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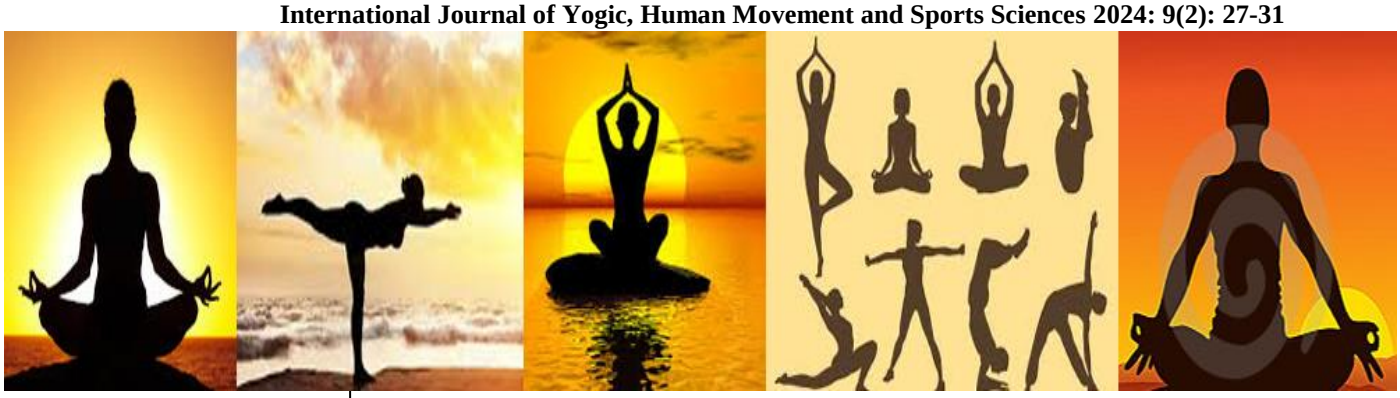

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# Effect of asana and pranayama on anxiety and quality of life among professionals with chronic mechanical low back pain

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**Abstract**
**Background:** Chronic Mechanical low back pain (CLBP) and anxiety significantly diminish the quality of life (QOL) among working professionals. Integrated practices of asana and pranayama have been shown to have a positive impact on Chronic Mechanical lower back pain. However, studies evaluating the impact of yoga practices such as asana and pranayama on Chronic Mechanical low back pain in the working population are scarce.
**Aim:** This study aimed to assess the impact of specific asana and pranayama on anxiety and quality of life in female professionals with chronic mechanical low back pain.
**Methods:** A total of 80 female professionals from an orthopedic hospital in Chennai were randomly assigned to either the yoga group (n = 20; mean age - 31.45±3.47 years) or the control group (n = 20; mean age - 32.75±3.71 years). The yoga group underwent interventions with an integrated module of asana and pranayama practices, One hour per day and five days a week for Six weeks, and did not engage in any physical practices in the control group. All participants were assessed at baseline and after 6 weeks using the World Health Organization Quality of Life Brief (WHOQOL BREF) questionnaire and the State Anxiety Scale.
**Results:** Data were analyzed using Analysis of Variance (ANOVA) for within-group comparisons and Independent Samples f-test for between-group comparisons, conducted using the Statistical Package for the Social Sciences (SPSS). Within-group analysis revealed significant changes in physical fitness, psychological wellness, and social domains in both the yoga and control groups. However, analysis showed a higher percentage of improvement in the yoga group compared to the control group.
**Conclusions:** The practice of asana and pranayama demonstrated reduced anxiety levels and greater improvements in QOL compared to the control group among working female professionals with CLBP. This suggests the importance of incorporating yoga as a lifestyle intervention for working professionals.

