

Original Research Article

A Study to Observe the Impact of Perceived Stress on Chronic Nonspecific Low Back Pain in Females of Reproductive Age Group in an Urban Population of West Bengal

Dr. Arunima Chaudhuri¹, Dr. Sajal Kumar Sarkar²

¹Associate Professor Department of Physiology, Rampurhat Government Medical College and Hospital (Affiliated to West Bengal University of Health Sciences), Rampurhat, West Bengal, India.

²Assistant Professor, Department of Surgery, Burdwan Medical College and Hospital (Affiliated to West Bengal University of Health Sciences), Burdwan, West Bengal, India.

Corresponding Author: Dr. Sajal Kumar Sarkar

ABSTRACT

Background: Low back pain (LBP) is one of the most common problem in the developed world and stress is believed to be one of the possible causes of chronic low back pain.

Aims: To observe the impact of perceived stress on chronic nonspecific low back pain in females of reproductive age group in an urban population of West Bengal.

Materials and methods: This prospective study was conducted in a tertiary care hospital in West Bengal in a time period of one year after taking clearance from the institutional ethical committee and consent of the patient. Two hundred female patients with chronic nonspecific low back pain (LBP) were included in this interventional study and divided into two groups: Group A and Group B (Age, Sex and BMI matched) using an online randomizer. Assessment of pain was done by Visual Analogue scale (VAS), range of motion by Modified Schober Test (MST) for extension and Oswestry Disability Index (ODI) for functional disability. VAS, MST, ODI were estimated on first day prior to treatment in both groups. Presumptive stressful life events stress scores (PSLES) were calculated. The Perceived Stress Scale (PSS) of Sheldon Cohen, the most widely used psychological instrument for measuring the perception of stress, was used to assess stress levels. Patients in Group A were asked to perform McKenzie exercise 10 times twice daily thrice a week for 3 months. Patients in Group B were asked to perform McKenzie exercise 10 times twice daily thrice a week for 3 months as well as progressive muscle relaxation. All the parameters were reassessed after 3 months in both groups.

Statistical analysis: Data were analyzed using software SPSS version 16.

Results: There was no significant difference in Age, PSS, PSLES, Waist/Hip ratio and BMI between the two groups on first examination. There was no significant difference in VAS, ODI and MST scores between the two groups on first encounter. PSS scores decreased in both groups following 3 months of treatment and the decrease was significantly more in Group B. VAS ODI scores were significantly decreased in both grouped in post treatment session as compared to pretreatment session and this change was more in subjects who practiced PMR and MST scores significantly increased in both groups after the treatment (P value Group A 0.04 and Group B <0.001).

Conclusions: Perceived stress may increase morbidity in females of reproductive age group suffering from nonspecific low back pain and progressive muscle relaxation therapy along with normal treatment protocol may have a better outcome.

Keywords: Chronic nonspecific low back pain, perceived stress, relaxation therapy.

INTRODUCTION

Low back pain (LBP) is one of the most common problems in modern population. It can be extremely disabling, and the social and economic burden is enormous. The cause of the vast majority of LBP is unknown; current tests cannot identify a pathological cause for the pain in at least 85% of cases and such LBP is usually termed non-specific low back pain. Inability to reliably identify pathology has given rise to numerous hypotheses concerning the cause of LBP, including reduced trunk extensor endurance, psychological distress, hamstring inflexibility, poor muscle control of the trunk, poor posture. [1-6]

To identify serious pathology, all guidelines for management of LBP recommend use of a diagnostic triage. Based on the findings from the history and physical examination, LBP is classified into one of three diagnostic categories: non-specific low back pain or simple backache, nerve root/spinal nerve compromise, or potential cases of serious spinal pathology. [1-6]

Because non-specific LBP currently cannot be further classified, it is often referred to according to its duration: acute LBP (duration less than six weeks); sub-acute LBP (duration more than six weeks and less than three months); and chronic LBP (duration more than three months). [1-6]

The mind is one factor that can influence how we perceive pain and how well we cope with it. Stress and emotional problems are believed to be possible causes of chronic low back pain. Psychological treatments such as relaxation techniques and cognitive behavioral therapy can be used to tackle these issues. Other treatments include medication, special exercises and physiotherapy. [1-6]

