



Proportion Of Musculoskeletal Pain And Knee Pain Related Disabilities Among Kathak Dancers Of The Saurashtra Region.

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ABSTRACT

Background: Most of the dancers have high prevalence of musculoskeletal pain and injury. Indian classical dance is one of them. Kathak is the most popular dance form of Indian classical dance. Though kathak is north Indian dance, but there are many kathak dancers in Gujarat and particular Saurashtra region. Many previous studies have shown musculoskeletal proportion in different type of dance forms, but there is no study one about musculoskeletal pain among kathak dancers and particularly knee pain related disabilities. With knowing proportion and difficulty level feel by the kathak dancers, treatment can be done accordingly.

Objectives: To find out proportion of musculoskeletal pain and knee pain related disabilities among kathak dancers.

Methods: An observational study was conducted at various kathak centers of the Saurashtra region. After checking inclusion and exclusion criteria, we take demographic data and asked their practice related questions to the dancers. The Nordic questionnaire sheet was filled by the dancers to know proportion of musculoskeletal pain. Oxford knee score taken to know difficulties in various activities. NPRS before and after dance practice was taken to know immediate knee pain after dance practice.

Results: the kathak dancers of the Saurashtra region have lower back and ankle pain with 20% of proportion. 15% dancers have knee pain, 12% shoulder pain, 11% hips/thighs pain and neck pain, 10% upper back pain and only 1% have wrist pain. Difficulties by kathak dancers due to knee pain is very mild.

Conclusion: The prevalence of back pain and ankle pain is highest among kathak dancers followed by knee pain. Knee pain related disabilities are very mild and there is no significant change in NPRS before and after dance practice.

Keywords: *musculoskeletal pain, knee pain, kathak dancers*

CHAPTER 1

INTRODUCTION

According to Sangeet Natak Academy, that is the National Academy for the performing arts of India, there are major eight classical dances in India. These eight traditional dance forms have roots in the Natyashastra.¹ The major eight forms of classical dance in the India are: Bharatnatyam, Kathak, Kathakali, Odissi, Kuchipudi Manipuri, Mohiniattam and Sattriya.^{1,4} One of the most well-liked classical dances in North India is kathak. Gujarat have a large amount of the students of the Kathak dancer. The Sanskrit term "Katha," which meaning narrative, is the root of the English word "Kathak," which meaning "to do with stories."^{3, 4} In Kathak dance the dancer tells the story, generally of lord Krishna and Hindu god goddess through their dance performance³.

Kathak consist of complex and powerful footwork with bol of various instruments like tabla, pakhavaj etc. In Kathak, a blend of parans, taals, and tatkar create the performance. The Kathak dance has its roots in northern India. The dance of love is another name for kathak. Men and women dancers move to the beat of their own feet striking the floor. Kathak dancers typically narrate tales of Indian epics like the Ramayana and Mahabharata, as well as tales of gods and goddesses. Stories were told in the past by storytellers known as bards, who used only their body language and facial expressions—no music. With time, this art form expanded to incorporate dances and music. Later, these motions would involve footwork accompanied by ghungroos, which are bells worn around the ankles. The Kathak dance originally originated in temples and later spread to kings' courts and royal residences.^{1, 2, 6}

Kathak dancers wear traditional hats and long-sleeved jackets for males, and Ghaghara skirts with cholis for ladies. The Kathak dance developed during Bhakti movement, but it was also performed in courts

of Mughal kings⁶. It was modified, adjusted, and incorporated Mughal court tastes throughout the 16th and 17th centuries, particularly under Akbar. It did, however, stagnate and diminish during the British colonial period. When India attained freedom and tried to use the arts to rediscover its historical origins and a sense of national identity, it was reborn^{1, 2, 4}. Kathak is primarily divided into two sections. Dance that is expressive (Nritya) and pure (Nritta).^{1,2} A few Kathak artists might get up on stage to address the audience, tell stories in a language different than their own, give an explanation, or lead the audience in a rhythmic rendition of a song⁶.

Kathak has mainly three distinct forms according to its evolution: Jaipur, Banares, and Lucknow. There are some differences in the dance style according to gharanas. The Jaipur gharana mainly focus on the foot movements, while the Banaras and Lucknow gharana mainly focus on facial expressions and graceful hand movements.⁴ Kathak dance forms emphasize rhythmic foot movements, with small bells, called as _ghoongroo with music. Kathak dancers tell stories through facial expressions, gestures, Upper body movements and arms. The focus of the Kathak is eye movements and foot movements of the dancers. The performing art of Kathak has been passed down orally and through practice from one to the next generation. This tradition is called as Guru shishya Parampara.^{1, 4}

Nritta begins with moving her neck, wrist, and eyebrows slightly. She then gradually increases her vigor and pace as she completes the Bol. Every bol contains brief segments where the dancers emphasize twists, gestures, and footwork. Every section is finished with a mark, which is usually a quick turn of the head.^{1, 2} during this segment, dancers do "tatkar," or sloping their feet on the floor to musical beats. An abstract, quick, and rhythmic element of Kathak is the nritta performance. Like all other traditional Indian dance forms, Kathak nrittas showcase pure movement, with a focus on the beauty of form, speed, range, and pattern in motion. It seeks to stimulate the audience's senses (prakriti). Nritta moves quickly and in time. Like all other traditional Indian dance forms, Kathak nrittas showcase pure movement, with a focus on the beauty of form, speed, range, and pattern in motion. It seeks to stimulate the audience's senses (prakriti). While Nritya, or slow and far more expressive Kathak dance, is rapid and rhythmic, Nritta is slower and uses dancers' expressions to communicate stories.¹ Nritya is the slower and expressive aspect of Kathak. It attempts to communicate feelings of storyline that particularly includes the story of Hindu gods. In an nritya, the dance expands to include words, musical notes, and gestures to articulate a message and the dancers put the efforts to connect with the viewers through their facial expressions and movements of their body parts. The Nritya part of the Kathak dance is also known as abhinaya part, as the dancers explain the story to the viewers with various gestures with the music. It has four aspects of a performance: 1. Angik that includes gestures and body language, 2. Vachik that includes song, recitation, music, and rhythm, 3. Aharya that includes dress, make-up, jewelry and 4. Satvik, that includes artist's mental disposition and emotional connection with the story and audience. The stories in Kathak performance mainly focus on Hindu lord Krishna and his childhood Leela. Sometimes the stories focus on Shiv and Devi from Indian epics. This form of expressiveness is also found in thumri and ghazals.^{2, 6}

According to WHO Musculoskeletal pain and musculoskeletal impairments includes more than 150 different diseases or conditions that affect the musculoskeletal system. It includes impairments in the muscles, bones, joints, and adjacent connective tissues leading to temporary or lifelong limitations in functioning and participation. Musculoskeletal conditions mainly characterized by pain and limitations in mobility and dexterity that can lead to reduction in people's ability to work and participate in society. One profession that has a direct correlation with musculoskeletal pain is dancing. Dancers have a higher risk of musculoskeletal pain and injury. Study about prevalence of pain among dancers is necessary to treat them accordingly. Kathak dance is the dance that requires intensive foot work and sharp turns, that can lead to musculoskeletal pain in the kathak dancers.^{3, 7} Extensive foot work can lead to pain in lower extremities among Kathak dancers. Purpose of Lower limb in the body is mainly weight bearing, pain or injury in the lower limb can lead to disabilities in daily life activities of the person.

Knee joint is the hinge type of synovial joint. The function of the knee joint in the human body is to weight bearing during gait, flexing, and rotating yet remaining stable during the activities of daily life, and transmitting forces across it. If there is pain and injury to the knee, it can lead to difficulties in basic activities of daily living. Knee pain among dancers can be due to injury, overuse of muscles surrounding the knee joint, ligament injuries, arthritis, etc. The footwork can put stress at the knee joint. Past research has demonstrated that kathak dancers are more likely to acquire flat feet and pronated feet because of their dancing postures and extensive practice sessions. Research has indicated a clear connection between knee pain and feet that are flat or pronated. Flat feet and pronated feet increase load on knee joint that can lead to early OA of the knee joint.

