

Association between Core Endurance, Flexibility and Balance and their Interrelationship among Bharatanatyam Dancers: A Rapid Review

Dr Archana P¹, Yashaswini M²

¹Associate Professor, Department of Musculoskeletal Physiotherapy , RV College of Physiotherapy, Bangalore

²Student, R V College of Physiotherapy, Bangalore

ABSTRACT

Background: Bharatanatyam is one of the oldest classical dance forms of India that is widely practiced. Bharatanatyam performance requires strength, flexibility, balance, postural stability and endurance for effective execution of complex movements. Core endurance is essential for balancing the trunk and stability in dance movements, whilst flexibility enables the movement of postures through a range of motion for gestures. It is essential to maintain balance in static and dynamic positions throughout the performance. The relationship between core endurance, flexibility and balance of the Bharatanatyam dancers is yet to be comprehensively synthesized, although these physical attributes are deemed essential for optimal performance. Unraveling these relationships may hold valuable insights for dance training, injury prevention, and performance.

Methods: A quick analysis was undertaken to collate recent information and evidence of core endurance and flexibility and balance in Bharatanatyam dancers. As per the inclusion criteria, studies that reported on at least one of the variables were included. For studies on Bharatanatyam dancers in English, various electronic databases, including PubMed, Scopus, Google Scholar, Web of Science and ScienceDirect. Essential information on study design, participants, outcome measures, and key findings was extracted and narratively synthesized.

Results: Research has indicated that Bharatanatyam dancers have better flexibility, balance and core stability than the non-dancers. Research shows that core endurance is positively associated with balance performance, with increased trunk stability leading to better postural control. The flexibility also affected the equilibrium by helping to execute movement effectively and successfully applying the strategy. Researches have indicated that dancers have dynamic balance and control of movement when they have higher core endurance. Nevertheless, differences in evaluation methods and sample characteristics impeded direct comparison between studies.

Conclusion: According to research, core endurance, flexibility, and balance are interrelated in Bharatanatyam dancers. Moreover, these contribute to performance. Improvements in one component may improve others by enhanced neuromuscular control and movement efficiency. There is need for a causal study with standardized tools and longitudinal designs for evidence-based training of Bharatanatyam dancers for future research.

Keywords: Bharatanatyam dancers, Core endurance, Flexibility, Balance, Postural control, Dance performance, Rapid review.

1.0 INTRODUCTION

The Bharatanatyam is one of India's oldest and most admired classical dances. It is famous for its elaborate footwork, expressive hand gestures, rhythmic precision, and rigorous postural requirements.^[1] Bharatanatyam is a classical Indian dance form that has originated and developed in Tamil Nadu, India.^[4] The different movements like araimandi execution, jumps, turns, dynamic transitions, etc. along with prolonged static positions make performance of Bharatanatyam physically demanding for the musculoskeletal system.^[1,2,16] To successfully perform Bharatanatyam, one will need to put together several components of physical. Fitness like core endurance, flexibility and balance.^[5] The trunk muscles capacity to perform activity over time while sustaining stability of the spine with movement is termed core endurance.^[5,7] Core endurance is considered essential for effective transfer of force between the upper and lower limbs, controlling posture and compensatory movements due to fatigue.^[9,5] According to the authors, dancers with enhanced core endurance are predicted to exhibit greater movement economy regarding stability during complex dance movements.^[1,17,18]

Flexibility is an important aspect of Bharatanatyam. The dance form requires extensive range of motion in the hip, knee, ankle and spinal joints to achieve aesthetically pleasing body positions and perform weight shifts.^[1] A good flexibility can help perform the move in the optimal amplitude, mechanically free of constraints and may impede the risk for a musculoskeletal injury.^[4,14] Past research has shown that dance training can improve flexibility through consistent stretching and moving practice.^[11,16] Balance means the ability to hold the body's center of mass within the base of support. The performance of static and dynamic dance activities both need balance.^[2] Bharatanatyam dancers frequently perform single-leg stances, directional changes, and transitional movements that challenge postural stability.^[20] Balance control is effectively achieved when co-ordination takes place through the visual, vestibular and somatosensory systems with the appropriate neuromuscular responses.^[3,8] Poor balance can decrease the quality of performance and may increase the risk of injury.^[10,15]