Progressive muscle relaxation (PMR) is one very common relaxation technique. It is also known as Jacobson's progressive muscle relaxation or deep muscle relaxation⁷. It is thought that mental

and emotional stress can make muscles tense, which makes low back pain even worse. Relaxation techniques like progressive muscle relaxation aim to interrupt this cycle. A number of studies suggest that progressive muscle relaxation can relieve low back pain and improve flexibility, at least in the short term. [7]

There is continuing uncertainty in back pain research as to which treatment is best suited to patients with non-specific chronic low back pain (CLBP). In a study, Gestalt therapy and the shock trauma method Somatic Experiencing (SE) were used as interventions in parallel with the usual cross-disciplinary approach. The aim was to investigate how these treatments influence a patient's capacity to cope with CLBP when it is coupled with depression. In this qualitative explorative study, a phenomenological- hermeneutic framework was adopted. Patients were recruited on the basis of following criteria: A moderate depression score of 23-30 according to the Beck Depression Inventory Scale and a pain score of 7-10 (Box scale from 0-10) and attendance at five- six psychotherapeutic sessions. Six patients participated in the study. The data was comprised of written field notes from each session, which were subsequently analysed and interpreted at three levels: naive reading, structural analysis and critical interpretation and discussion. [6]

Three areas of focus emerged: the significance of previous experiences, restrictions in everyday life and restoration of inner resources during the therapy period. The study revealed a diversity of psychological stressors that related to loss and sorrow, being let down, violations, traumatic events and reduced functioning, which led to displays of distress, powerlessness, reduced self-worth, anxiety and discomfort. [6]

Overall, the sum of the stressors together with pain and depression were shown to trigger stress symptoms. Stress was down-played in the psychotherapeutic treatment and inner resources were re-

established, which manifested as increased relaxation, presence, self-worth, sense of responsibility and happiness. This, in turn, assisted the patients to better manage their CLBP. [1-7]

CLBP is a stress factor in itself but when coupled with depression, they can be regarded as two symptom complexes that mutually affect each other in negative ways. When pain, stress and depression become overwhelming and there are few internal resources available, stress seems to become prominent. There is increasing evidence that chronic back pain can cause both physical and emotional distress. As researchers are learning more about the links between pain, depression and anxiety, they are also gaining insight into ways to break the cycle of pain and emotional distress. [1-6]

Low back pain is more common in females as female muscular ligamentary supports are not as strong as male counterparts. Pregnancy, puerperium and excess workload, lack of posture care adds to this problem. Women in reproductive age group have to play multiple roles and this adds extra stress to their lives which may further aggravate this problem. A study conducted in Meerut in 2015 observed that hormonal and reproductive factors along with duration of work hours and posture while working is all associated with chronic low back pain. [8]

Women have a life-expectancy advantage over men, but a marked disadvantage with regards to morbidity. Individual differences in physical and mental health are further notably explained by the degree of stress individuals endure, with women being more affected by stressors than men. [9] Most Indian women are over stressed. In a survey conducted in 2011 [9] it was found the highest stress is perceived by women between 25-55 years who have to manage multiple roles in various fields. So the present study was conducted to see the impact of perceived stress on chronic nonspecific low back pain in a reproductive age group in an urban population of West Bengal.

MATERIALS AND METHODS

This interventional study was conducted in a tertiary care hospital in West Bengal in a time period of one year after taking clearance from the institutional ethical committee and informed consent of the patients.

Two hundred female patients with chronic nonspecific low back pain were included in this randomized study and divided into two groups: Group A and Group B (Age, Sex and BMI matched) using an online randomizer.

Inclusion criteria: Female subjects in reproductive age group presenting with nonspecific LBP (duration more than 3 months).

Exclusion criteria: Patients with gross musculoskeletal, neurological disorder, cardiovascular and metabolic disorder, and on drugs that may alter test results were excluded. Subjects on treatment from psychiatry problem, pregnant women, puerperal mothers, sportswomen, yogis, subjects on regular meditation and exercise regime were excluded. Hypothyroid patients, subjects having adrenal disorders, androgenic/anabolic drug users were not included.

On first appointment history was carefully recorded followed by physical examination. BMI, Waist/Hip ratio were measured. Assessment of pain was done by Visual Analogue scale (VAS), range of motion by Modified Schober Test (MST) for extension and Oswestry Disability Index (ODI) for functional disability. VAS, MST, ODI were estimated on first day prior to treatment in both groups.

