

LOW BACK PAIN IN DANCERS- A SYSTEMATIC REVIEW

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Abstract

Background: In dance literature, Low back pain (LBP) has been referred to as one of the most predominant musculoskeletal disorders encountered by dancers. Thus there is a need to support the prevalence of low back pain in dancers with different styles and associated risk factors to it.

Purpose: To find out the evidence for the prevalence of low back pain in dancers and to list the causes of low back pain which is considered as risk factors in dancers

Methods: Studies published between 2000 -2023 were included from different dance styles like Kathak, Bharatanatyam, Ballet, hip-hop and modern dancers, age group-15-40 yrs. Out of 46 studies that were screened; nine fulfilled the inclusion criteria and were included in the review.

Results: Prevalence of back pain in Kathak dancers mostly due to barefoot stamping with pronated foot. In Bharatanatyam dancers due to maintenance of posture (half sitting, full sitting position), there is hyperlordosis, inadequate core muscle strength, increased anterior pelvic tilt, tightening of the lumbar extensor musculature, and insufficient strength of hamstring muscles. Injury seems relatively high in ballet dancers where the two movements are most common the demi plié (which is the same as aramandi in Bharatanatyam) and grand plié (which also is identical to muzumandi).

Conclusion: This study aims to call attention to this gap of enumerating the various risk factors for back pain with repetitive body movements according to each dance style. Rehabilitation program should be implemented at the earliest who will emphasize dancers to be trained at an early stage.

Keywords-*low back pain dancers, dancers, dance style*

Introduction

1.1.1. Dance and injury

Dance is a physical pursuit and benefit with cardio respiratory fitness, muscle size and strength, bone mineral density, as well as reduced rates of obesity, depressive symptoms, dementia risk, and long-term illness. Dance can also be physically demanding who begin training in early childhood participate in multiple dance styles. Professional dance is physically demanding entailing constant repetition of complex movements and movement patterns, which has been associated with injury risk. Dancers of all genres frequently do beautiful but difficult movements, choreography, training, and performances which call for strength, mobility, elegance, passion, and emotion. [1] Injury in dancers can include loss of professional opportunity which can cause stigmatization inside the

dancing community, can cause identity disruption and emotional suffering. Longer term injuries may have negative impact on health and increased risk of chronic illness. With the right training, dancers can avoid compromising their health and wellness as they execute the positions and motions required for their art form. [1]

1.1.2 Dance style practice: Ballet, modern, tap, dramatic, folk, flamenco, break dancing, ballroom dancing, hip hop, contemporary, salsa, free style and jazz are among the most popular dance styles practiced in Western nations. Ballet and Bharatanatyam (an Indian classical dance form) are two of the most popular dance styles in the world. Despite worldwide practice of several traditional Indian dance forms classical dancer's health problems are rarely explored. Till date western dancers have a high frequency and severity of back and lower extremity injuries. It is uncertain though; if Indian dancers who engage in traditional dance styles endure comparable pain and injury traits. [6,7, 8]

1.1.3 Musculoskeletal problems –low back pain in dance injury:

The frequent health issue of low back pain can be characterized as an uncomfortable sensory and emotional experience. Factors associated with LBP are diverse and heterogeneous. A trustworthy indicator of injury to tissue or disease is pain. It is not possible to ignore the contribution of mechanical or physiological components to pain. Attention recently has been raised about the rising prevalence of LBP in both the young population and children. Numerous researches have revealed that LBP is an issue that affects a lot of teenagers, with a peak occurrence in the third decade of life. Rapid development and increased physical activity may be the root of LBP in children and adolescents. Young adults who were not diagnosed with LBP at age 14 had a greater chance of the ailment 25 years later. As a result, during the first few years of adolescence, effective exercise can stop the course of LBP and lower the related morbidities. Previous research has shown that a high body mass index (BMI) is linked to a higher incidence of LBP. Physical factors are not the only ones that increase the risk of LBP but psychosocial factors such as stress, anxiety, depression, monotony, poor interpersonal relationships, job satisfaction, lack of social support are also considered. These risk factors may cause an acute LBP event to become a persistent problem.[12-14]