In this study, to know proportion of musculoskeletal pain Nordic musculoskeletal questionnaire have been taken. It is reliable to know the proportion of musculoskeletal pain. Numerous investigations have been conducted to verify its validity and reliability among individuals in various professions. This questionnaire includes pain at various body region in last twelve months and in last seven days. Neck, Shoulders, Elbows, Wrists/hands, Upper back, Lower back, Hips, Knees, and Ankles/foot are the areas covered by the questionnaire. Person must mark on the area, where he/she felt the pain in last twelve months and last seven days to know proportion of pain in different regions.^{30, 31, 32} Oxford knee score is a reliable questionnaire generally used for pre and post total knee replacement patients. Oxford knee score (OKS) describes various basic activities of daily living and its severity according to patient's perception. In this study questions of this questionnaire describe difficulties felt by the dancers. In the scale there is multiple choice 0 to 4 numbers according to difficulty level. 4 indicates least difficulty and 0 indicates highest difficulty in the task. Through the questions we know proportion of the difficulties in daily activities felt by the dancers.^{33, 34}

Numerical Pain Rating Scale (NPRS) is the basic scale use in clinical practice. In this scale there is a line and on that there are 0 to 10 numbers. 0 indicates no pain, 5 indicated moderate level of pain and 10 indicates severe pain. Patient can choose one number according to their perception. NPRS is the basic tool commonly used by the clinician 's pre and post treatment.³⁶



1.1 A pose of the kathak dance



1.2 Tatkar position of the kathak

CHAPTER 2

REVIEW OF LITERATURE

2.1 Epidemiology of Musculoskeletal pain

1.71 billion people suffer from musculoskeletal ailments globally.¹⁰ Musculoskeletal problems are the primary cause of impairments around the globe. Low back pain is the leading cause of disability in 160 countries.¹⁰ Lower wellbeing, a reduced ability to participate in society, and early retirement from the workforce are all consequences of musculoskeletal problems. They are characterized by pain and restricted movement and dexterity.¹⁰ Musculoskeletal diseases (MSDs) are a prevalent source of chronic pain and disability, with a prevalence of over one million cases worldwide.^{8,9} It is anticipated that emerging nations would have the highest rates of musculoskeletal pain, hence it is imperative that preventative and treatment measures be taken.⁹ In 2019, **Ashokkumar and colleagues** carried out review research. They looked at articles on musculoskeletal pain on Google Scholar, PubMed, and the National Library and discovered that between 6.92% and 76.8% of adult Indians had MSDs.⁸ The most common risk factors for musculoskeletal discomfort include female gender, middle age, lower educational attainment, modest job, frequent weight lifting, and repetitive hand movements at work. It has been shown that there is a high correlation between these traits and musculoskeletal pain. Numerous individuals encountered musculoskeletal issues. Insufficient understanding keeps the affected people from getting help. Musculoskeletal disorders are those that impact the neck, lower back, upper and lower limbs, muscles, nerves, tendons, joints, cartilage, and supporting structures.⁸

2.2 Profession and Musculoskeletal pain

Some workers have larger population that suffers from musculoskeletal pain according to type of the work. Many studies had focused on work related musculoskeletal pain. Work-related musculoskeletal disorders (WMSDs) are responsible for morbidity in many working populations¹¹. **(Sandul Yasobant et al 2014)** conducted a review study of musculoskeletal pain among healthcare workers. Regardless of location, 56% of nurses, 55% of physiotherapists, 54% of dentists, 39% of lab technicians, and 38% of doctors reported having physical pain in the previous year.¹¹ They found that. Prevalence of pain among nurses found to be prevalent than other health care workers.

(Subbarayalu et al. 2013) found that in the previous 12 months, IT workers had encountered WRMSDs in one way or another. The most common complaint, with 30% of the samples reporting having had neck pain issues in the previous 12 months, was this one. With yearly prevalence estimates of 13%, 14%, and 25%, respectively, shoulder pain, wrist and hand pain, and low back pain were the next most frequently reported symptoms.¹² According to a questionnaire survey conducted by **(Ghosh T et al., 2010)**, the majority of goldsmiths suffered from occupational disorders such as neck (80%), shoulder (20%), wrist (45%), and low back (75%) pain, as well as eye issues like irritation (30%) and burning feeling (70%).¹³ According to **(Damayanti S. et al., 2017)**, 53.52% of respondents reported having neck discomfort, rendering it the most prevalent musculoskeletal ailment. Teachers did not, however, report having persistent neck pain. Although neck discomfort was more frequent than back and shoulder pain, these body regions had greater rates of chronic pain. In addition, knee and wrist discomfort were less common than the other complaints. The greatest risk factor that was mentioned was using hands above the shoulder (62.27%).¹⁴ According to worker perspective, 65.8% of participants reported having an average level of mental stress at work **(Nafeesa et al., 2018)**. Things going on at work that were out of control had the biggest effect on the many of individuals (84.5%) among the many psychological stresses associated to the job. The bulk of physical pain/discomfort experienced by research participants during the previous 12-month period (53.5%) was related to the neck area. A statistical analysis showed a significant relationship between the prevalence of MSD and occupational mental stress.¹⁵

2.3 Musculoskeletal Pain and Dancers

Joy in Lagos State, Nigeria, professional dancers' incidence of musculoskeletal discomfort and injuries was investigated by **(Anulika Aweto et al., 2014)**. They discovered that the prevalence of musculoskeletal conditions and pain throughout a 12-month period was 86.1%. Of the participants, 36% had sustained an injury during the research, whereas 58% had sustained an injury two to four weeks earlier. The lower back (32.9%), ankle (25.2%), and knee (54.8%) were the body parts most affected.¹⁶ Indian classical dancers' musculoskeletal injury epidemiology was investigated by **Sarah Masal et al.,** in 2021. They used publications from PubMed, Cochrane, and Google Scholar to complete a systemic review study. Lower limbs sustained the many of the injuries. In Bharatanatyam dancers, the most common area for injuries was the back (42.5%), then after the knee (28.30%) and ankle (18.64%), whereas in Kathak dancers, the most common areas for

injuries were the back (47%), knee (16%), and ankle (18.64%). Of all the injuries sustained by 60 dancers, 80% involve low back discomfort, 17% to 30% involve the spine, and 38% involve the upper back. 54% of complaints were about the hips, 48% were about the thighs and knees, and 45% were about the ankles and foot.¹⁷ In a 2014 study by **Shruti Nair et al.**, Indian dancers in Mumbai and Mangalore were found to have a higher prevalence of musculoskeletal diseases in the back (42.5%), knee (28.3%), and ankle (18.6%). Stress was the most often cited cause of injury (34.4%), followed by exhaustion (17.2%), overwork (24.7%), and falls (13.5%). Of the dancers, 43.30% always did warm-up exercises and only 20% stretched after the dance. Nearly 60% of dancers engaged in non-dance-related kinds of exercise, such as yoga, aerobics, and swimming.¹⁸ A survey of musculoskeletal injuries among female Bharatanatyam dancers in the Udupi District of India was conducted by **Kumar et al., 2021**. It was shown that 10.8% of dancers claimed to have sustained musculoskeletal injuries due to dancing. Their rate of injury per 1,000 hours of dance was 0.65. The most often injured areas were the knee (27.2%) and ankle (27.2%), followed by the hip (9%), and lower back (13.6%). Of the dancers, 36.4% kept dancing despite of their injuries. For their dance-related ailments, 54.5% of the injured dancers sought medical attention from a professional.¹⁹ (**Annie Thomas et al., 2023**) investigated low back discomfort in dancers. They discovered that the primary cause of back pain in Kathak dancers was their pronated feet when they stamped barefoot. Because Bharatanatyam dancers maintain their posture (half-sitting, full-seated), they exhibit hyper lordosis, weak core muscles, an increased anterior pelvic tilt, lumbar extensors tightness, and weak hamstring muscles.²⁰

2.4 Kathak dance and musculoskeletal changes

In a study conducted by (**Chanageri SV et al., 2023**), The authors looked at how amateur teenage female Kathak dancers at certain Bengaluru dancing schools used their feet in relation to functional activities and in relation to foot deviations and concomitant foot injuries. They found that the foot posture index was normal and that there were no restrictions on the usage of the feet when performing the Kathak dancing form. However, the foot function index showed that the people were in significant discomfort, which restricted their pattern of activity and made it challenging for them to dance well.²³ In their 2017 study, Roopika Sabharwal and Sonia Singh examined ankle instabilities and disability in Kathak dancers. They discovered that foot and ankle disabilities affected 70% of Kathak dancers. Eighty percent of Kathak dancers had left ankle instability, and seventy-five percent had right ankle instability²¹. The relationship between foot deviations and the functional activity and dynamic balance of female Kathak dancers by **Bhagyashree Salekar et al.**, in 2024. They discovered that a sizable portion of Kathak dancer 's 56.25 percent—had pronated feet. The greatest population (86.25%) had no impairment in foot function, according to foot functional activity. A lower baseline score on the Y balance test was found in 25% of the sample, indicating a higher risk of musculoskeletal injuries and balance loss²⁴. According to research by **Shweta Chandan et al., 2018**, 3% of people had supinated feet, 7% had normal feet, 25% had pronated feet, and 65% had very pronated feet. Five percent of people had cavus feet, seventeen percent had normal feet, and eighty-eight percent had planus feet.²⁵ **Dr. Shefali Milind Naik et al., 2019** investigated the low back pain prevalence among Pune's Kathak dancers. They discovered that: 59% of Kathak dancers in Pune reported experiencing low back discomfort, with 94.31% reporting mild disability and

5.68% reporting moderate disability⁷.

