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ASSOCIATION BETWEEN SYMPTOMS OF CENTRAL SENSITIZATION WITH PAIN AND DISABILITY IN PATIENTS WITH CHRONIC LOW BACK PAIN –A CROSS SECTIONAL STUDY

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Abstract: **BACKGROUND:** Low back pain (LBP) is one of the most common musculoskeletal issues experienced by the adults in their life time. People with age 35-55 are more prone to Low Back Pain. This persistent pain condition may include the central sensitization (CS) phenomenon, which implies a wide range of symptoms and that may be taken into account in LBP treatment. CS symptoms can be measured by the Central Sensitization Inventory (CSI). **OBJECTIVE**: The aim of the study was to explore association of CS with pain and disability. **METHODOLOGY:** In present cross-sectional study total of 100 Gujarati participants aged 33-55, suffering from LBP were included. CS symptoms were measured with the Gujarati Version of the CSI, pain was measured by VAS and disability was measured by ODI Gujarati version Statistical analysis was done by using SPSS 20 version. Spearman's rank correlation coefficient test was applied for co-relation. Significance level was set at $p<0.05$. **RESULT:** The mean CSI total score for the whole sample was 35.49±5.26 points. CSI total score had subclinical values in the whole sample; The CSI mean total score was 34.49±5.26 points for females and 35.16±5.22 points for males. Patients showed significant differences in CSI total score by gender (P = 0.000). There was statistically significant moderate positive correlation exists between CSI score and VAS score, moderate positive correlation between CSI score and ODI score.**CONCLUSION:** Present study concludes that there moderate positive correlation exists between CSI score and pain, moderate positive correlation between CSI score with disability. Although participants showed mean subclinical values in CSI total score, participants with scores ≥40 were found across chronic low back. In particular, females with LBP participants were most affected by high CSI scores. In light of these results, it is recommended that clinicians supplement their assessment with the CSI in low back patients for improved decision-making during treatment.

KEY WORDS: Central Sensitization, LBP, Frequency, Association, Disability.

I. INTRODUCTION

Low back pain (LBP) is one of the most common musculoskeletal issues experienced by the adults in their life time.[1,2] In industrialized countries the prevalence of non-specific LBP is 60-70% i.e. The prevalence rate of adult is higher than child and adolescent. People with age 35-55 are more prone to LBP.[3] The occurrence of Low Back Pain in India is also alarming with nearly 60% of the people in India have suffered from low back pain at some time during their lifespan.[4] Between 60% and 80% of the population will experience LBP during their lives and up to 15% becomes chronic.[5]

It is a heterogeneous condition presenting with various underlying pain mechanisms that often challenge clinicians to determine effective treatment strategies. Despite the wide range of pharmacological and surgical treatment options currently available for patients with LBP, a substantial proportion of patients fail to achieve adequate pain relief and continue to experience significant pain, pain-related distress and disability.[5] Sometimes, relief of light pain is achieved naturally within two months. If the pain persists for longer than three months, it develops as chronic pain.[6] LBP is not only heterogeneous but also contradictory. LBP patients suffer not only from physical discomfort but also from functional disabilities that may cause impairment and interfere with their quality of life.[7] The natural history of LBP has been observed to be extremely variable and may last a few days or persist for many years.[8] The natural history of LBP has been observed to be extremely variable and may last a few days or persist for many years.[8] physical health consequences of CLBP, individuals with CLBP are at risk of a range of other adverse outcomes, including depression, anxiety, strained interpersonal relationships, financial difficulties and a reduced overall quality of life.[5]

Central sensitization (CS) can be defined as a process of abnormal and intense enhancement of pain caused by increased neuronal responses to stimuli in the central nervous system.[9] there are limited studies in the literature found which explains the

exact association between symptoms of CS with pain and disability among patients with CLBP. Hence the purpose of this study is to find out the association between symptoms of CS with pain, disability and QOL among patients with CLBP.

