the FABQ-G Physical activity subscale, and 46.4% of patients had high fear. In the present study, 90.8% of patients of CLBP out of 250 patients had low fear on the FABQ-G Work subscale, and 9.2% of patients had high fear.

According to pain diagram groups under the FABQ-G Physical activity subscale, In the Organic Group, 55.5% had low fear, and 44.5% had high fear among 227 CLBP patients. However, in the amplified organic group, 38.9% had low fear, 61.1% had high fear among 18 CLBP patients, and in the non-organic group, 20% had low fear, and 80% had high fear among five patients. According to pain diagram groups under the FABQ-G Work subscale, 91.6% had low fear in the Organic Group, and 8.4% had high fear among 227 CLBP patients. However, 88.9% had low fear in the amplified organic group, 11.1% had high fear among 18 CLBP patients; in the non-organic group, 60% had low fear, and 40% of patients had high fear among five patients. In this study, pain level weakly correlates with FABs and their subscales. This situation means that if pain increases, it mildly increases the FABs in CLBP patients. However, Tania Inés Nava-Bringas et al. **[29]**suggested a strong relationship between pain severity, FABQ scores, and functional disability in Mexicans with CLBP. This difference in findings may be linked to geographically different samples.

In SF-12, PCS and MCS each have a score range of 0-100. Those who scored above 50 are considered in good health, those who scored between 31 and 50 are believed to have average health, and below 30 are considered in poor health. Out of 250 CLBP patients under the PCS subscale of SF-12, 11.2% had poor health, 76.8% had average health, and the remaining 12% of patients considered themselves in good health despite having CLBP. Out of 250 CLBP patients under the MCS subscale of SF-12, 2.4% had poor health, 46.4% had average health, and the remaining 51.2% considered themselves in good health despite CLBP. In this study, pain level shows a weak negative correlation with the physical and mental components of HRQoL (SF-12) scores. That indicates that QoL will be poor if the pain level is more. Similarly, Husky M M *et al.* [30] reported in their study that persons with CLBP scored significantly lower on all SF-

36 subscales, including both composite physical (PCS) and mental scores (MCS). That reflects a decreased quality of life for persons with no CLBP.

In this study, PCS and MCS scores of SF-12 were mild to moderate and negatively correlated with depression scores. Also, this study's PCS and MCS scores ranged from 34.96 to 49.08. Scores less than 50 on PCS and MCS are considered suboptimal, and less than 30 are deemed poor. However, in their research, Elliott TE, Renier CM, and Palcher JA concluded that the SF-36 Mental Composite Score and all subscales were highly correlated with depression in chronic pain patients. [42] They also recommended that The SF-36 may be a useful clinical tool to measure HRQoL in chronic pain patients.

This study's pain level positively correlates with the disability scale (ODI-G). That indicates that if pain increases, it moderately increases the disability in CLBP patients. In this study, pain level shows a weak positive correlation with depression scores. If pain increases, it will mildly increase the depression level in CLBP patients. Beyraghi N *et al.* [31] reported that there is a significant link between psychiatric (depression and anxiety) and clinical factors (pain and disability) in patients with CLBP. The disability score was higher than pain intensity, and depression was the most critical predictor of disability, which must be recognized and treated in CLBP patients. The present study supports that depression can predict disability and pain severity in CLBP patients.

The concept of fear avoidance has offered an appealing model that accounts for why some people develop dysfunctional pain problems. [32] This study aimed to determine the relationship between fear-avoidance beliefs, pain, and disability index in patients with LBP and identify factors influencing FABs, pain, and disability index. In this study, disability scores positively correlate with FABQ-G Total score and its subscales. If the disability is more, there will be a moderate increase in FABs in CLBP patients. It has been proposed that confrontation is an adaptive response to pain, while avoidance is a maladaptive behavior causing LBP patients to avoid certain daily activities that may cause pain. [33] In the acute phase of LBP, fear avoidance is considered an adaptive response to avoid movements that would cause tissue damage. However, higher fear-avoidance beliefs were related to persistent disability and inactivity. [34] It is considered an essential cognitive factor leading to chronic disability in LBP patients.