2.5 Physiological changes in Kathak dancers

Research on self-reported perceived stress, depression, and generalized anxiety disorder among Kathak dancers and physically active non-dancers in North India was conducted in 2023 by **Monika Kulshreshtha et al.** They discovered that both Kathak dancers and non-dancers had comparable rates of felt stress. Kathak dancers reported much less symptoms of depression than controls. The likelihood of depressive symptoms and anxiety symptoms was four times higher in non-dancers and seven times higher in non-dancers accordingly. Compared to dancers, non-dancers had greater adjusted chances of experiencing generalized anxiety and depression symptoms²⁶. **Shivani Chandel and Monika Kulshreshtha (2024)** conducted research on Kathak's role in lowering the risk of hypertension and preserving handgrip strength symmetry. They discovered that dancers with high HGS had a far lower chance of getting hypertension. Compared to dancers, non-dancers with HGS asymmetry were 1.8 times more probable to report having hypertension. An alternate technique for preserving HGS symmetry and lowering the chance of hypertension development is Kathak.²⁷. The health-related aspects of physical fitness and adiposity indicators were examined in a study conducted in 2022 by **Kulshreshtha M and Malik SL** between Kathak dancers and non-dancers in north India. They discovered that whereas the waist-to-hip ratio was considerably higher in Kathak dancers than in non-dancers, all other adiposity indicators were not. In comparison to the control group, Kathak dancers demonstrated significantly superior scores on all tests measuring muscular strength, endurance, and flexibility. Women of all ages can participate in Kathak dance as a kind of exercise that can enhance physical strength and stave off onset of obesity²². Kathak dancing has several health advantages.

CHAPTER 3

NEED OF THE STUDY

The dance and musculoskeletal pain are interrelated. Dance has many physiological and psychological effect. Among them there are chances of musculoskeletal pain and injuries very frequently. To prevent and treat the dancers according to their pain areas, we need the study that focuses on musculoskeletal pain related to dancers. Many studies have been done about prevalence of musculoskeletal pain among Indian classical dancers and another dance forms, but there is no study done yet that focus on knee pain and knee pain related disabilities in kathak dancers. This study will give an idea about knee pain related difficulties in particular activities among kathak dancers in their daily life. We will get idea about knee pain before and after the dance practice.

CHAPTER 4

SIGNIFICANCE OF RESEARCH

The kathak dance requires extensive footwork and energy that can lead to musculoskeletal pain among dancers. Extensive footwork can lead to lower limb pain and injury. After knowing musculoskeletal pain proportion among the dancers, they can be treated accordingly. Many dancers may drop their dance practice due to severe musculoskeletal pain. To preserve our classical dance form the dancers should not leave the dance due to musculoskeletal pain. This study focusses on knee pain related difficulties among dancers. This study can give future study scope among the kathak dancers. Past studies have been done on kathak dancers and foot deviations. Foot deviation can lead to knee pain. Kathak dance have some postures that must be done with pronated foot, so there are chances the dancers can suffer from knee joint pain.

CHAPTER 5

OBJECTIVES

- To study proportion of musculoskeletal pain in kathak dancers.
- To study proportion of knee pain and disabilities related to knee pain in Kathak dancers.
- To study activities the dancers felt difficult due to knee pain.
- To find out knee pain before and after kathak dance practice.

CHAPTER 6

METHODOLOGY

6.1 : Study design:

Observational study

6.2 : Study settings:

Various Kathak centers of the Saurashtra region

6.3 : Sampling method:

Stratified sampling has been used

6.4 : Sample size calculation:

Using Raosoft sample size calculator:

Margin of error - 9.27% Level of confidence - 95% Size of population - 2000 Response distribution-50%

Calculated sample size - 109.97

According to inclusion criteria 106 subjects have been taken in the study.

6.5 : Sampling Criteria:**Inclusion criteria:**

- Kathak dancers who have minimum two years of experience and practices minimum 5 hours in a week.
- Willingness to participate.
- Age group: 15-35 years.

Exclusion criteria:

- Any Congenital deformity
- Any neurological disorders.
- Pregnancy

6.6 : Operational definition:

BMI: BMI is ratio of person 's weight to square of height in meters. $\text{Weight (kg)} / [\text{height (m)}]^2$

6.7 : Data collection tools:

1. Assessment form
2. Participation form
3. Consent form
4. Pen, pencil, eraser, paper
5. Nordic questionnaire sheet
6. Oxford Knee score questionnaire sheet
7. NPRS scale

6.8: Data collection procedure:

At beginning, I have approached to the kathak dance classes and take permission from the Guru of the dance classes. I encouraged dancers to be part of my study. I checked for the inclusion and exclusion criteria among the population. I explained the study and questions filling to them and the dancers who did not want to take part was excluded. after that participants have been selected. After signing the informed consent form, I took demographic details before starting the procedure. I measured weight and height to confirm BMI. I asked them years of practicing Kathak and weekly hours of practicing and noted. I asked them about drop out of dance due to knee pain. I asked them about exercise other than kathak and noted type of exercise and noted type of exercise. I have explained about procedure to fill standardized Nordic questionnaire to them. After filling the Nordic questionnaire, I have explained procedure to fill the oxford knee scale and NPRS scale. After their dance practice they gave me NPRS. I have taken NPRS both before and after dance practice.

6.9: Data analysis:

The statistical analysis will be carried out using excel sheets. Descriptive analysis will be performed which includes frequency, mean and standard deviation.

CHAPTER 7

RESULTS

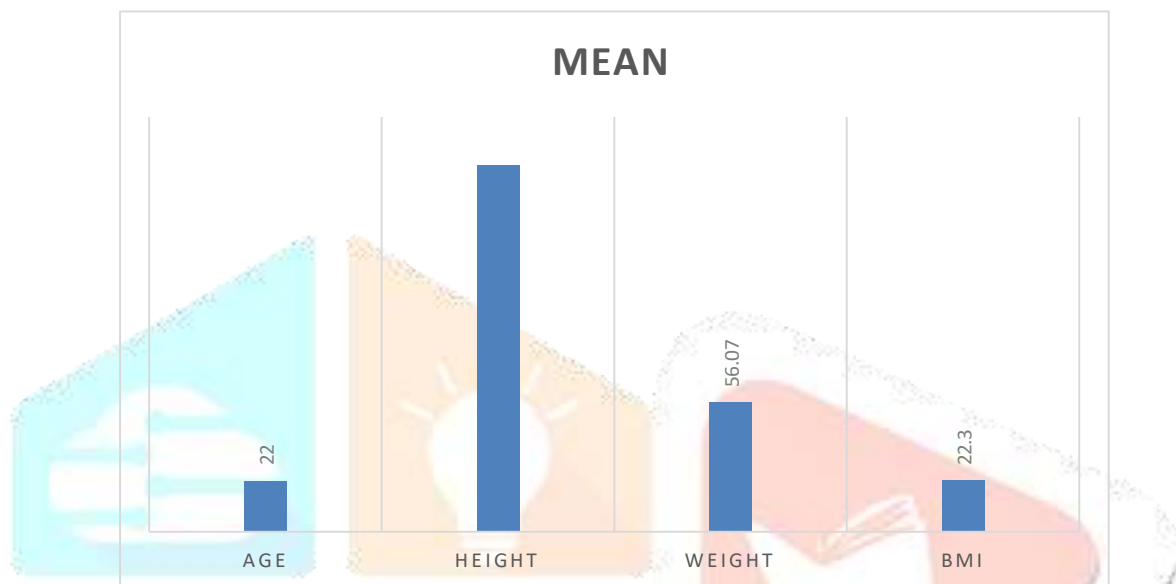
DESCRIPTIVE STATISTICS

Out of 106 participants with age range of between 15 to 35 years and a mean age was approximately 22 years. Study sample had only females. The mean height of the group was 158.78cm. The mean weight of sample was 56.07 kg.