I. RESEARCH METHODOLOGY

STUDY DESIGN: Cross sectional study, STUDY POPULATION: Patients with Chronic Low Back Pain, aged between 35-55 years of age group.[3]SAMPLING TECHNIQUE: Convenient sampling, STUDY DURATION: 1 Year

3.1Population and Sample

Sample size calculation for the present study, using G*Power 3.1 version. Effect size, based on the correlation analysis between CSI and pain intensity was assumed to be moderate (r = 0.5) (taken from results of the study done by Eva Huysmans, MSc, in 2017), the significance level was set at α = 0.05 and power at 0.95. Two tailed calculation revealed that the total sample should include 100 patients.

3.2 Data and Sources of Data

SPB Physiotherapy College OPD and other Physiotherapy OPDs of Surat.

INCLUSION CRITERIA:

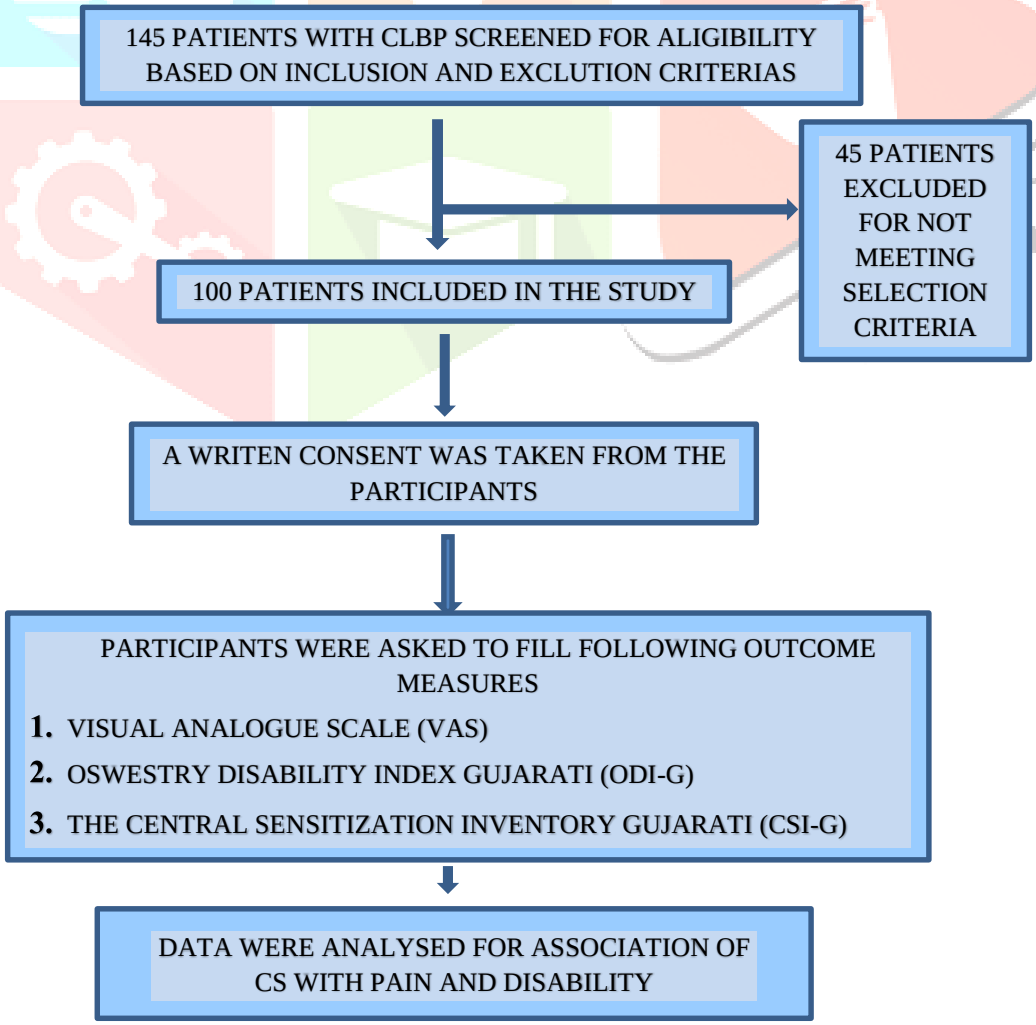
- Both male and female with age group 35 to 55 years.[3]
- Subjects with nonspecific low back pain and non-radicular back pain.[9]
- Subject with duration of LBP: More than or at least 3 months.[9]
- Subject who are willing for participate.
- Subject who can read and write Gujarati.