**Keywords:** Asana, pranayama, low back pain, professionals, anxiety, quality of life

## Introduction
Yoga, originating in India and described as far back as the Vedic texts, has been practiced for millennia. It has emerged as a popular mind-body therapy for chronic mechanical low back pain, as suggested by emerging scientific studies worldwide. Moreover, the National Institutes of Health have classified yoga as "a form of Complementary and Alternative Medicine." Yoga adopts a multidimensional approach, utilizing practices at both the physical level (Asana) and the mind level (Pranayama techniques and relaxation techniques).
The demands of the female working profession, including physical fitness, and psychosocial challenges, contribute significantly to musculoskeletal disorders among females. Chronic mechanical low back pain stands out as the most prevalent musculoskeletal disorder among professionals.
Yoga is a traditional system of mind-body practice that seeks to align bio-rhythms through a harmonious connection between mind, body, and breath. Yoga interventions have been demonstrated to enhance physical health, mental well-being, psychological balance, behavioral regulation, and interpersonal interactions. Consequently, they may also lead to a simultaneous reduction in a range of psycho-pathological symptoms.

Psychological disturbances may either contribute to chronic low back pain (CLBP) or arise as a consequence of it, often exerting predictive value and a greater impact than biomechanical factors. Among the most frequently reported disturbances are depression, anxiety, fear, and anger. Functional disability in any form can have a significant psychological impact. CLBP is strongly associated with state anxiety, and in patients with mechanical low back pain and functional disability is correlated with scores on both anxiety and Quality of life scales.

Elevated levels of emotional stress and anxiety can induce neurological and behavioral changes as well as negative lifestyle practices, which in turn can detrimentally affect quality of life. The WHO-QoL-BREF is recognized as a valid tool for assessing subjective quality of life. WHO defined Quality of life, encompasses individuals' perceptions of their position in life within the context of the culture of the person and value systems they belong to, along with their goals, expectations, principles, and concerns. This assessment tool comprises 26 questions wherein participants rate their perception of their quality of life over the past four weeks on a 5-point Likert scale, encompassing four domains: physical health, psychological health, social relationships, and environment.

Studies have shown nonspecific improvements in quality-of-life following yoga interventions among breast cancer survivors, menopausal women, and individuals with nonspecific chronic back pain.

Yoga, among the most popular mind-body interventions, impacts Brain-derived neurotrophic factor (BDNF), which plays crucial roles in the neuroplasticity of the central nervous system. BDNF is now recognized to regulate sensory neurotransmission at spinal and brain levels, and to modulate neuropathic and inflammatory pain in adulthood. Over the past decade, human studies have demonstrated the expression of BDNF in both nondegenerate and degenerate intervertebral discs and herniated discs, implicating BDNF's association with low back pain.

Brain-derived neurotrophic factor and serotonin levels increase with yoga intervention and are considered mediators of the beneficial effects of asana and pranayama on mental disorders and neurological disorders. While substantial evidence supports the notion that pranayama increases Brain-derived neurotrophic factor levels in various disease states, the detection of changes in Brain-derived neurotrophic factor levels as an effector of yoga practice on pain modulation has not been widely reported. Interestingly, one recent study observed an increase in serum Brain-derived neurotrophic factor levels after a 12-week yoga intervention in patients with depression. Additionally, serotonin has been proposed as one of the neuromodulators mediating the effects of yoga. Building upon previous findings, it is hypothesized that various asana and pranayama practices alleviate anxiety and improve the quality of life in patients with chronic diseases.

## Methods

**Study Design:** Forty female professionals with chronic mechanical low back pain were recruited through local flyers distributed in Chennai, India. Twenty female professionals were assigned to the experimental group, which underwent a 6-week yoga program. Twenty female professionals were assigned to the control group.

**Inclusion criteria:** Patients with mild to moderate levels of pain diagnosed by Visual Analogue Scale (VAS) were included in the study. A total of 60 female working professionals aged between 30 and 40 years with chronic Mechanical low back pain were eligible for participation.

**Exclusion criteria:** Patients with severe mental or medical comorbidities, those already practicing yoga or undergoing cognitive behavioral therapy or psychotherapy, users of addictive substances, and those non-cooperative during the study were excluded. Forty participants who met the inclusion criteria provided written informed consent and were included in the study, while seven participants were excluded during screening.