In this study, we categorized depression based on their scores as normal, i.e., not having depression, mildly depressed, moderately depressed, and severely depressed on Zung's self-reporting depression scale. Out of 250 CLBP patients, 217 (86.8%) were normal, 29 (11.6%) were mildly depressed, 3 (1.2%), and 1 (0.4%) patient was severely depressed.

In the organic group, out of 227 CLBP patients, 201 (88.5%) CLBP patients were not having depression or were normal, 23 (10.1%) were mildly depressed, 2 (0.9%) were moderately depressed, and 1 (0.4%) was severely depressed. In the amplified organic group, out of 18 CLBP patients, 13 (72.2%) CLBP patients were not having depression or were normal, 4 (22.7%) were mildly depressed, 1 (5.6%) was moderately depressed, and none were severely depressed. In the non-organic group, out of 5 CLBP patients, 3 (60.0%) CLBP patients were not having depression or were normal, 2 (40%) were mildly depressed, and none were moderately or severely depressed. In this study, disability scores and depression scores have a moderate correlation. This study shows that if the disability is more

than correspondingly, depression also will be moderately increased.

This study shows it is crucial to test the psychological aspects, such as fear-avoidance beliefs, depression, and quality of life, besides measuring disability and pain among CLBP patients. We need studies from multiple centers with larger CLBP samples to confirm the reproducibility and validity of these data in other populations.

Conclusion

All the outcome measures showed a mild to moderate association between them. Pain, PCS, and MCS showed no difference across pain diagram groups. FABS and disability scores were slightly higher in the Amplified organic group. Depression was also marginally more elevated in the amplified-organic group.

References:

1. Cai C, et al,"Correlates of self-reported disability in patients with low back pain: the role of fear-avoidance beliefs." Annals of the Academy of Medicine, Singapore. 2007;36(12):1013-20.
2. Maughan EF, et al,"Outcome measures in chronic low back pain." European spine journal : official publication of the European Spine Society, the European Spinal Deformity Society, and the European Section of the Cervical Spine Research Society. 2010;19(9):1484-94.
3. Helmhout PH, et al,"Prognostic factors for perceived recovery or functional improvement in non-specific low back pain: secondary analyses of three randomized clinical trials." Eur Spine J. 2010;19(4):650-9.
4. Waddell G. "Low back disability. A syndrome of Western civilization. "Neurosurgery clinics of North America. 1991;2(4):719-38.
5. Johansson A-C, et al,"Psychosocial stress factors among patients with lumbar disc herniation, scheduled for disc surgery in comparison with patients scheduled for arthroscopic knee surgery." European spine journal : official publication of the European Spine Society, the European Spinal Deformity Society, and the European Section of the Cervical Spine Research Society. 2007;16(7):961-70.
6. Reneman MF,et al,"Are pain intensity and pain related fear related to functional capacity evaluation performances of patients with chronic low back pain?" Journal of occupational rehabilitation. 2007;17(2):247-58.
7. Sinikallio S,et al,"Depression is associated with poorer outcome of lumbar spinal stenosis surgery." European spine journal : official publication of the European Spine Society, the European Spinal Deformity Society, and the European Section of the Cervical Spine Research Society. 2007;16(7):905-12.
8. Smeets RJ, et al,"Do psychological characteristics predict response to exercise and advice for subacute low back pain?" Arthritis and rheumatism. 2009;61(9):1202-9.
9. Waddell G, et al"A Fear-Avoidance Beliefs Questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability. Pain." 1993;52(2):157-68.
10. Siqueira FB, et al"Análise das propriedades psicométricas da versão brasileira da escala tampa de cinesiofobia." Acta Ortopédica Brasileira. 2007;15:19-24.
11. Foster NE,et al,"Distinctiveness of psychological obstacles to recovery in low back pain patients in primary care." Pain. 2010;148(3):398-406.
12. Kinney RK, et al,"Prevalence of psychopathology in acute and chronic low back pain patients." Journal of occupational rehabilitation. 1993;3(2):95-103.