EXCLUSION CRITERIA: [9]

- Acute low back pain and with a known cause.
- Serious or progressive neurologic deficits.
- Symptoms of serious underlying conditions such as Tumor, Infection, Vertebral Compression Fracture, Ankylosing Spondylitis, or Clinically Significant Spinal Stenosis.
- Skin inflammation or edema in lower back.
- Pregnant or until 1 year Postnatal.
- Epilepsy, Cancer, Arthritis, major Psychiatric disorders.
- Awaiting Surgery or having had surgery in the past 6 months.

3.3 Theoretical framework

STUDY LAYOUT



Ethical approval was taken by institutional ethical committee at SPB Physiotherapy College. Participants of the study was approached through various HODs of respective study setting places. Patients with chronic low back pain was asked informally to participate in the study and their willingness. Prior to the commencement of the study, detailed procedure of the study was explained to the patients and a signed informed consent form was taken from them. The patient was screened on the basis of inclusion and exclusion criteria and their age, sex, working status, educational level, medical health history, body mass index, duration of symptoms and impact of their symptoms on activities of daily living was taken by an assessment Performa. Total numbers of participants were 100 as calculated by G*power software. The patients were assessed with following outcome measures. i.e., the visual analogue scale, Oswestry Disability Index, central sensitization inventory scale Gujarati. The patients were given the scales and asked to read and tick the scores as per the instructions are given into the forms.

3.4Statistical tools and econometric models

The data was entered using Microsoft Excel 2017 and it was analyzed using SPSS 20 version. data were analyzed by non-parametric tests i.e., spearman's rank correlation coefficient test. The level of significance was set at $\alpha = 0.01$.

IV. RESULTS AND DISCUSSION

4.1 Results of Descriptive Statics of Study Variables

TABLE 1: PATIENT'S DEMOGRAPHIC VARIABLES (N=100)

VARIABLES	MEAN±SD	MEDIAN	MIN	MAX
Age(years)	43.52±5.58	43	35	55
BMI (kg/m^3)	26.53±2.53	26.3	19.20	32.200
Duration (months)	14.22±7.74	12	4	36

A total of 145 patients with CLBP were screened for this study out of those 100 participants were included in the study and 45 patients were excluded for not meeting selection criteria. The mean age was 43.52 (SD=5.589) years, mean BMI was 26.53 (SD=2.53) kg/m2 and Mean duration of symptoms was 14.22 (SD=7.74) months of all participants. Median, MIN, MAX values were seen in TABLE 1.

TABLE 2: MEAN, STANDARD DEVIATION, MEDIAN, MIN AND MAX OF OUTCOMES:

The mean total CSI score was 35.49 (SD=5.268) points. Mean pain intensity measured by VAS was 6.51(SD=0.96) cm and mean disability measured by Oswestry disability index was 41.95(SD=8.52) points.

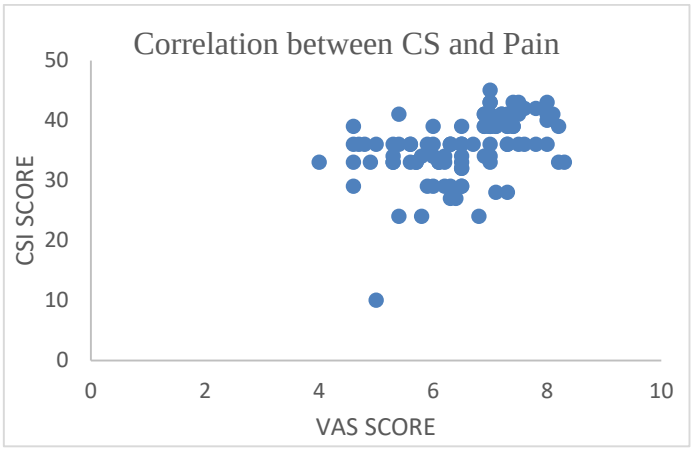
VARIABLES	MEAN±SD	MEDIAN	MIN	MAX
Total CSI score	35.49±5.26	36	10	45
VAS score(cm)	6.51±0.96	6.1	4	8.2
ODI score(points)	41.95±8.52	41	24	58