Age, socioeconomic status, lower education, obesity, smoking, method of transportation, time of transportation, over exercise, prolonged standing, injury, and employment have all been linked in some studies to LBP. Increased anterior pelvic tilt, abdominal muscle weakness, hamstring tightness, decreased back extensor endurance and flexibility, leg length discrepancy, IT band tightness, hip abductor and adductor flexibility and strength, and triceps surae flexibility are mechanical factors associated with back pain.[14,15] Literature supports all the above mentioned factors in college going students and young athletes. Therefore, there is a need for research to support the prevalence of back pain among dancers of all genres and the risk factors that go along with it.

Aims and objectives:

To find out the evidence for the prevalence of low back pain in dancers.

To list the causes of low back pain which is considered as risk factors in dancers.

Materials and Methods

Using the search phrases dancers and low back pain dancers, a database search for pertinent peer-reviewed papers was carried out. Medline/PubMed, Google Scholar, Scopus, and other databases were searched. Research published between 2000 and 2023 that met the age requirement of 18 years or older were considered. After that, citation titles and abstracts were scrutinised for their applicability to the inclusion of the focus on low back pain occurrence in dancers. Nine of the 46 papers that were available and that were examined met the inclusion criteria thus were incorporated in the review.

Results:**Methodological quality**

Each of the selected three systematic reviews was screened against the ten questions forming the CASP method. The results of the screening are Smith T et al 2020 the average CASP score was 6/11 with Swain et al 2019- score of 5/11 and Jacobs. C et al 2012 -score being 5/11. All the studies included in this review listed above belong to moderate quality. Two RCT –Kulkarni M et al 2018 and Khandekar S et al 2018 was evaluated with methodological quality of CASP – where both the studies score 2 out of 11 which shows moderate quality. One prospective cohort study- Swain et al 2018 was qualified with CASP scoring – 6/12 which shows moderate quality again. Three cross sectional studies- Ranade P et al 2019 with CASP score 6/12 –moderate quality, Roussel N et al 2013 with CASP score 9/12 –high quality and De Souza et al 2022 with CASP score 8/12-moderate quality.

Discussion**Primary objective:****Prevalence of low back pain in Dancers**

The North Indian traditional dance known as Kathak is distinguished by its swift turns, rhythmically complex footwork, and delicate hand postures. They dance barefoot, emphasising foot pounding and rapid rhythmic changes. According to Shafali and Parag[6], low back discomfort affects 59% of Kathak dancers in Pune. According to the research conducted by Shweta Chandan and colleagues [6], 25% of Kathak dancers have pronated feet, while 65% of them had extreme pronation.

Kulkarni M et al concluded that statically both the groups had equal effects on reduction of low back pain and improvement of core strength in bharatanatyam dancers with core stabilization exercises and kinesiotaping.[7] Khandekar S et al study was to assess how well pilates exercises relieved low back pain in bharatnatyam dancers with NPRS and OSWDQ scales showing significant difference.[8]

Dr Jatin et al reported Ballet dancers with LBP have a prevalence of 57% on average. In ballet dance, low back pain as well as injuries appears to be very common. On the frequency of problems with the back in modern or hip-hop dancers, little research is available. [5] N Roussel et al proved Dancers with a history of LBP showed poorer lumbopelvic motor control ($p < 0.05$). [4] De Souza et al aimed to verify flexibility of spine and foot classical ballet posture in teenagers and the STarT back tool's potential for chronicity. The major findings suggested a potential risk of chronicity in young classical ballet dancers with high-intensity low back pain. [10]

Jacobs L C et al included dancers like professional ballet, high school level, university level, gymnasts, modern dancers related to prevalence, incidence and risk factors. [2] Swain et al synthesize epidemiology of low back pain in pre professional and professional dancers. [3] Swain C.T.V et al performed a prospective cohort in pre-professional and professional ballet school dancers where 24% reported have persistent LBP. LBP was frequent and had a variety of effects on dancers. [9] This study emphasizes how important it is for dancers to have access to healthcare providers who are knowledgeable about evidence-based LBP management and prevention strategies.

