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PREVALENCE OF LOW BACK PAIN IN PROFESSIONAL LAVANI DANCERS: AN OBSERVATIONAL STUDY

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Abstract : Low back pain (LBP) is a common musculoskeletal complaint among dancers, yet little is known about its prevalence and functional impact in professional Lavani dancers, who perform vigorous footwork, repetitive pelvic movements and rapid torso rotations. This observational study assessed the prevalence of LBP, associated factors and functional disability among professional Lavani dancers in Pune. A total of 105 professional female Lavani dancers aged 18–35 years, with at least two years of dance experience, were included after ethical approval and informed consent. Demographic and dance-related details, frequency of LBP and its effect on dance performance were recorded. Pain intensity was measured with the Numerical Pain Rating Scale (NPRS) and functional disability with the Oswestry Disability Index (ODI), and data were analysed descriptively. LBP was experienced often by 45.7% and always by 14.3% of dancers, while only 3.8% never experienced it. Dance performance was the most frequently reported aggravating activity (55.2%), followed by prolonged standing (18.1%). Pain affected dance performance in 58% of participants, and 51.4% reported missing performances or practice because of pain. On the ODI, 40% had moderate disability, 33.3% severe, 22.9% minimal and 3.8% crippling disability; NPRS scores of 7 and 8 were common in the 26–30 and 31–35 year age groups. Low back pain is a frequently reported problem among professional Lavani dancers, with considerable effects on function and dance participation. Early identification, preventive education, structured warm-up and core stabilisation, and physiotherapy-based management are recommended.

IndexTerms **-** Low Back Pain, Professional Lavani Dancers, Prevalence, Numerical Pain Rating Scale (NPRS), Oswestry Disability Index (ODI), Functional Disability, Physiotherapy, Dance-Related Musculoskeletal Disorders.

I. INTRODUCTION

Lavani is a vibrant and dynamic folk dance form of Maharashtra that involves intricate movements, rapid footwork, hip gyrations and fluid torso rotations. Although it is celebrated for its cultural richness and artistic expression, the physical demands placed on Lavani dancers are substantial. Dancers often engage in prolonged periods of dancing and perform complex movements that require high levels of flexibility, strength and stamina. As a result, musculoskeletal problems, particularly low back pain (LBP), are a common complaint among practitioners of this art form.

Much of a dancer's identity is tied to the ability to stay connected to dance throughout life, and injuries can threaten this identity. Many dancers continue in other roles within the dance industry once they retire from professional performance, and with a retirement age in the late twenties or early thirties, this is similar to other types of sport and significantly earlier than national mandatory retirement ages. Keeping dancers injury-free throughout their career and during partial retirement is central to supporting them [1].

Low back pain is a significant problem worldwide, and data suggest that dancers show an increased prevalence of LBP compared with the general population who exercise less often. Much of the existing literature on LBP and dance-related injury does not subdivide the study population by genre, often using the umbrella term 'dancers' or combined labels such as 'modern and ballet dancers'. These terms do not give context to the dance genres studied and prevent comparisons [1]. Musculoskeletal pain and injury have also been described in folk, ballroom, ballet, modern and Indian classical dancers [5–9], [14], and LBP is known to be a leading cause of disability worldwide [13].

In Lavani dancers, LBP is one of the most frequently reported ailments and affects the ability to perform and to sustain a long-term career. The high prevalence can be attributed to repetitive strain from deep bending and twisting, postures that stress the lumbar spine, a lack of training in biomechanics, inadequate warm-up and insufficient recovery time. Chronic LBP not only impairs performance but also affects overall quality of life, which has become a growing concern for dancers and choreographers because it threatens the sustainability of the dance form [2].

LBP in dancers is an ongoing problem that has been documented to have a lasting negative effect, even after dancers have stopped dancing professionally, and dancers of all ages, sex, proficiency levels and genres may experience it [3]. Dancers, who are required to perform complex and repetitive movements of the spine, are thought to be vulnerable to LBP, but limited evidence is available on its prevalence, impact and associated factors in this population [4].