TABLE 3: ANALYSIS INCLUDING CORRELATION BETWEEN CSI SCORE AND VAS SCORE:

			VAS score
Spearman's Rho	CSI score	Correlation Coefficient	0.502**
		Sig. (2-tailed)	0.000
		N	100

**. Correlation is significant at the 0.05 level (2-tailed).

Firstly, as normality of VAS Score was 0.003, so data was not normally distributed therefore non parametric correlation test was used. i.e., Spearman's rho was used. P value is 0.000 and the correlation between pain and central sensitization is 0.502 so there is moderate positive significant correlation.[11]



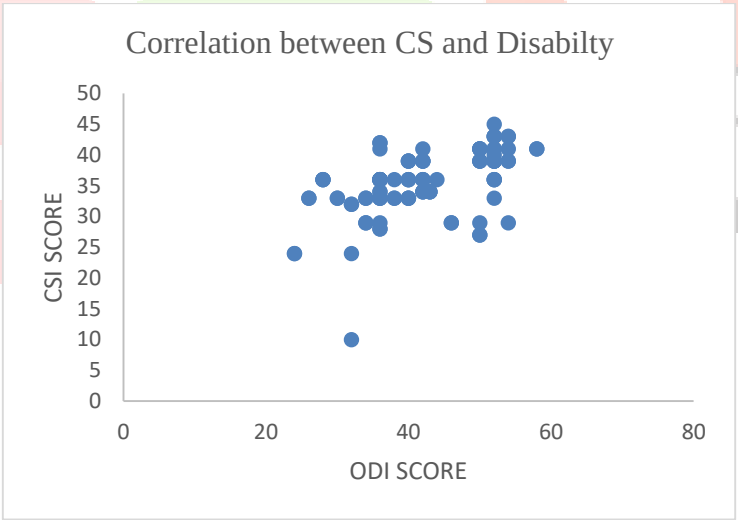
GRAPH 1: CORRELATION BETWEEN CSI SCORE AND VAS SCORE.

TABLE 4: ANALYSIS INCLUDING CORRELATION BETWEEN CSI SCORE AND ODI SCORE:

			ODI score
Spearman's Rho	CSI score	Correlation Coefficient	0.557**
		Sig. (2-tailed)	0.000
		N	100

**. Correlation is significant at the 0.05 level (2-tailed).

As normality of ODI Score was 0.000, Non parametric correlation test was used. i.e., Spearman's rho was used. P value is 0.000 and the correlation between disability and central sensitization is 0.557 and so there is moderate positive significant correlation.[11]

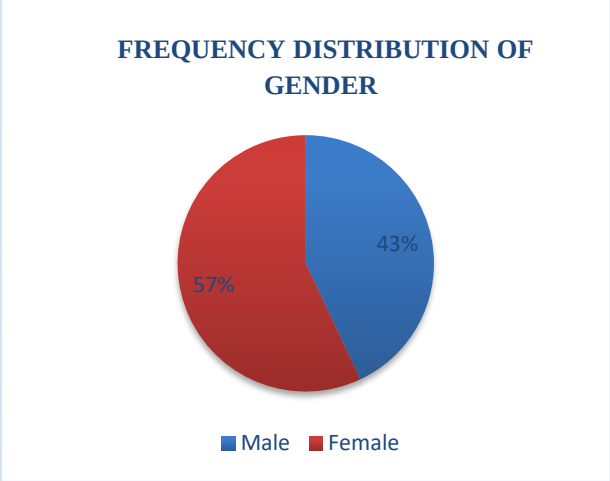


GRAPH 2: CORRELATION BETWEEN CSI SCORE AND ODI SCORE.

TABLE 5: WITHOUT AND WITH CS IN EACH GENDER GROUP.