Visual Analogue scale (VAS): It consists of a 10 cm line, bounded by terminal anchors (e.g. pain as bad as it could be or no pain at all). The patient is allowed to mark the line relative to the intensity of pain. Scores can be between 0-10, where 0 is no pain at all and 10 where pain intensity is maximum. [10-11]

Modified Schober Test (MST) for extension: A point is marked between

dimples of pelvis at the level of S2. Two points, one 5cm below and the other 10cm above are marked and the distance between the two is measured. The patient is asked to extend spine to the maximum extent and the distance is remeasured and the difference is calculated. [10-11]

Oswestry Disability Index (ODI): ODI helps in assessing how LBP is affecting daily life activities including pain intensity, personal care, lifting, walking, sitting, standing, sleeping, sex life, social life, travelling. Each item is scaled from 0-5 with higher values representing greater disability. ODI= Total score according to patient\ 50×100.Score: 0-20% (minimal disability); 21-40% (moderate disability); 41-60% (severe disability); 61-80% (crippled); 81-100% (bed ridden). [10-11]

Measures of stress: The stress related behavioral parameters studied were Presumptive life event stress scale (PSLES) and perceived stress (PSS). [12-14]

Subjects were asked to tally a list of 43 life events based on a relative score. Accordingly, they were categorized into no stress, less/moderate stress and severe stress. Score Stress up to 40: No stress; 41-200 Less/moderate stress; More than 200 severe stresses.

The Perceived Stress Scale (PSS) of Sheldon Cohen, the most widely used psychological instrument for measuring the perception of stress, was used to assess stress levels. It is a measure of the degree to which situations in one's life are appraised to be stressful. Items were designed to find how unpredictable, uncontrollable, and overloaded respondents find their lives. The scale also includes a number of direct queries about current levels of experienced stress. The questions in the PSS ask about feelings and thoughts during the last month. It comprises of 10 items, four of which are reverse-scored, measured on a 5-point scale from 0 to 4. PSS scores are obtained by reversing responses (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1, and 4 = 0) to the four positively stated items (items 4, 5, 7, and 8) and then

summing across all scale items. Total score ranges from 0 to 40.

Patients in Group A were asked to perform McKenzie exercise [15-16] 10 times twice daily thrice a week for 3 months. The exercises included 1) Extension in lying with elbow flexed: Patient was asked to lie in prone position. Then supporting forearm with flexed elbows, patient was asked to lift the head with chest off the ground for 5 seconds 2) Extension in lying with elbow extended: Elbows here were extended slowly from flexed position and head, chest, upper abdomen lifted off the ground maintaining the position for 5 seconds. 3) Extension in standing: Patients were asked to stand in erect posture keeping hands over both iliac crest and extend spine backward up to maximum limit without posterior tilting of pelvis, maintaining position for 5 seconds.

Patients in Group B were asked to perform McKenzie exercise 10 times twice daily thrice a week for 3 months as well as progressive muscle relaxation. All subjects in Group B were also given a training of Progressive muscle relaxation (PMR). Training involved tensing the specific muscle groups for 7-10 sec, followed by releasing them (relaxing) for 15-20 sec as per Jacobson's protocol. [7] They were asked to practice this technique at home for 20 min every day for 3 months and come for follow-up.

All the parameters were reassessed after 3 months in both groups. During the study period they were followed up as routine checkup at OPD and over telephonic conversation.

Increased sympathetic activity has been observed during the premenstrual phase and this was positively correlated with the stress levels in previous studies. To avoid stress effects of the premenstrual phase, we examined our subjects during the postmenstrual phase.

Statistical analysis: Data were analyzed using software SPSS version16; probability values (P Value) <0.05 were considered as statistically significant and P Values <0.01

were considered as statistically highly significant. T test was used.

RESULTS

This study was conducted in a time span of one year on two hundred females in reproductive age group having chronic nonspecific low back pain. They were divided into two groups using an online randomizer and Group A received McKenzie exercise and Group B received McKenzie exercise as well as progressive muscle relaxation treatment for 3 months. There was no significant difference in Age, PSS, PSLES, Waist/Hip ratio and BMI between the two groups on first examination (Table1). There was no significant difference in VAS, ODI and MST scores between the two groups on first encounter. PSS scores decreased in both groups following 3 months of treatment and the decrease was significantly more in Group B (Table 2). VAS ODI scores were significantly decreased in both grouped in post treatment session as compared to pretreatment session and this change was more in subjects who practiced PMR (Table3-4) and MST scores significantly increased in both groups after the treatment (Table5, P value Group A 0.04 and Group B <0.001).