13. Rush AJ, et al,"Depression and chronic low back pain: establishing priorities in treatment. "Spine. 2000;25(20):2566-71.
14. Lethem J, et al,"Outline of a Fear-Avoidance Model of exaggerated pain perception--I." Behaviour research and therapy. 1983;21(4):401-8.
15. Vlaeyen JW, et al,"Fear of movement/(re)injury, avoidance and pain disability in chronic low back pain patients." Manual therapy. 1999;4(4):187-95.
16. Dahl B, et al,"Nonorganic pain drawings are associated with low psychological scores on the preoperative SF-36 questionnaire in patients with chronic low back pain." Eur Spine J. 2001;10(3):211-4.
17. Trocoli TO, Botelho RV,'Prevalence of anxiety, depression and kinesiophobia in patients with low back pain and their association with the symptoms of low back spinal pain." Revista brasileira de reumatologia. 2016.
18. Sagheer MA,et al,"Association between chronic low back pain, anxiety and depression in patients at a tertiary care centre." JPMA The Journal of the Pakistan Medical Association. 2013;63(6):688-90.
19. Chung EJ, Hur Y-G, et al,"A study of the relationship among fear-avoidance beliefs, pain and disability index in patients with low back pain." Journal of exercise rehabilitation. 2013;9(6):532-5.
20. Hong JH, et al,"Assessment of depression, anxiety, sleep disturbance, and quality of life in patients with chronic low back pain in Korea."Korean journal of anesthesiology. 2014;66(6):444-50.
21. Oliveira DS, et al,"The Impact of Anxiety and Depression on the Outcomes of Chronic Low Back Pain Multidisciplinary Pain Management-A Multicenter Prospective Cohort Study in Pain Clinics with One-Year Follow-up." Pain medicine (Malden, Mass). 2018.
22. Panhale VP, et al,"Association of Physical Performance and Fear-Avoidance Beliefs in Adults with Chronic Low Back Pain." Annals of medical and health sciences research. 2016;6(6):375-9.
23. Meucci RD, et al,"Prevalence of chronic low back pain: systematic review." Revista de saude publica. 2015;49(73):1-10.
24. Childs JD, et al,"Responsiveness of the numeric pain rating scale in patients with low back pain." Spine. 2005;30(11):1331-4.
25. Luo X, et al,"Reliability, validity, and responsiveness of the short form 12-item survey (SF-12) in patients with back pain. Spine." 2003;28(15):1739–45.
26. Ali M,et al," The 12-item medical outcomes study short form health survey version 2.0 (SF-12v2): a population-based validation study from Tehran, Iran. "Health and Quality of Life Outcomes. 2011;9(12).
27. Interpretation Guides to Standardized Questionnaires Employed in the ALS CARE Database, including the: Short Form-12 Health Survey (SF-12) 2019 [19/03/2019]. Available from: https://www.outcomes-umassmed.org/als/sf12.aspx.
28. Fritz JM, George SZ,et al," The role of fear-avoidance beliefs in acute low back pain: relationships with current and future disability and work status." Pain. 2001;94(1):7-15.
29. Nava-Bringas TI,et al,"Fear-avoidance beliefs increase perception of pain and disability in Mexicans with chronic low back pain." Revista brasileira de reumatologia. 2017;57:306-10.
30. Husky MM, et al,"Chronic back pain and its association with quality of life in a large French population survey." Health and quality of life outcomes. 2018;16(1):195-.
31. Beyraghi N, et al,"Evaluation of the relationship between disability and pain severity with anxiety and depression in chronic low back pain patient: Research and review."International Journal of

Contemporary Dental and Medical Reviews. 2016.

32. Linton SJ, et al,"Are fear-avoidance beliefs related to the inception of an episode of back pain? A prospective study." Psychology & health. 2000;14(6):1051-9.
33. Vlaeyen JW,et al,"Fear of movement/(re)injury and muscular reactivity in chronic low back pain patients: an experimental investigation."Pain. 1999;82(3):297-304.
34. van Tulder MW, et al,"Conservative treatment of acute and chronic nonspecific low back pain. A systematic review of randomized controlled trials of the most common interventions."Spine. 1997;22(18):2128-56.