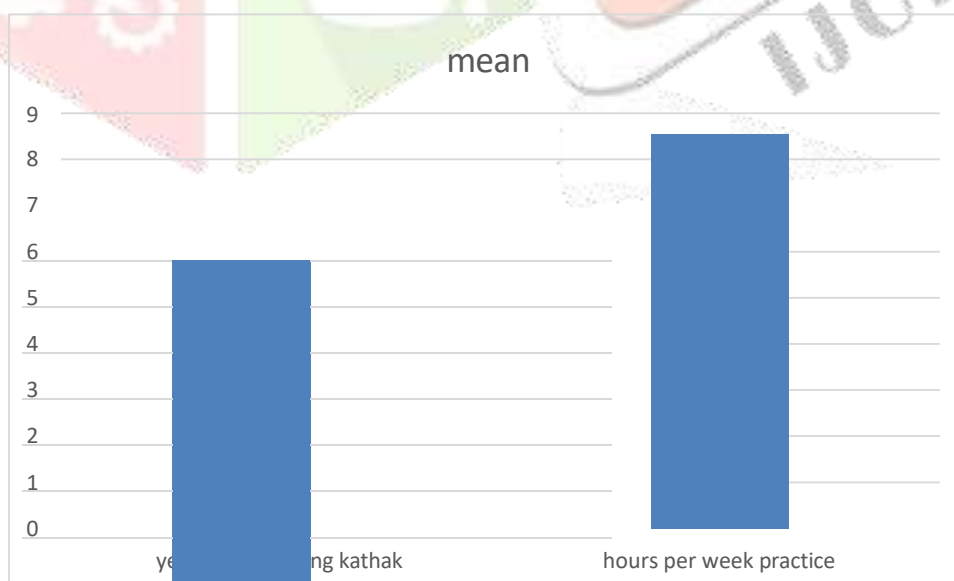
	Mean	SD
Age (in years)	22	±5.96 years
Height (in cm)	158.78	±7.69 cm
Weight (in kg)	56.07	±11.89 kg
BMI (in kg/m²)	22.30	±4.67 kg/m ²
Years of Practicing kathak	7.08	
Practice hours per week	8.56	

Table 7.1: Demographic details of study Subjects (N=106)

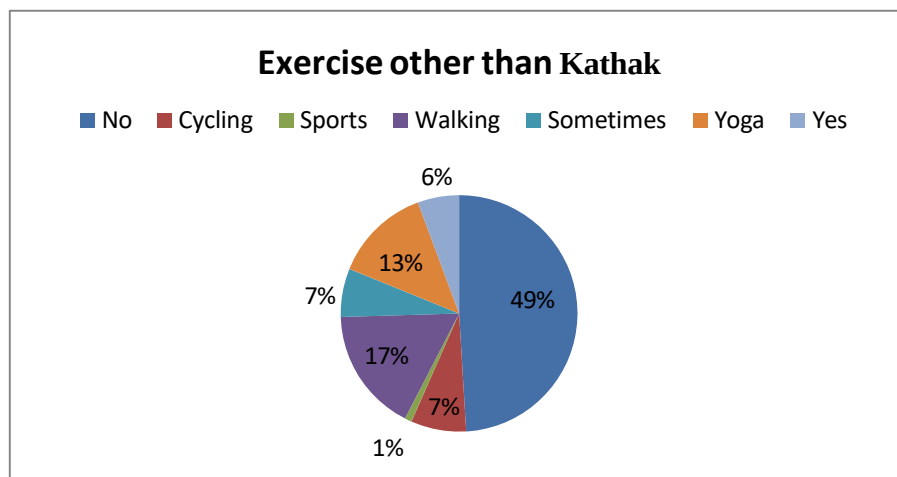
Table 7.1 indicates that the average age of participants is approximately 22 years, indicating that the study group consists of relatively young individuals. The mean height is about 158.78 cm, and the mean weight is 56.07 kg. This falls within the healthy weight range. The mean BMI is calculated as 22.30 Kg/m². Normal BMI considered between 18.5 and 24.9 Kg/m², suggesting that, on average, participants have a healthy body weight relative to their height. The average duration of practicing Kathak is 7.08 years. This indicates a considerable level of experience and commitment to the dance form among the participants. On average, participants engage in Kathak practice for 8.56 hours per week. This reflects a significant time investment in honing their skills and maintaining proficiency in Kathak.



Graph 7.1: Mean Age, Height, Weight, and BMI



Graph 7.2 Mean years of practicing kathak and hours per week practice



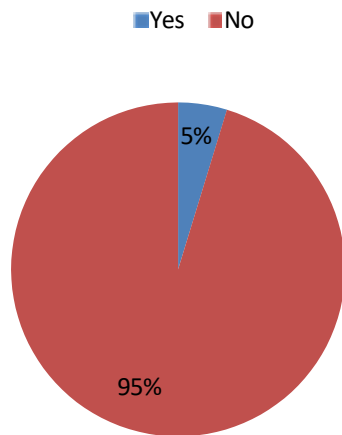
Graph 7.3 exercise other than kathak

The graph 7.3 reflects a diverse range of exercise habits among individuals in relation to their engagement in Kathak. Among those who do not practice Kathak, various daily exercise routines are observed, including cycling, walking, yoga, and unspecified daily exercises. Notably, a significant number of individuals opt for walking and yoga as part of their regular exercise regimen, while others engage in activities like cycling and sports. Kathak practitioners appear to have a lower frequency of daily exercise, with a majority not engaging in daily exercise routines. This disparity in exercise habits sheds light on the differing approaches to physical activity between those immersed in Kathak and those who pursue alternative forms of exercise.

Area of the pain	No. of Dancers
Lower back	26
Ankle/foot	25
Knees	19
Shoulders	15
Hip/thighs	14
Neck	14
Upper back	13
Hands/ wrists	1

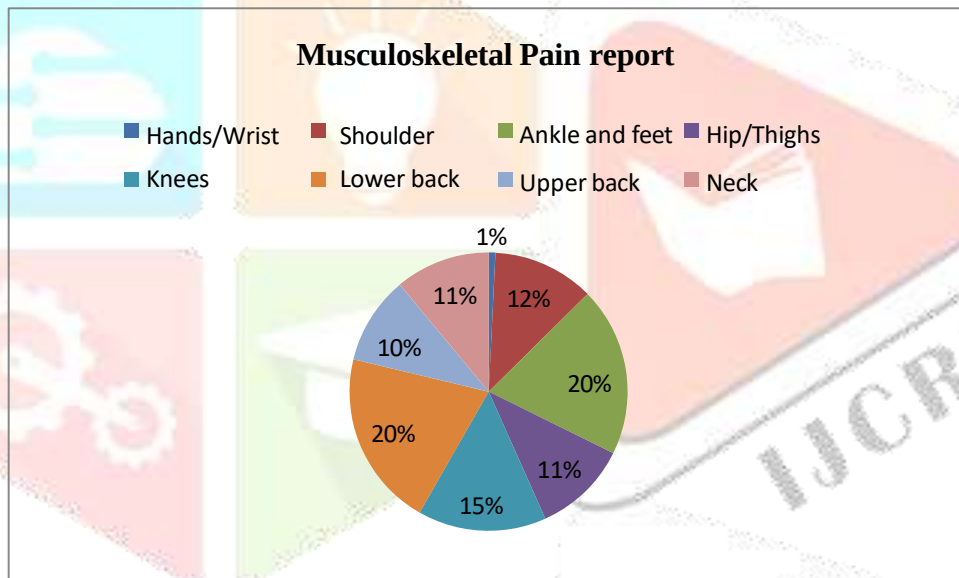
Table 7.2 Musculoskeletal pain and number of dancers

Have you ever thought to leave kathak due to knee pain?



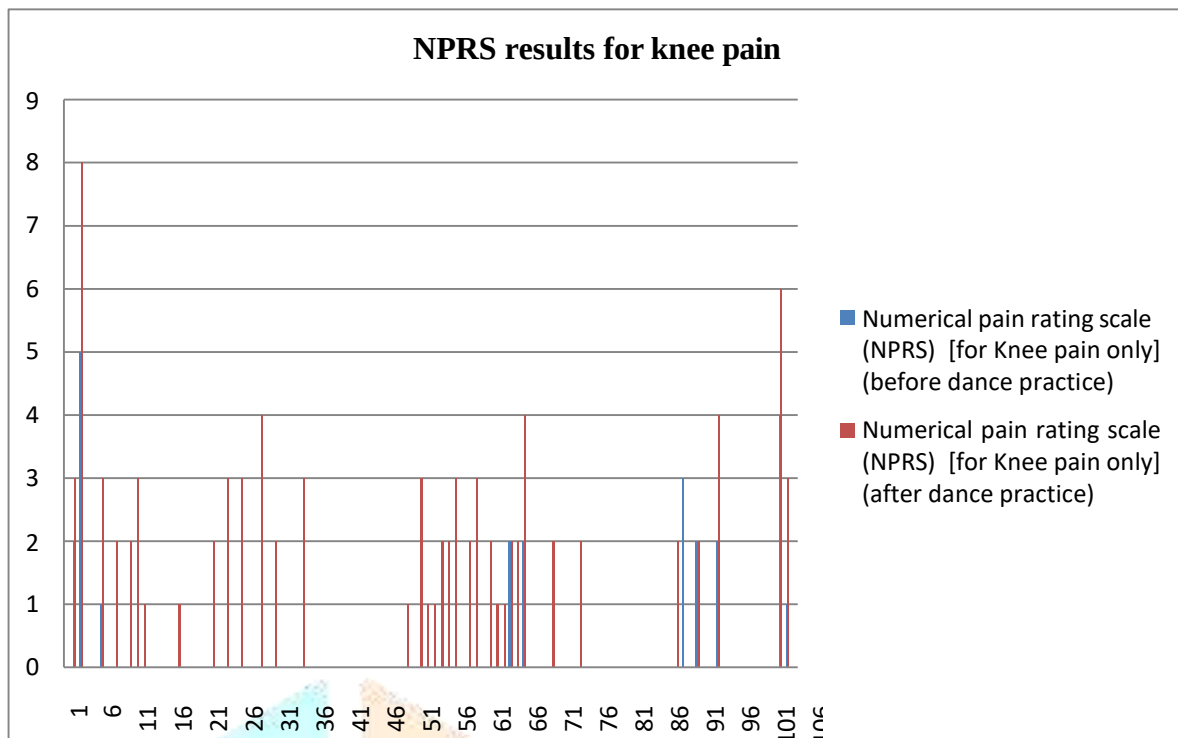
Graph 7.4 dancers who wants to leave kathak due to knee pain

Majority of respondents, 101 out of 106, have not considered leaving Kathak due to knee pain. This suggests the dancers do not have that severe knee pain that they have to leave practice.