Table 1: The average values of Age, PSS, PSLES, Waist/Hip ratio and BMI two groups in pre-treatment session are shown in the following table.

PARAMETERS	Mean ± SD		P- VALUE
	GROUP A	GROUP B	
AGE(Years)	26.6 ± 5.2	26.2 ± 5.3	0.55
BMI(Kg/m ²)	25.7 ± 1.8	25.06 ± 1.5	0.55
Waist/Hip ratio	0.98 ± 0.07	0.99 ± 0.08	0.3
PSS	29.9 ± 2.6	29.4 ± 3.1	0.32
PSLES	359.3 ± 42.3	357.3 ± 47.5	0.8

Results showed no significant difference in Age, PSS, PSLES, Waist/Hip ratio and BMI between two groups.

P-value <0.05 (*significant)

P-value <0.01 (**highly significant)

Table 2: The average values of PSS and BMI two groups in post-treatment session are shown in the following table.

PARAMETER	Group A	Group B	P VALUE
	No=100 Mean ±SD	No=100 Mean ±SD	
PSS	29.3 ± 4.5	21.8 ± 1.6	<0.001**
BMI (kg /m2)	23.9 ± 3.99	23.2 ± 3.8	0.2

Results showed significant difference in PSS between two groups. PSS and BMI both were significantly decreased in both groups as compared to pretreatment session with B group showing more significant decrease in PSS scores.

P-value <0.05 (*significant)

P-value <0.01 (**highly significant)

Table 3: Comparison of VAS scores before and after treatment in both groups

Group	VAS (Pre-treatment)	VAS (Post- treatment)	P Value
A	5.76±1.24	2.4±0.9	P<0.001**
B	6.12±1.3	1.53±0.9	P<0.001**

VAS = Visual Analogue Scale.

Significant and highly significant if the analyzed probability values (P value) were P<0.05* and P<0.01**, respectively

Table 4: Shows ODI values of group A and group B

Group	Pre-treatment Score	Post-treatment Score	P Value
B	37.76±11.8	18.6±9.1	<0.001**
A	37.2±12.9	27.5±13.2	<0.001**

Oswestry Disability Index (ODI)

Significant and highly significant if the analyzed probability values (P value) were P<0.05* and P<0.01**, respectively

Table 5: Shows MST values of group A and group B

Group	Pre-treatment Score	Post-treatment Score	P Value
B	1.2±0.94	3.02± 1.1	<0.001**
A	1.12±0.8	2.4±0.98	0.04*

Modified Schober Test (MST)

Significant and highly significant if the analyzed probability values (P value) were P<0.05* and P<0.01**, respectively

DISCUSSION

Psychological research has focused on identifying people with acute pain who are at risk of transitioning into chronic and disabling pain, in the hope of producing better outcomes. Several multicausal Cognitive Behavioural models dominate the research landscape in this field. The cognitive-behavioural researchers in the late 20th century noted that acute pain was associated with a pattern of physiologic responses seen in anxiety attacks, whilst chronic back pain was characterized more effectively by habituation of autonomic responses and by a pattern of vegetative signs similar to those seen in depressive disorders. Several studies have indicated

that pain-related fear is one of the most potent predictors of observable performance and is highly correlated to self-reported disability levels in subacute and chronic pain. [17]

In the acute pain situation, "avoidance" behaviours, such as resting, are effective in allowing the healing process to occur. In chronic pain patients, the pain and disability appear to persist beyond the expected healing time for such a complaint. The danger is that a protracted period of inactivity, as a strategy for coping with the persistent pain may lead to a disuse syndrome. It is associated with physical deconditioning such as loss of mobility, muscle strength and lowered pain thresholds (allodynia). Consequently, the performance of daily physical activities may lead more easily to pain and physical discomfort. As a result, the avoidance of activity becomes increasing likely, as does the risk of chronicity. [17-21]

Numerous studies have shown strong connections between psychological factors and chronic pain. In one study, depressed individuals were 3 times more likely than their nondepressed counterparts to develop chronic back pain, showing depression to be a potentially modifiable risk factor in the development of chronic back pain. Another study found a significant association between sexual abuse and a lifetime diagnosis of nonspecific chronic pain, chronic pelvic pain, and other painful conditions, indicating the importance of obtaining a thorough patient history. Breathing and relaxation exercises activate the parasympathetic nervous system, which can help the body return to a calmer state - decreasing heart rate, blood pressure, and muscle tension - while stopping the release of stress hormones. [22-23]

In the present study we observed that subjects with chronic nonspecific LBP practicing PMR and exercise had better prognosis as compared to subjects only on exercise regimen. These findings are similar to the previous studies. PSS scores were also significantly lower in these subjects

practicing both exercise regimen and relaxation exercises.