The core of Lavani's aesthetic lies in rapid, eccentric movements. The dance involves constant transitions between deep squats (*Mandi*) and sudden, explosive trunk rotations known as *Latkas* and *Jhatkas*. These movements require a high degree of lumbar lordosis and forceful pelvic tilting, which, from a biomechanical perspective, places considerable shear load on the intervertebral discs. Such high-velocity movements are often performed for hours in heavy sarees and with several kilograms of *ghungroos* (ankle bells), leading to cumulative micro-trauma. The ghungroos add centrifugal force to every kick and stamp, magnifying the ground reaction forces that travel from the heels to the sacroiliac joints and lumbar region. The dancer must also maintain an exaggerated anterior pelvic tilt, which increases the compressive load on the L4–L5 and L5–S1 segments. Combined with the high-velocity shaking of the hips, the lumbar spine is subjected to repetitive rotational shear forces. Over years of performance this may lead to early-onset disc degeneration, facet joint arthropathy and chronic muscle imbalances, particularly tightening of the iliopsoas and weakening of the abdominal stabilisers. Despite its cultural vitality, Lavani remains under-researched with respect to musculoskeletal health, and preliminary observations suggest a high prevalence of LBP among professional performers.

NEED OF THE STUDY.

By conducting this study, awareness can be raised, preventive measures improved and targeted rehabilitation programmes developed for dancers. This would not only promote better health and well-being among Lavani dancers but also ensure the sustainability of the dance form by addressing a pressing issue that affects the ability of its practitioners to perform at their best.

Aim and Objectives.

Aim: The primary aim of this study was to assess the prevalence of low back pain among Lavani dancers and to explore the factors contributing to its occurrence. By understanding the extent and causes of LBP in this group, the study aims to provide data-driven insights for improving the dancers' health and performance longevity.

Objectives:

1) To determine the overall prevalence of low back pain in Lavani dancers.
2) To assess the severity and frequency of low back pain among different age groups and experience levels within Lavani dancers.
3) To evaluate the impact of LBP on dancers' performance.
4) To suggest preventive strategies, treatment options and rehabilitation techniques to mitigate the risk of LBP in Lavani dancers.

REVIEW OF LITERATURE

Swain et al. (2018) conducted a prospective study of the prevalence and impact of LBP in pre-professional and professional dancers, examining its effect on dance participation, care-seeking and medication use. Of the 119 participating dancers (54% of those invited), 52% reported activity-limiting LBP and 24% reported chronic LBP. Seventeen percent of all episodes of LBP resulted in some dance activity being missed completely, one-third of the sample sought care and one-fifth used medication. A history of LBP was associated with activity-limiting LBP ($p < 0.01$) [3].

Swain et al. (2019), in a systematic review of the epidemiology of LBP and injury in dance, included fourteen studies reporting LBP prevalence, thirteen cross-sectional and one prospective. The median (range) point prevalence was 27% (17%–39%), and the median 12-month prevalence was 73% (41%–82%) for any LBP and 33% (25%–52%) for LBP associated with activity limitation or disability. One study reported a 24% prevalence of chronic LBP, and lifetime history of LBP ranged from 17% to 88%, with a median of 50% [1].

Henn et al. (2020) systematically reviewed LBP and injury in ballet, modern and hip-hop dancers (33 articles: 25 ballet, five modern and three hip-hop) and noted that chronic pain can compromise a dancer's ability to dance for the rest of their life. The prevalence of LBP was relatively high in ballet (20.3%–79% of dancers) and hip-hop (46.6%–85.7%), whereas little research existed on modern dancers [2].

Sadhu et al. (2024) evaluated the prevalence, location and pattern of musculoskeletal pain and discomfort among dancers and reported that LBP was the most common problem (30.8%), with significant relationships between LBP and pain in the hip, knee and ankle, emphasising the need for awareness and preventive measures [16]. Vianin (2008) reviewed the psychometric properties of the Oswestry Disability Index and reported acceptable internal consistency (Cronbach α 0.71–0.87), high test–retest reliability ($r = 0.83–0.99$) and intraclass correlation coefficients of 0.84–0.94 [15].