Graph 7.5 Proportion of musculoskeletal pain among kathak dancers

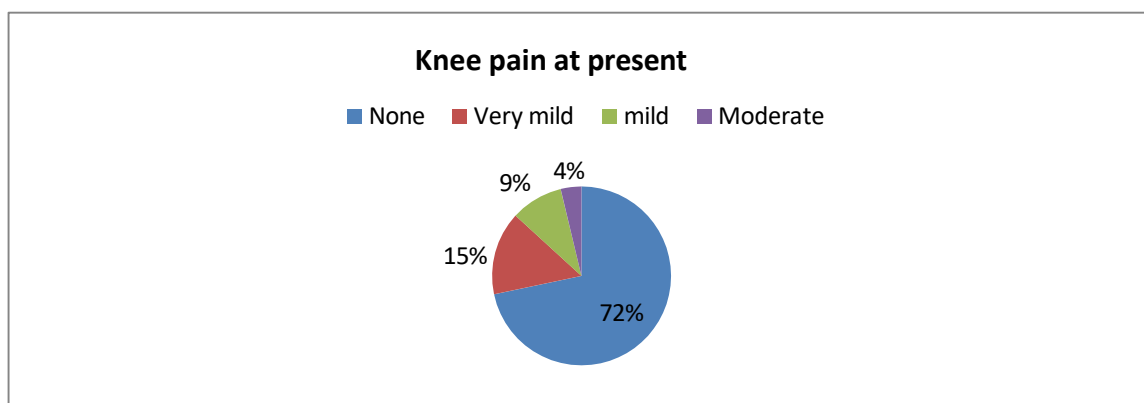
The analysis of pain reported among individuals practicing Kathak reveals important insights into the area 's most affected. Among the participants, lower back pain emerged as the most prevalent issue, with 26 individuals reporting discomfort in this region. Following closely, pain in the ankle and feet was reported by 25 participants, indicating a significant incidence in these areas. Knee pain also featured prominently, with 19 individuals experiencing discomfort in their knees. Shoulder pain was reported by 15 participants, while hip and thigh pain affected 14 individuals. Neck and upper back pain were reported by 14 and 13 participants, respectively, indicating a moderate prevalence in these areas. Surprisingly, pain in the hands and wrists was the least reported, with only one participant mentioning such discomfort. These findings highlight the need for attention to musculoskeletal health among Kathak practitioners, particularly in addressing issues related to lower back, ankle, knee, shoulder, hip, and neck regions to ensure optimal well-being and performance. The graph 7.5 indicates proportion of musculoskeletal pain among kathak dancers.



Graph 7.6 NPRS before and after Kathak dance practice

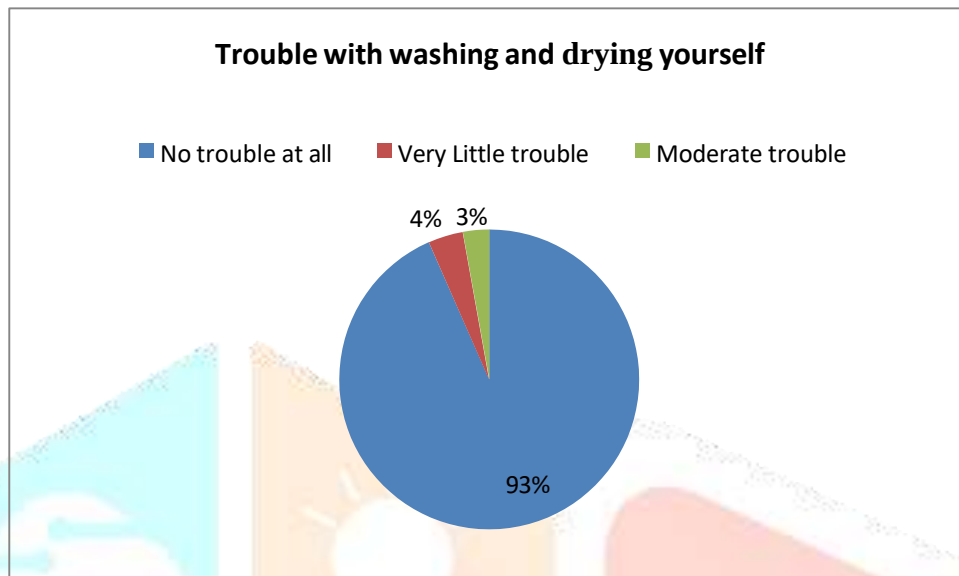
The analysis of the Numerical Pain Rating Scale (NPRS) for knee pain before and after dance practice reveals interesting insights. Before dance practice, most participants reported no pain, with scores in range of 0 to 5. Knee pain was generally not a significant issue prior to engaging in Kathak dance. After dance practice, while the most common score remained 0 indicating no pain, some participants did report increased pain, with scores in range of 1 to 6. However, severe pain (scores above 5) was rare both before and after practice. These findings indicate that Kathak practice, based on this dataset, does not consistently lead to significant knee pain among practitioners. The observed increase in pain scores after practice, though present in some cases, generally fell within the mild to moderate range.

Knee pain related questions:



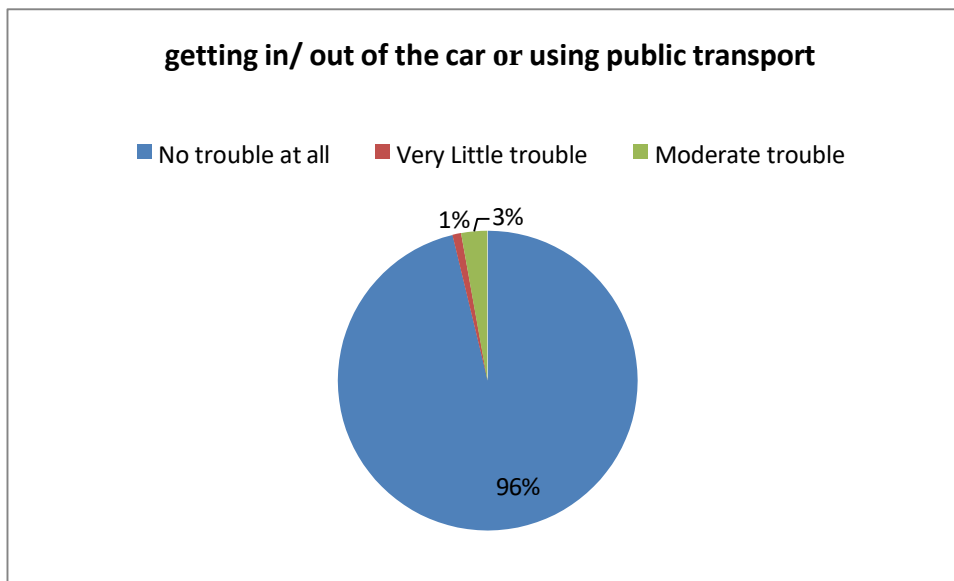
Graph 7.7 knee pain at present

Most respondents, 76 out of 106, described their knee pain as none, indicating that a significant portion of individuals practicing Kathak do not experience knee pain. The Dancers who reported pain, 16 described it as very mild, 10 as mild, and 4 as moderate. This suggests that while knee pain is not uncommon, the majority respondents experience either no pain or only mild discomfort, with a smaller proportion experiencing moderate levels of pain.