GENDER	TOTAL(NO.)	WITHOUT CS % (NO.)	WITH CS % (NO.)	CSI TOTAL SCORE, MEAN±SD	P Value
MALE	43	88.37% (38)	11.62% (5)	34.49±5.26	0.000
FEMALE	57	75.43% (43)	24.56% (14)	35.16±5.22	

Among total 100 participants 43 (43%) were males and 57 (57%) were females. The frequency of CS was higher for females 24.56% (N=14) than males 11.62% (N=5). The CSI mean total score was 34.49±5.26 points for females and 35.16±5.22 points for males. Significant differences were also found in average CSI total score by gender (P = 0.0096). Gender distribution is showed in Table 2.



GRAPH 3: PIE-CHART OF FREQUENCY DISTRIBUTION OF GENDER.

DISCUSSION:

Total 100 patients with CLBP without radiculopathy were included. Patients with CLBP, aged between 35-55 years of age group were included. In those 43 males and 57 females were assessed for this study. Duration of this study was 1 year. This study shows association of central sensitization with pain, disability and QOL in patients with CLBP. This study showed CSI total scores and their distributions based on a 40-point cut off [31] in different gender suffering from CLBP.

The International Association for the study of pain described that Central sensitization is "Increased responsiveness of nociceptive neurons in the central nervous system to their normal or subthreshold afferent input. It is also defined as an angumentation of responsiveness of central neurons to input from unimodal and polymodal receptors. [10]

Under musculoskeletal conditions, some symptoms such as pain cannot be explained by a specific organic cause. [12] This has led to a growing interest in CS to explain some cases of "nonorganic" symptoms. This neuro-physiological phenomenon is defined as an amplification of neural signaling within the central nervous system, which provokes an abnormal increase in pain. [13] In the past decennia, a relevant subsample of patients with chronic pain, including individuals with CLBP, have shown an increased responsiveness to noxious and non-noxious stimuli, described as CS. [14] CS is a result of an imbalance in the nociceptive pathways ('pain pathways') and supraspinal structures due to an amplified facilitation and/or reduced inhibition.[13,15,16] The phenomenon, CS, is manifested by an amplified pain perception regarding its intensity (hyperalgesia and allodynia), duration (aftersensations and temporal summation) and distribution (expansion of the receptive field), as well as a reduced conditioned pain modulation (CPM). [16] When analyzing differences, a higher percentage of females (24.56%) had significant CS symptoms than men (11.62%). This finding concurs with previous literature suggesting that there are gender differences in chronic pain risk [17] and in the association between brain structure alterations and pain-related psychosocial characteristics. [18] These differences may be related to CS in terms of higher prevalence of fibromyalgia, migraine, chronic widespread pain, and persistent postoperative pain in females than males. [19,20,21] Overall, the prevalence of persistent pain is greater among females. [12] Although further research is needed related to CS. As result shows that if the CSI score increases pain intensity was increases so there was positive moderate significant correlation between CSI score and Pain. Disability score (ODI) also increases with higher score of CSI there was positive moderate significant correlation between CSI score and disability. Neblett et al. found the associations among the CSI severity-level groups and patient-reported depressive symptoms, perceived disability, sleep disturbance, and pain intensity. [22]

CONCLUSION:

Present study concludes that there is moderate positive correlation exist between CSI score with pain intensity, moderate positive correlation between CSI score with disability. In particular, females with LBP participants were most affected by high CSI scores. In light of these results, it is recommended that clinicians supplement their assessment with the CSI in low back patients for improved decision-making during treatment.

LIMITATION AND FUTURE RECCOMENDATIONS:

- In this study sample size was limited with only 100 patients and samples were collected from Surat City only. In future studies larger sample size can be taken.
- CSI is a patient-reported outcome, as used to assess a patient's symptoms or functional status at a specific time. However, this information is subjective. Future research should supplement CSI data with objective measures.
- This study includes correlation of VAS and ODI outcomes with CSI. So, Correlation with other outcomes also can be included in further studies.

ETHICAL APPROVAL:

Ethical approval was taken by institutional ethical committee at SPB Physiotherapy College.

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