Mechanical factors and demands in dancers causing low back pain

Kathak dancers have pronated foot posture which may indicate towards predisposition of foot, knee and back related problems and negative impact on the lower back thus leading to pain and dance-related injury [6]

Bharatanatyam dancers show maintenance of full sitting and half- sitting postures repetitive movements, rigorous foot work, reduced flexibility and strength, previous injury and joint laxity. It leads to the presence of musculoskeletal disorders in them. Numerous variables, such as stress, excessive work, tiredness, falls, a lack of exercise, uneven flooring, and poor diet, can lead to injuries. Inadequate core muscle strength, increased anterior pelvic tilt, tightening of the lumbar extensor musculature, and insufficient strength of hamstring muscles are mechanical causes of back discomfort. Dancers' back muscles are strained by movements that demand external turning of the legs and folding at the knee joints, which results in hyperlordosis. There are high chances of iliopsoas major shortening during hip flexion exercises that require repetition in the aramandi position. [11]

While the erector spinae and hip flexor muscles continue to be short, the resulting hyperlordosis lengthens the abdominal muscles, rendering them vulnerable to weakness. [11] Hamstrings and tight lumbodorsal fascia in the back, and weak muscles of the abdomen in the front causes pain, weak pelvic muscles and poor pelvic control which all contribute to low back pain. [8,11]

Ballet dancing requires turnout, a deep knee bend, and an upright spine similar to Bharatanatyam dancing. The two movements are the demi plié (which is the same as aramandi in Bharatanatyam) and grand plié (which also is identical to muzumandi). Regardless of their age, level of training, or gender, ballet dancers are susceptible to low back pain or injury. [5,16]

Limitation and Future recommendation

There is a dearth in the literature listing potential risk factors associated with low back pain in dancers with treatment guidelines. By categorizing those in to levels of classification awareness can be spread with appropriate preventive measures .Strengthening spine and lower limb should be practiced in dancers to make them less prone to injuries.

Conclusion:

There are plenty of mechanical factors with physical and psychosocial factors related to each dance style which leads to prevalence of back pain. Rehabilitation program to be implemented which will emphasize dancers to be trained at an early stage.

Implications: Posture is co-ordinated movement of upper and lower extremity and trunk muscles with adequate amount of strength, flexibility and endurance. Abnormal posture, experience in dance in years and in levels of training of dance should be the risk factors for low back pain in different dance forms.

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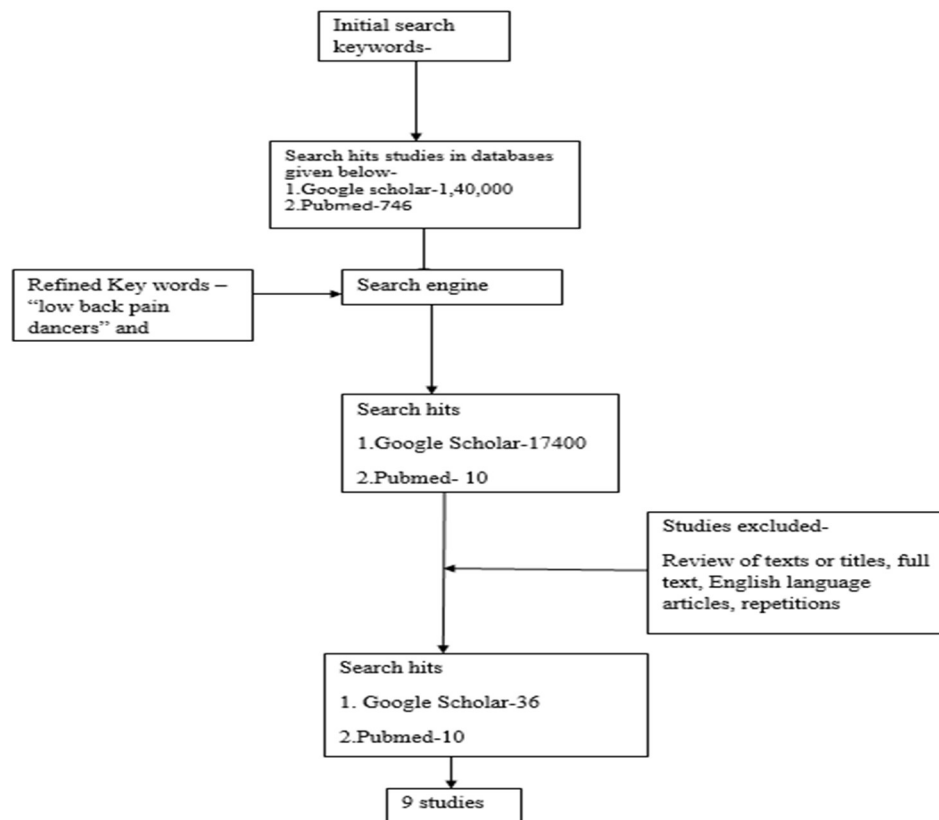