MATERIALS AND METHODS

A. Study design and participants

This observational study was conducted among professional Lavani dancers from Pune over a period of six months, with a sample size of 105. Ethical approval was obtained from the institutional committee, and informed consent was taken from all participants before data collection.

Inclusion criteria: female Lavani dancers aged 18 to 35 years; a minimum of two years of Lavani dance experience; and actively participating in Lavani dance (at least 3 hours per day or week).

Exclusion criteria: age above 35 years; low back or related surgery within the past year; and current or recent low back injury or any chronic condition (past six months).

B.Materials and outcome measures

The materials used were a consent form, a demographic data sheet, the Numerical Pain Rating Scale (NPRS) and the Oswestry Disability Index (ODI). The demographic sheet recorded age, years of dancing, hours of dancing and number of dance days per week, frequency of LBP, aggravating activities, effect of rest, effect of pain on performance, missed performances or practice, and the contribution of costume, footwear, stage surface and travel.

Oswestry Disability Index (ODI): used to measure the level of disability caused by low back pain. Reliability: Cronbach α ranges from 0.71 to 0.87, with high test–retest reliability (r = 0.83 to 0.99). Validity: construct validity has shown high correlation with the Roland–Morris Disability Questionnaire ($r = 0.819$, $p < 0.001$) [15].

Numerical Pain Rating Scale (NPRS): used to assess pain intensity. Its reliability is moderate (ICC = 0.67), and the scale is valid for measuring pain intensity [17].

C. Procedure

Ethical approval from the institutional committee was obtained and Lavani dancers from Pune were approached. The aims and objectives of the research were explained to the participants, and those who fulfilled the inclusion criteria were included in the study after written informed consent. The NPRS was used to assess pain intensity, and the ODI was used to measure the level of disability caused by low back pain. The assessment sheets were compiled, data collection was completed within the estimated time frame, and statistical analysis was performed.

D. Data analysis

The collected data were entered and analysed using Microsoft Excel and IBM SPSS Statistics. Descriptive statistics, including frequency, percentage, mean and standard deviation, were used to summarise the demographic characteristics and low back pain-related variables of the participants. The Shapiro–Wilk test was used to assess the normality of numerical data. The prevalence of low back pain was calculated by dividing the number of participants reporting low back pain by the total number of participants assessed and multiplying the result by 100. Both 12-month prevalence and current prevalence were considered based on the questionnaire responses.

RESULTS

A total of 105 professional female Lavani dancers participated in the study. The results are presented in Tables 1 to 13.

Table 1: age distribution of participants (N = 105)

Age (years)	Frequency (n)	Percentage (%)
19	1	1.0
20	1	1.0
22	2	1.9
24	2	1.9
25	5	4.8
26	4	3.8
27	4	3.8
28	9	8.6
29	10	9.5
30	24	22.9
31	1	1.0
32	14	13.3
33	5	4.8
34	12	11.4
35	11	10.5
Total	**105**	**100.0**

Most respondents were in the late twenties to mid-thirties. Participants aged 30 years formed the largest group (n = 24, 22.9%), while younger participants were comparatively fewer.

Table 2: years of performing Lavani dance (N = 105)

Years of dancing	Frequency (n)	Percentage (%)
2	1	1.0
3	6	5.7
4	5	4.8
5	22	21.0
6	15	14.3
7	8	7.6
8	13	12.4
9	9	8.6
10	22	21.0
12	4	3.8
Total	**105**	**100.0**

Experience ranged from 2 to 12 years. Five and ten years of experience were each reported by 22 dancers (21.0%), and a considerable proportion had between 5 and 10 years of experience, indicating that the sample included both moderately experienced and established performers.

Table 3: practice / performing hours per day (N = 105)

Hours per day	Frequency (n)	Percentage (%)
2	1	1.0
3	91	86.7
4	11	10.5
5	2	1.9
Total	**105**	**100.0**

Most participants (n = 91, 86.7%) practised or performed for 3 hours per day; 10.5% reported 4 hours, 1.9% reported 5 hours and one participant reported 2 hours.

Table 4: dance days per week (N = 105)

Days per week	Frequency (n)	Percentage (%)
2	2	1.9
3	31	29.5
4	68	64.8
5	4	3.8
Total	**105**	**100.0**

Nearly two-thirds of the participants (n = 68, 64.8%) danced 4 days per week, followed by 3 days per week (n = 31, 29.5%).