Many psychological factors have been suggested to be important obstacles to recovery from low back pain. Nicholas MK [24] compared a more comprehensive range of 20 factors in predicting outcome in primary care. Consecutive patients consulting 8 general practices were eligible to take part in a prospective cohort study; 1591 provided data at baseline and 810 at 6 months. Clinical outcome was defined using the Roland and Morris Disability Questionnaire (RMDQ). The relative strength of the baseline psychological measures to predict outcome was investigated using adjusted multiple linear regression techniques. The sample was similar to other primary care cohorts (mean age 44 years, 59% women, mean baseline RMDQ 8.6). The 20 factors each accounted for between 0.04% and 33.3% of the variance in baseline RMDQ score. A multivariate model including all 11 scales that were associated with outcome in the univariate analysis accounted for 47.7% of the variance in 6 months RMDQ score; rising to 55.8% following adjustment. Four scales remained significantly associated with outcome in the multivariate model explaining 56.6% of the variance: perceptions of personal control, acute/chronic timeline, illness identify and pain self-efficacy.

A systematic search [25] was undertaken for prospective studies dealing with psychosocial risk factors for poor outcome of LBP in primary care, screening PubMed, PsychInfo and Cochrane Library databases. The methodological quality of studies was assessed independently by two reviewers using standardized criteria before analysing their main results. Twenty-three papers fulfilled the inclusion criteria, covering 18 different cohorts. Sixteen psychosocial factors were analysed in three domains: social and socio-occupational, psychological and cognitive and behavioural. Depression, psychological distress, passive coping strategies and fear-

avoidance beliefs were sometimes found to be independently linked with poor outcome, whereas most social and socio-occupational factors were not. The predictive ability of a patient's self-perceived general health at baseline was difficult to interpret because of biomedical confounding factors. The initial patient's or care provider's perceived risk of persistence of LBP was the factor that was most consistently linked with actual outcome. [25-27]

Psychological factors rarely seem to be an important cause of prolonged pain, but they invariably affect it. [20-27] Our study also demonstrates similar findings. Research over the last 35 years has demonstrated that pain, as well as numerous other factors, change the central nervous system in ways that lead to prolonged pain, even when the illness or injury that initiated it has healed. In fact, most chronic pain is more attributable to sensitization of the nervous system than to problems in the body parts that hurt.

An article by Linton SJ et al [27] reviewed the role of psychological factors in the development of persistent pain and disability, with a focus on how basic psychological processes have been incorporated into theoretical models that have implications for physical therapy. It was observed that pain has clear emotional and behavioral consequences that influence the development of persistent problems and the outcome of treatment. As psychological processes have an influence on both the experience of pain and the treatment outcome, the integration of psychological principles into physical therapy treatment would seem to have potential to enhance outcomes. The present study also demonstrates similar findings.

Applying psychological knowledge in the clinical practice of physical therapy, however, has been quite a challenge. A majority of physical therapists are aware of the importance of psychological factors and attempt to utilize this awareness in their practice. The application of psychological knowledge in physical therapy might range

from providing reassurance to setting goals or inquiring about the functional consequences of pain.

Limitations and future scope: The subjects were followed up only for 3 months which adds limitation to the present study, longitudinal studies with long term follow up are on the way. Only female subjects of a specific age group were included so the effects of the study cannot be generalized on the population as a whole.

CONCLUSIONS

Perceived stress may increase morbidity in females of reproductive age group suffering from nonspecific low back pain and progressive muscle relaxation therapy along with normal treatment protocol may have a better outcome.

Conflict of interest: Declared None.

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How to cite this article: Chaudhuri A, Sarkar SK. A study to observe the impact of perceived stress on chronic nonspecific low back pain in females of reproductive age group in an urban population of West Bengal. *International Journal of Research and Review*. 2018; 5(12):320-327.