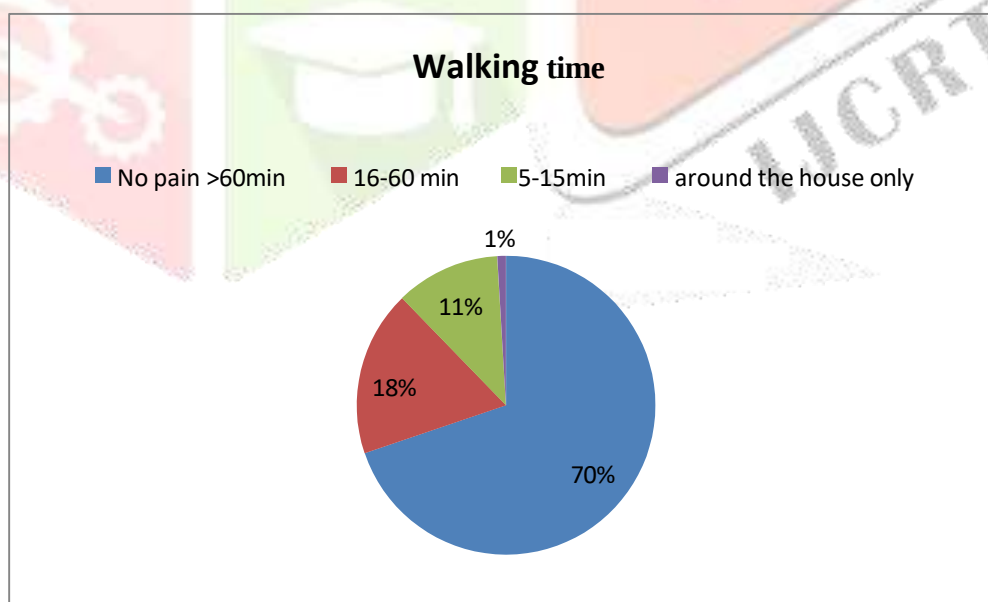
Graph 7.8 trouble in self-washing and drying

The study results regarding the difficulty individuals experience in washing and drying themselves due to knee problems reveal a significant finding. Out of the respondents, the vast majority, total 99 individuals, reported "No trouble at all." So, for most people, knee issues do not impede their ability to perform these daily activities. A small fraction, comprising 4 respondents, reported experiencing "Very Little trouble," suggests that while they may have some discomfort or mild difficulty, it is not severe enough to considerably hinder their routine. Only a minimal number of participants, 3 in total, indicated "Moderate trouble," implying that their knee problems are more pronounced and have a noticeable impact on washing and drying themselves. While knee issues are present among some individuals, the overall impact on daily self-care activities such as washing and drying is relatively low for the majority.



Graph 7.9 getting in/out of car or public transport

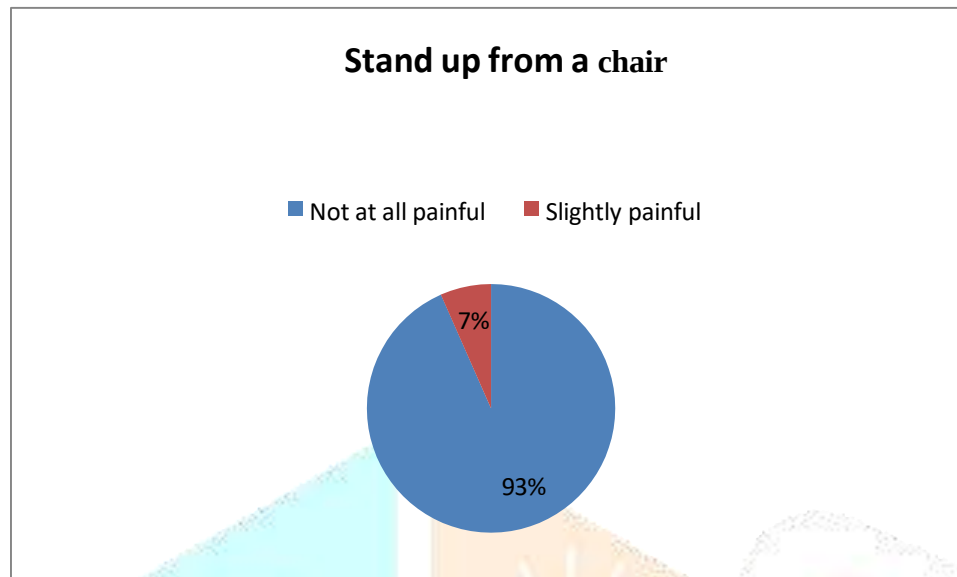
The study results concerning difficulties with getting in and out of cars or using public transport due to knee problems present a clear trend. A substantial majority of respondents, total 102 individuals, reported "No trouble at all," indicating that knee issues have not interference with their ability to use personal or public transportation. A very small number, only 1 respondent, reported "Very Little trouble," suggesting that any difficulty experienced is minimal and does not affect their transportation routines. Only 3 respondents indicated "Moderate trouble," meaning that their knee problems have a more noticeable impact on their ability to access cars or public transport. These results imply that, the majority of those surveyed do not consider knee problems to be a significant obstacle to transportation.



Graph 7.10 walking time

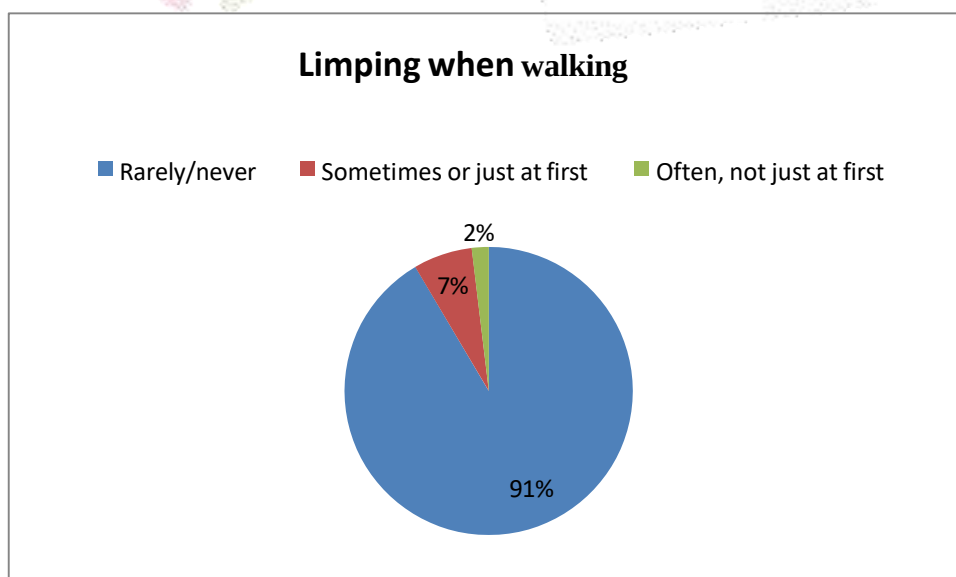
The study results regarding the duration individuals can walk before experiencing severe knee pain provide valuable insights into the impact of knee issues on mobility. A significant portion of respondents, 74 in total, reported "No pain >60min," that means that they can walk for more than an hour without severe knee pain, suggesting a high level of mobility and minimal impact from knee issues. Another group of 19 respondents reported being able to walk for "16-60 min" before severe pain sets in, indicating a moderate level of endurance.

A smaller group, comprising 12 respondents, can walk for only "5-15 min" before severe knee pain becomes an issue, reflecting a more restricted level of mobility. Lastly, one person reported being able to walk "around the house only" before experiencing severe pain, indicating a significant limitation in their ability to walk. These findings illustrate a wide range of mobility among individuals with knee issues, with the majority can walk for extended periods, while a smaller proportion experiences more severe limitations.



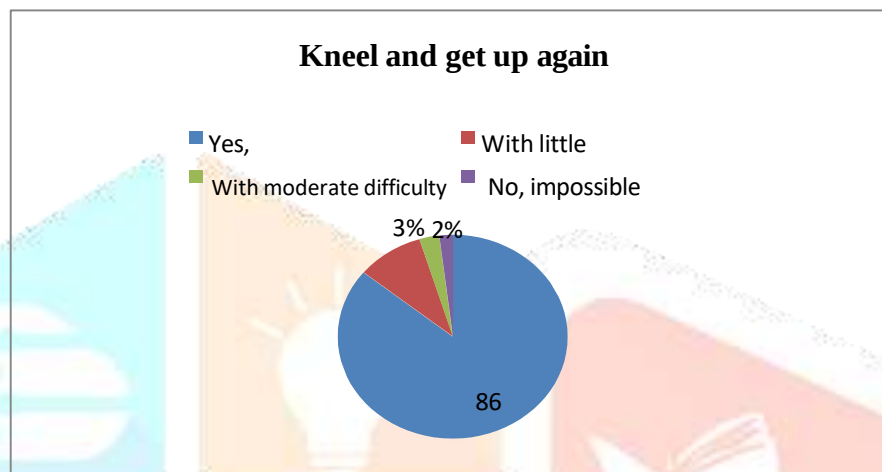
Graph 7.11 sit to stand from chair

The study's findings of knee problems causing discomfort while getting out of a chair after eating offer a clear picture. The majority of respondents, or 99 people, said it was "Not at all painful," meaning that even if they have knee problems, getting up from a chair does not cause them any real pain. It implies that most people's knee conditions do not prevent them from engaging in this regular activity. After eating, a smaller group of 7 respondents said it was "Slightly painful" to get out of a chair. This indicates that they experience some discomfort, but not enough to make it significantly difficult for them to move around. These results clarify that although some people have small proportion of discomfort.