**Randomization was performed using the chit box method. Participants were randomly assigned to**

**Interventional group (n=20):** Received yoga intervention for 6 weeks in addition to standard medical treatment.

**Control group (n=20):** Received standard medical treatment alone for the same duration.

**Study Procedure:** Participants rated their pain using the Visual Analogue Pain Scale (VAS) with scores Pain Ranging from 0 to 10, where 0 indicated no pain and 10 indicated the worst pain imaginable. Mild pain was defined as VAS scores between 3 and 5, while moderate pain was defined as VAS scores between 6 and 8.

Participants were instructed to maintain their lifestyle during the intervention. The yoga intervention group practiced a set of Asanas, Pranayama, and relaxation techniques for one hour daily, five days a week, under the guidance of a trained yoga instructor. Anxiety and quality of life (QOL) were assessed through questionnaire before training and after the sixth week in both study groups.

**The following yoga practices were recommended during the study period**

**Asanas:** Talasana, Marjariasana, Adho Mukha Svanasana, Shashankasana, and Supta Jathara Parivartanasana.

**Pranayama:** Diaphragmatic breathing, Anulom-vilom, Bhramari, and Omkar Chanting.

Statistical analysis was performed using Analysis of Variance (ANOVA) to determine significant differences between the control group and experimental groups I and II for Anxiety and Quality of Life pre- and post-intervention. The significance level was set at 0.05.

**Anxiety**

The analysis of variance in the data obtained for the Anxiety of pre and post-test of the Asanas and pranayama training Group (EG) and control (CG) groups have been presented in table 1.

**Table 1:** Analysis of variance of ASANAS and pranayama practice group and control group on anxiety

| Group | Yogic Practice | Control Group | Source of variance | Sum of squares | DF | Mean square | 'F' Ratio |
|---|---|---|---|---|---|---|---|
| Pre Test Mean | 22.95 | 40.15 | Between | 44.100 | 1 | 44.100 | 0.954 |
| SD | 4.94 | 6.65 | Within | 1757.500 | 38 | 46.250 | |
| Post-test Mean | 40.10 | 38.05 | Between | 2941.225 | 1 | 2941.225 | 68.453* |
| SD | 7.84 | 6.94 | Within | 1632.750 | 38 | 42.967 | |
| Adjusted Post-test mean | 31.5 | 39.1 | Between | 3573.975 | 1 | 3573.975 | 42.06* |
| | | | Within | 1801.200 | 37 | 54.173 | |

* $F_{(0.05)}$ (1, 38 and 1, 37) = 4.10, *Significant at 0.05 level of confidence

Table 1 displays the pre-test means of Anxiety for the experimental and control groups, indicating values of 22.95±4.94 and 40.15±6.65, respectively. The obtained 'F' ratio value of 0.954 for the pre-test scores of both groups on Anxiety was less than the required table value of 4.10 for significance with df 1 and 38 at a 5% level of confidence. This suggests no significant difference between the groups at pre-test, confirming equal randomization.

The post-test mean values of Anxiety for the experimental and control groups were 40.10±7.84 and 38.05±6.94, respectively. The obtained 'F' ratio value of 68.453 for post-test scores was greater than the required table value of 4.10 for significance with df 1 and 38 at a 5% level of confidence. This indicates a significant difference among the means due to Asana and Pranayama practices on Anxiety Level.

The adjusted post-test mean values for the experimental and control groups were 31.50 and 39.10, respectively. The obtained 'F' value for this comparison was also greater than the required table value of 4.10 for significance with df 1 and 37 at a 5% level of confidence. The study's results demonstrate a significant difference between the experimental and control groups in the changes in Anxiety after eight weeks of training. Additionally, there was a significant change in Anxiety following Asana and Pranayama practice.

**Health-related quality of life**

The analysis of variance in the data obtained for the Health-related quality of life of pre and post-test of the Asanas and pranayama training Group (EG) and control (CG) groups have been presented in table 2.