Table 5: frequency of low back pain (N = 105)

Frequency of LBP	Frequency (n)	Percentage (%)
Often	48	45.7
Rarely	21	20.0
Sometimes	17	16.2
Always	15	14.3
Never	4	3.8
Total	**105**	**100.0**

Nearly half of the participants (45.7%) experienced low back pain often and 14.3% experienced it always, whereas only 3.8% reported never experiencing it. Thus, 101 of the 105 dancers (96.2%) reported low back pain with some frequency, indicating that LBP is a commonly reported concern in this population.

Table 6: activity that increases pain most (N = 105)

Activity	Frequency (n)	Percentage (%)
Performance	58	55.2
Long standing	19	18.1
Bending forward	7	6.7
No such pain	7	6.7
Twisting movements	6	5.7
Lifting costumes/equipment	4	3.8
Practice	4	3.8
Total	**105**	**100.0**

Dance performance was the most frequently reported activity associated with increased pain, accounting for more than half of the responses (55.2%), followed by prolonged standing (18.1%). Bending forward, twisting movements, lifting costumes or equipment and practice were reported less frequently.

Table 7: does rest reduce pain? (N = 105)

Response	Frequency (n)	Percentage (%)
Yes	57	53.3
No	48	46.7

Rest reduced pain in 57 participants (53.3%), whereas 48 participants (46.7%) reported no relief with rest.

Table 8: does pain affect dance performance? (N = 105)

Response	Frequency (n)	Percentage (%)
Yes	60	58.0
No	45	42.0

Sixty participants (58.0%) reported that pain affected their dance performance, while 45 (42.0%) reported no such effect, suggesting that pain is a relevant factor influencing dance performance.

Table 9: missed performance / practice due to pain (N = 105)

Response	Frequency (n)	Percentage (%)
Yes	78	51.4
No	27	48.6

Seventy-eight participants (51.4%) reported having missed a dance performance or practice session because of pain, whereas 27 (48.6%) had not missed any sessions. Pain may therefore interfere with participation in dance-related activities and affect the continuity of training and performance.

Table 10: do costume, footwear, stage or travel contribute to pain? (N = 105)

Response	Frequency (n)	Percentage (%)
Yes	70	42.9
No	35	57.1

Responses regarding the contribution of costume, footwear, stage surface and travel to pain were ‘yes’ in 70 participants (42.9%) and ‘no’ in 35 participants (57.1%).

Table 11: Oswestry Disability Index total score (N = 105)

Score	n	%	Score	n	%	Score	n	%
0	4	3.8	15	3	2.9	25	4	3.8
3	1	1.0	16	4	3.8	26	2	1.9
5	1	1.0	17	8	7.6	27	3	2.9
7	1	1.0	18	4	3.8	28	1	1.0
8	6	5.7	19	4	3.8	30	1	1.0
9	1	1.0	20	12	11.4	31	1	1.0
10	10	9.5	21	7	6.7	32	1	1.0
11	1	1.0	22	4	3.8	35	2	1.9
12	1	1.0	23	3	2.9	40	1	1.0
13	6	5.7	24	8	7.6			

ODI total scores ranged from 0 to 40, with a score of 20 being the most frequent (n = 12, 11.4%), followed by scores of 10 (n = 10, 9.5%) and 17 and 24 (n = 8 each, 7.6%).

Table 12: Oswestry Disability Index interpretation (N = 105)

Disability category	Frequency (n)	Percentage (%)
Moderate	42	40.0
Severe	35	33.3
Minimal	24	22.9
Crippled	4	3.8
Total	**105**	**100.0**

Moderate disability was the most common category (40.0%), followed by severe disability (33.3%), minimal disability (22.9%) and crippling disability (3.8%). Moderate-to-severe functional disability was thus present in about three-quarters of the dancers.