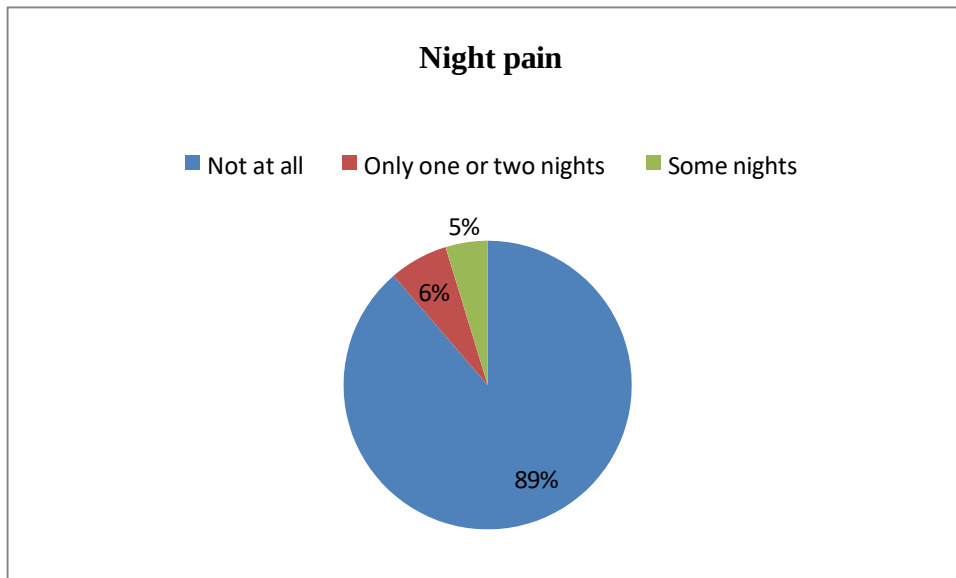
Graph 7.12 Limping with walking

The study results concerning limping when walking due to knee problems reveal a predominant trend. A significant majority of respondents, total 97 individuals, reported "Rarely/never" limping, indicating that knee issues do not typically cause them to limp while walking. For most of the individuals, their knee condition has not significantly affected their gait. A smaller group, comprising 7 respondents, reported limping "Sometimes or just at first," states that they may experience initial discomfort or occasional limping but are generally able to walk normally after some time. Only 2 respondents indicated limping "Often, not just at first," meaning that their knee problems are more persistent and cause a noticeable impact on their walking consistently. These findings shows that while a few individuals experience frequent limping, the majority can walk without significant disruption from their knee issues.



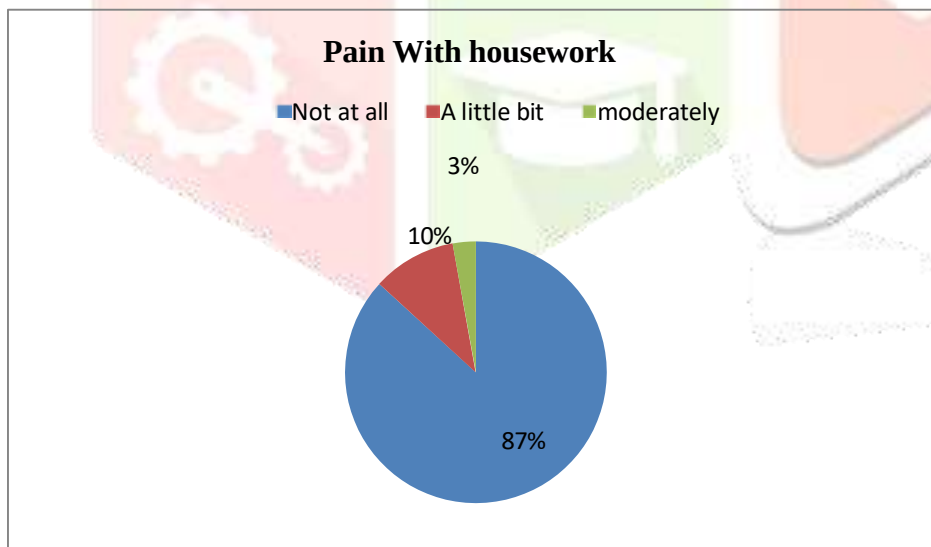
Graph 7.13 kneel to get up

The study results regarding the ability of the dancers to kneel down and get up again due to knee problems provide a comprehensive overview of the respondents' capabilities. A large majority, consisting of 91 individuals, reported "Yes, easily," indicating that knee issues do not impede their ability to perform this action, reflecting a high level of knee function and flexibility. A smaller group of 10 respondents indicated they could kneeling down and get up again "With littledifficulty," suggesting some minor challenges but overall adequate knee function. Another 3 respondents reported doing so "With moderate difficulty," implying that their knee problems present a noticeable challenge but not an insurmountable one. Lastly, 2 respondents indicated "No, impossible," indicating that their knee problems are so bad that they are unable to do this activity at all. These results show that although most people can kneel and stand up with little to no trouble, a tiny percentage has moderate to severe limits in these abilities.



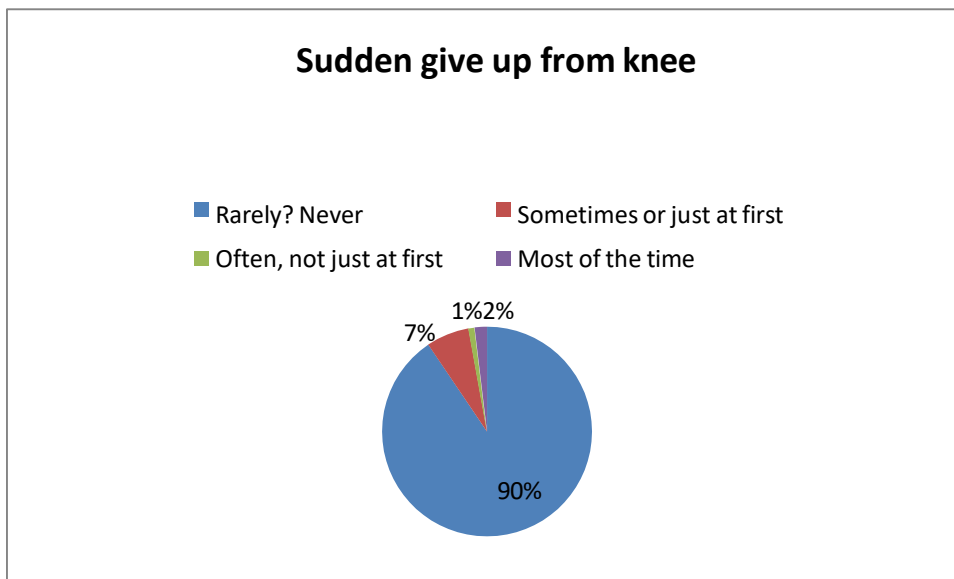
Graph 7.14-night pain

The study results regarding knee pain experienced at night while in bed indicate that most respondents have no night pain. A substantial majority, totaling 94 individuals, reported "Not at all," indicating that due to knee they do not feel trouble during the night, allowing for restful sleep. A smaller group of 7 respondents mentioned experiencing pain "Only one or two nights," suggesting occasional discomfort but not a frequent issue. Additionally, 5 respondents reported pain "Some nights," indicating more recurrent disturbances due to knee pain, which may affect their sleep quality on a regular basis. These findings state that while the majority are not troubled by knee pain at night, a minority experiences occasional to frequent nocturnal discomfort.



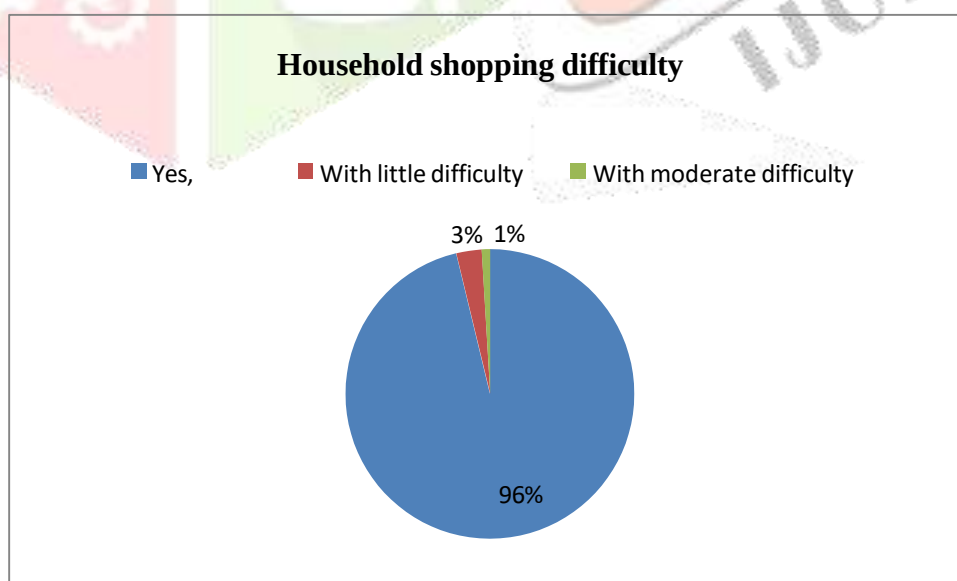
Graph 7.15 pain with housework

The study results regarding knee pain experienced at night while in bed show varying levels of impact. A significant majority of respondents, totaling 92 individuals, reported "Not at all," indicating that knee pain does not trouble them in house work. A smaller group of 11 respondents mentioned experiencing pain "A little bit," suggesting occasional or mild discomfort that may not affect their normal house work. Additionally, 3 respondents reported pain "Moderately," indicating more recurrent or severe disturbances due to knee pain in house work.