Figure1 PRISMA Flow Chart

	Author name and year	findings
1	Jacob C et al 2012 musculoskeletal Injury and pain in dancers.	Dance students are more likely to sustain lower extremities, hip, and back injuries, as well as ankle sprains in the opposite ankle, and dancers' ACL injuries may be exacerbated by fatigue.
2	Erica D. Henn Dr. Tina Smith, Dr. Jatin Ambegaonkar et al 2020	Ballet, hip hop and modern dancers. Ballet dancers are at risk for low back pain or injury independent of gender, age or level of mastery; there is not enough evidence to draw any conclusions about modern dancers or hip-hop dancers and their relationship to low back. pain
3	Swain et al 2019 LBP and injury in dance populations.	Fifty full-text articles were included. The median (range) point, yearly, and lifetime prevalence of LBP was 27% (17%-39%), 73% (41%-82%), and 50% (17%-88%), respectively. The lower back contributed to 11% (4%-22%) of time loss and 11% (5%-23%) of medical-attention injuries.
4.	Sohana Khandekar and Dr. Shrikant Mhase 2018	Female Bharatanatyam dancers ages 18- 30 years With NPRS and OSWDQ scales showing improvements, PILATES was proved to be effective in treating low back pain in female bharatanatyam dancers.
5	Kulkarni M et al 2018 low back pain in Bharatanatyam dancers.	Core stabilisation exercises and kinesiotaping had incomparable effects in reducing VAS and enhancing core strength in Bharatanatyam dancers with low back pain over a period of six weeks in both groups.
6	Swain C.T.V et al LBP in professional dancers and its impact -	119 dancers participated, with Activity limiting LBP was reported by 52% of dancers, while chronic LBP was reported by 24%. One-third of the sample reported care-seeking and one-fifth of the sample used medication. A history of LBP was associated with activity limiting LBP ($p < 0.01$; adjusted odds ratio: 3.98; 95% confidence interval: 1.44, 11.00).
7	Dr Shefali and Dr Parag 2019 Kathak dancers age 15-30 yrs	In Pune, 59% of Kathak dancers reported experiencing low back discomfort, with 94.31% reporting mild disability and 5.68% reporting moderate disability.
8	Roussel N et al 2013 dancers with LBP and without LBP Age 17-26 yrs	Dancers with a history of LBP displayed worse lumbopelvic motor control than healthy dancers ($p < 0.05$). People with a history of LBP have less motor control.

9	De Souza et al low back pain in adolescents of classical ballet 2022	Dancers with high-intensity low back pain showed a potential risk of chronicity The thoracic and lumbosacral flexibility in the sagittal plane had no effect on the intensity of the spine pain. Greater supine FPI was related to mild low back pain. Higher exposure time-frequency and dancing time were related to lower Startback Screening tool scores.
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Table 1: Summary of articles including low back pain in dancers.