Table 13: NPRS pain intensity according to age group (N = 105)

Age group (years)	NPRS score	Frequency (n)	Percentage (%)
18–20 (n=2)	4	1	50.0
	9	1	50.0
21–25 (n=9)	2	1	11.1
	5	1	11.1
	6	3	33.3
	7	1	11.1
	8	3	33.3
26–30 (n=51)	2	2	3.9
	3	3	5.9
	4	3	5.9
	5	2	3.9
	6	4	7.8
	7	15	29.4
	8	19	37.3
	9	3	5.9
31–35 (n=43)	4	1	2.3
	5	1	2.3
	6	4	9.3
	7	12	27.9
	8	20	46.5
	9	5	11.6

Among the two participants aged 18–20 years, one reported a score of 4 and the other a score of 9. In the 21–25 year group, scores of 6 and 8 were the most frequent (3 participants, 33.3%, each). In the 26–30 year group, a score of 8 was the most common (n = 19, 37.3%), followed by a score of 7 (n = 15, 29.4%). In the 31–35 year group, a score of 8 was reported by 20 participants (46.5%), followed by 7 (n = 12, 27.9%). Overall, NPRS scores of 7 and 8 were common among participants aged 26–30 and 31–35 years. The 18–20 year group contained only two participants, which limits meaningful comparison, and these findings describe the distribution of pain intensity across age groups without establishing an association between age and pain severity.

II. Discussion

This study assessed the prevalence of low back pain among professional Lavani dancers and its relation to pain intensity, functional disability and dance performance in 105 professional female Lavani dancers aged 18 to 35 years, using the NPRS for pain intensity and the ODI for functional disability.

Low back pain was a commonly reported musculoskeletal problem in this group. Of the participants, 45.7% experienced pain often and 14.3% always, 16.2% sometimes and 20% rarely, and only 3.8% never experienced it, suggesting that a considerable proportion of professional Lavani dancers have recurrent episodes of low back pain. The repetitive movements, prolonged physical activity, rapid pelvic movements, trunk rotations and sustained postures involved in Lavani may place mechanical stress on the lumbar spine, and continuous exposure during practice and performances may increase the likelihood of musculoskeletal discomfort. Altered lumbar movement and spinal kinematics have been studied in dancers with low back pain [10], [12].

Most participants were in their late twenties to mid-thirties, with participants aged 30 years forming the largest group (22.9%), indicating that the study included many dancers in their active professional years. Experience was spread across durations, with 21% each reporting 5 and 10 years, which allows low back pain to be examined among performers with different durations of dance participation. Regarding dance exposure, 86.7% practised or performed for 3 hours per day and 64.8% danced 4 days per week. Repeated exposure and insufficient recovery between demanding sessions may contribute to the development or aggravation of symptoms; however, the present study does not establish a direct causal relationship between the duration of dancing and low back pain.

Dance performance was the most commonly reported aggravating activity (55.2%), followed by prolonged standing (18.1%), forward bending (6.7%), twisting movements (5.7%), and lifting costumes or equipment and practice (3.8% each). Lavani involves repeated pelvic movements, coordinated trunk movements, dynamic footwork and sustained lower-limb

postures, which place repeated demands on the lumbar and surrounding musculature and may contribute to pain during performance.

Low back pain also affected professional participation: approximately 58% of participants reported that pain affected their dance performance and 51.4% reported missing performances or practice sessions because of pain. Pain-related limitations may impair the ability to maintain specific postures, perform repetitive movements and sustain the physical demands of performances.

The NPRS findings showed that higher pain scores were frequently observed among participants aged 26–35 years: a score of 8 was reported by 37.3% of the 26–30 year group and 46.5% of the 31–35 year group, followed by a score of 7 in 29.4% and 27.9% respectively. These observations describe the distribution of pain intensity across age groups and do not indicate a statistically significant relationship between age and pain severity.

On the ODI, 40% of participants had moderate disability, 33.3% severe, 22.9% minimal and 3.8% crippling disability. The predominance of moderate and severe disability indicates that low back pain was associated with considerable functional limitation, which may affect lifting, standing, walking, sitting and other daily activities, and for professional dancers may interfere with regular practice and stage performance.