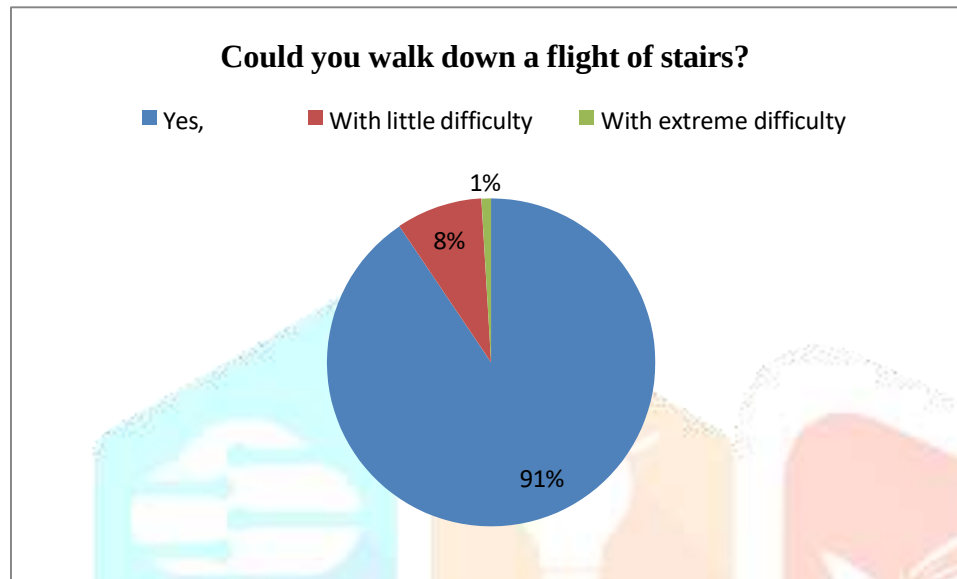
Graph 7.16 sudden give up from knee

The study results on the sensation that the knee might suddenly 'give way' or 'let you down' reveal the following insights. A large majority, total 96 individuals, reported experiencing this feeling "Rarely/never," suggesting that for most respondents, their knee stability is not a concern, and they do not often worry about their knee giving way. A smaller group of 7 respondents indicated experiencing this sensation "Sometimes or just at first," implying occasional uncertainty about knee stability, particularly at the beginning of an activity. Only 1 respondent reported feeling this way "Often, not just at first," indicating a more consistent and frequent concern about knee stability. Lastly, 2 respondents noted feeling this sensation "Most of the time," suggesting a significant and ongoing issue with knee stability that likely affects their confidence in their knee's reliability. These indicates that while the majority do not frequently experience concerns about their knee giving way, a small minority faces intermittent to persistent issues with knee stability.



Graph 7.17 household shopping difficulty

The survey results regarding the ability to do household shopping independently provide a clear view of the respondents' capabilities. A substantial majority, totaling 102 individuals, reported "Yes, easily," indicating that knee issues do not impede their ability to perform this task, reflecting a high level of functional independence and mobility. A smaller group of 3 respondents indicated they could shop "With little difficulty," suggesting some minor challenges but overall sufficient ability to manage household shopping their own. Only 1 person reported being able to shop "With moderate difficulty," implying that their knee problems present a more noticeable challenge but still allow them to complete the task. While the majority can perform household shopping with ease or minor difficulty, a very small fraction experiences moderate limitations in this activity.



Graph 7.18 stair climbing difficulty

The study results regarding the ability to walk down a flight of stairs due to knee issues demonstrate a range of capabilities among respondents. A significant majority, totaling 96 individuals, reported being able to walk down stairs "Yes, easily," indicating that their knee condition does not significantly impede this activity, reflecting a high level of mobility and functional ability. A smaller group of 9 respondents mentioned they could walk down stairs "With little difficulty," suggesting minor challenges or discomfort but still manageable. Only 1 respondent able to walk down stairs "With extreme difficulty," highlighting a more pronounced limitation in their ability to navigate stairs due to knee problems. While the majority can manage walking down stairs without major issues, a few individuals experience varying degrees of difficulty in this task due to their knee condition.

CHAPTER 8

DISCUSSION

The study was intended to find out the proportion of musculoskeletal pain and specifically knee pain related disabilities among kathak dancers. The study conducted to find out knee pain immediately before and after dance practice pain rating. Dance, musculoskeletal pain and injuries are interrelated with each other. There were previous studies that states proportion of musculoskeletal problems among dancers. In 2014, Happiness Anulika Aweto found that 12 months prevalence of musculoskeletal pain was 86.1% and 36% responsiveness

noted injury at the time of study, 58% respondents noted injury two to four weeks before the study. Most affected parts in dancers were knees followed by lower back and ankle among dancers.¹⁶ There was a systemic review paper written by Sarah Masal in 2021 about the most common site of injury among classical dancers was lower limb. They compared the site of pain between Bharatnatyam and Kathak dancers and they found the most injured site among Bharatnatyam dancers was back (42.5%), knee (28.30%) and then ankle (18.64%) while in Kathak dancers, most injured site was back (47%), knee (16%) and then ankle (20%)¹⁷.

In Mumbai and Bangalore, dancers reported back as common sites of injury followed by knee and ankle. In a study conducted by Shruti in 2014, a maximum cause of injury was stress followed by overwork, tiredness, and falls¹⁸. In 2023, Sneha found in a study that back pain in the Kathak dancers was due to barefoot stamping with pronated foot.²⁰

Many previous studies found foot postural deviations among Kathak dancers. In 2023, Chanagari SV found that pain in the ankle of Kathak dancers was severe with restricted activity pattern²³. Roopika Sabharwal found that 70% Kathak dancers were suffered from foot and ankle disabilities²¹. Bhagyashree in 2024 found that large population of Kathak dancers have pronated feet²⁴. Shweta Chandan in 2018 found that most of the Kathak dancers had excessively pronated foot followed by pronated foot, normal foot, and supinated foot.²⁵ Foot posture deviations can lead to knee pain among Kathak dancers. In this study, the investigator found that only 19% Kathak dancers have knee pain. Age range of the dancers was between 15 to 35 years and a mean age was approximately 22 years. Study sample had only females. The mean height of the group was 158.78cm. The mean weight of sample was 56.07 kg. Lower back pain emerged as the most prevalent issue, with 26 individuals reporting discomfort in this region. Pain in the ankle and feet was reported by 25 participants. 19 individuals experiencing discomfort in their knees. Shoulder pain was reported by 15 participants, while hip and thigh pain affected 14 individuals. Neck and upper back pain were reported by 14 and 13 participants, respectively, indicating a moderate prevalence in these areas. Main pain areas among the Kathak dancers are back and ankles followed by knees. Focus on the knee pain related difficulties, Kathak dancers have mild level of difficulties. Questionnaire includes knee pain at present, bathing, trouble in in out of car and public transportation, walking, standing up from chair, limping while walking, kneel and get up, night pain, pain during house work, giving up during walking, household shopping and stair climbing. Kathak dancers noted very less difficulties in the above activities. Majority of the Kathak dancers found that there was no pain before and after dance practice except a few.

CHAPTER 9

LIMITATIONS OF THE STUDY

In this study only female Kathak dancers have been taken to participate, as male Kathak dancers are very limited in Saurashtra region.

CHAPTER 10

FUTURE RECOMMENDATIONS

- In future study researcher can study on upper limb joints and related difficulties among kathak dancers.
- They can focus on treatment aspect of musculoskeletal pain of the kathak dancers.
- Comparative study between male and female dancers can be done in future studies.

CHAPTER 11**CONCLUSION**

In this study we observed that proportion of back pain and ankle/foot pain (20%) is the highest in kathak dancers, followed by knee pain (15%). Proportion of Shoulder pain 12%, Hip/thigh pain and neck pain 11%, Upper back 10% and hands pain 1%. Most of the kathak dancers have no changes in pain before and after kathak dance practice, while some dancers reported mild to moderate increment in knee pain after the kathak dance practice. Responses of the dancers in oxford knee questionnaire describe that most of the kathak dancers do not have pain and disabilities due to pain, only few dancers who have knee pain have mild level of difficulties in their daily activities. From the study we can conclude that Kathak dancers feel mild difficulties due to knee pain.

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