**Table 2:** Analysis of variance of ASANAS and pranayama practice group and control group on health-related quality of life

| Group | Yogic Practice | Control Group | Source of variance | Sum of squares | df | Mean square | 'F' Ratio |
|---|---|---|---|---|---|---|---|
| Pre Test Mean | 62.20 | 48.90 | Between | 837.225 | 1 | 837.225 | 3.437 |
| SD | 16.3 | 10.92 | Within | 9256.150 | 38 | 243.583 | |
| Post-test Mean | 53.05 | 58.30 | Between | 883.600 | 1 | 883.600 | 5.376* |
| SD | 14.8 | 11.6 | Within | 6246.000 | 38 | 164.368 | |
| Adjusted Post-test mean | 57.6 | 53.6 | Between | 2693.705 | 1 | 2693.705 | 7.185* |
| | | | Within | 7129.600 | 37 | 364.089 | |

* $F_{(0.05)}$ (1, 38 and 1, 37) = 4.10, *Significant at 0.05 level of confidence

Table 2 presents the pre-test means of Health-related quality of life for the experimental and control groups, with values of 62.20±16.3 and 48.90±10.92, respectively. The obtained 'F' ratio value of 3.437 for the pre-test scores of both groups on Health-related quality of life was less than the required table value of 4.10 for significance with df 1 and 38 at a 5% level of confidence. This indicates no significant difference between the groups at pre-test, affirming equal randomization.

The post-test mean values of Health-related quality of life for the experimental and control groups were 53.05±14.8 and 58.30±11.6, respectively. The obtained 'F' ratio value of 5.376 for post-test scores was greater than the required table value of 4.10 for significance with df 1 and 38 at a 5% level of confidence. This demonstrates a significant difference among the means due to Asana and Pranayama practices on psychological variables, specifically Health-related quality of life. The adjusted post-test mean values for the experimental and control groups were 57.60 and 53.60, respectively. The obtained 'F' value for this comparison was also greater than the required table value of 4.10 for significance with df 1 and 37 at a 5% level of confidence.

The study's results reveal a significant difference between the experimental and control groups in the changes in Health-related quality of life after eight weeks of training. Additionally, there was a significant change in Health-related quality of life following Asana and Pranayama practice.

**Discussion**

**Mechanism of Yoga Therapy Module:** The probable mechanism of action of asana and pranayama involves balancing autonomic nervous functions by triggering neurohormonal mechanisms that suppress sympathetic activity through down regulation of the hypothalamic-pituitary-adrenal axis (HPA). Additionally, mindfulness-based Yoga practices may enhance parasympathetic activity, potentially reducing anxiety and pain and ultimately improving quality of life. Furthermore, the cellular effects of mechanical action and fluid pressure on structures such as cartilage suggest that asanas might alter spinal joint function. Low levels of intermittent fluid pressure, as experienced during joint distraction, can decrease the production of catabolic cytokines such as interleukin 1 and tumor necrosis factor. Thus, Asana may provide the necessary motion and forces on joints to maintain integrity. Moreover, pranayama and relaxation techniques following Asana help relax joints and muscles, reduce oxidative stress, and promote mental calmness. This study underscores the potential role of integrated asana and pranayama in managing chronic low back pain reducing anxiety and improving the quality of life.

**Conclusion**

Yoga intervention significantly improves overall quality of life and reduces anxiety among female professionals. The interventional group exhibited notably better physical and psychological health after six weeks of yoga compared to the control group. Moreover, when comparing the interventional group to the control group after six weeks, the mean change in all areas of quality of life and reduction in anxiety was

considerably greater in the interventional group subjects. Yoga demonstrated improvements across most domains of quality of life for individuals experiencing anxiety within a short period. Therefore, promoting yoga as an alternative therapy alongside medication can yield beneficial and prompt results, as yoga naturally heals both the body and mind. This research underscores the importance of raising awareness and promoting the practice of yoga among female professionals. However, further studies on a larger population are warranted to strengthen our current understanding of the beneficial effects of yoga intervention on quality of life.

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