The findings are consistent with previous research in other dance populations. Swain et al. [3] reported that 52% of pre-professional and professional dancers experienced activity-limiting LBP and 24% chronic LBP, with some dance activity being missed, which parallels the reported interference with performance and missed sessions among the Lavani dancers here. Swain et al. [1] found a substantial prevalence of LBP across dance populations, with activity limitation and disability, and Henn et al. [2] identified LBP as a common complaint in ballet, modern and hip-hop dancers whose persistent pain could affect participation and long-term function, in agreement with the moderate-to-severe disability and recurrent pain observed in professional Lavani dancers.

From a physiotherapy perspective, the findings emphasise the importance of preventive and rehabilitative strategies. Management may include core stabilisation, strengthening of the abdominal and paraspinal muscles, lumbar–pelvic control training, flexibility exercises, postural correction and movement re-education, together with education on warm-up and cool-down routines, activity modification, recovery periods and early management of symptoms. Individualised programmes can be designed according to the dancer's pain intensity, functional limitation and professional requirements.

III. Conclusion

This study highlights the high prevalence and considerable functional impact of low back pain among professional Lavani dancers, showing that the repetitive biomechanical demands of the dance impair performers during their peak career years. Factors such as sustained deep lower-limb flexion, rapid torso rotations and a near-absence of structured warm-up routines appear to contribute to this occupational musculoskeletal strain. The reliance on passive rest rather than active clinical management points to a gap in occupational health and injury prevention within traditional performing arts. Proactive musculoskeletal screening, targeted core stabilisation conditioning and accessible physiotherapy are essential to safeguard dancers' well-being, protect career longevity and support the sustainable future of Lavani as a cultural art form.

IV. Clinical Implications

Proactive musculoskeletal screening: routine clinical screening of professional dancers to identify early signs of lumbar dysfunction, movement faults and functional limitation before they progress to chronic disability.

Targeted pre-rehabilitation: specialised regimens focusing on core stabilisation, deep abdominal and paraspinal strengthening and lumbar–pelvic motor control to help performers withstand high-velocity rotational and flexion forces.

Shift toward active rehabilitation: educating performers to move away from passive coping such as prolonged rest or self-medicated pain relief, and toward active physiotherapy, therapeutic exercise and guided movement re-education.

Occupational health education: workshops for dancers, troupe leaders and choreographers emphasising dynamic warm-ups, proper physical pacing and ergonomic awareness in injury prevention.

Holistic and multidisciplinary support: collaboration between performing-arts organisations and physiotherapists to address external factors such as footwear support, costume weight distribution and stage flooring.

V. Limitations of the Study

Cross-sectional design: the design restricts the ability to establish causal relationships between specific Lavani movements and the onset of low back pain.

Reliance on self-reported data: data were collected mainly through subjective questionnaires (NPRS and ODI), exposing the study to recall bias regarding symptom history over the preceding six months.

Geographical limitation: the sample was restricted to female professional Lavani dancers in the Pune region, limiting generalisability to performers elsewhere.

Exclusion of age and gender groups: the study focused on female performers aged 18 to 35 years, leaving out male dancers and older, highly experienced practitioners who may have different musculoskeletal profiles.

Lack of objective biomechanical assessment: direct objective measures such as surface electromyography, spinal range of motion or force-plate analysis were not included.
Potential confounding variables: individual fitness levels, daily ergonomic demands, non-dance physical activity and nutritional habits were not controlled and may have influenced reported pain.

VI. Future Scope of the Study

Longitudinal and prospective investigations: to better establish causal relationships between cumulative dance exposure and the development of chronic low back pain.
Objective kinematic and biomechanical analysis: motion capture, surface electromyography and force plates to measure muscle activation, spinal range of motion and lumbar loading during Lavani movements.
Expanded demographic representation: inclusion of male performers, older veteran dancers and practitioners from other regions or other traditional folk dance genres to enhance generalisability.
Clinical interventional and rehabilitation trials: randomised controlled trials of core stabilisation programmes, neuromuscular training and standardised pre-performance warm-up protocols for preventing and managing low back pain.
Ergonomic and environmental impact studies: analysis of how stage flooring, costume weight and distribution, and footwear mechanics contribute to spinal stress and injury risk.

VII. Acknowledgment

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