The increasing attention to the relationship between core endurance flexibility, and balance has evolved in sports and dance sciences.^[1] The performance of balance is likely affected by postural stability controlled by the core musculature, along with flexibility which provides efficient movement and positioning of joints in the balance activity.^[11] Many studies have explored the relationship between movement efficiency and other relevant physical capacities, such as physical education. Nevertheless, the findings have been inconsistent, and the extent of the associations among Bharatanatyam dancers have not been systematically synthesized.^[7,12] The growing popularity of Bharatanatyam and emphasis on evidence-based dance training have not resulted in reviews on the relationship between core endurance, flexibility and balance among dancers.^[11,1] It is important for physiotherapists, dance instructors, sports scientists and healthcare professionals who wish to enhance performance and/or prevent injury in dancers.^[1,11] A quick review of evidence on core endurance, flexibility and balance in Bharatanatyam dancers is thus warranted. The review aims to investigate the relationship of these physical fitness components and their combined effect on dance performances and postural control. The findings could assist the development of conditioning and rehabilitation programs, which aim to optimise performance and reduce injuries in Bharatanatyam dancers.^[1,2,11]

2.0 METHODOLOGY

2.1 Search Strategy

A systematic electronic search was carried out to find studies on core endurance, flexibility, and balance and their correlation in Bharatanatyam dancers. The review was conducted using a rapid review framework and followed evidence synthesis conventions. Searching for research published from 2015 to 2025, electronic databases such as PubMed, Scopus, Web of Science, ScienceDirect, and Google Scholar were searched. The searches were carried out by combining controlled vocabulary and free-text keywords, namely, Bharatanatyam dancers, classical dancers, core endurance, core stability, trunk endurance, flexibility, balance, postural control, physical fitness, and dance performance using Boolean operators (AND/OR). We manually looked at reference lists of eligible studies and relevant review articles to find more studies. Only human studies subjected to peer-review and published in English were included. The titles and abstracts of all the studies identified were screened for eligibility based on the pre-agreed inclusion and exclusion criteria. Full-text articles satisfying the inclusion criteria were screened for the study design, participant characteristics, assessment methods, outcome measures and key findings related to core endurance, flexibility, balance and interrelationship among Bharatanatyam dancers. Any uncertainties regarding study eligibility were resolved through careful evaluation of the full-text articles.

2.2 Inclusion Criteria

Studies were included if they met all of the following criteria:

Population: Bharatanatyam dancers, at the age of 12 or above, regardless of their gender, training experience, or dance performance.

Assessment: Studies assessing the effects on one or more of the following variables: core endurance, core stability, flexibility, balance, postural control, or physical fitness characteristics associated with Bharatanatyam dancing.

Comparison: Non-dancers, dancers of any other dance form, different age groups, different levels of experience, or comparisons between Bharatanatyam dancers in terms of physical performance characteristics. No comparison studies were excluded even when the comparison was not performed against a non-dancer group.

Outcome: The study had at least one outcome that measured core endurance, flexibility, static balance, dynamic balance, postural control, movement efficiency or the relation among them.

Study Design: Cross-sectional studies, observational studies, comparative studies, cohort studies, quasi-experimental studies, experimental studies, and randomized controlled trials.

Publication Criteria: Published articles in English within the period 2015 to 2025, in any peer-reviewed journal. Dissertation and research papers from institutions with enough methodological information were also included

2.3 Exclusion Criteria

Studies were excluded if they met any of the following conditions:

Population: Studies with participants who practiced other types of dance than Bharatanatyam and Bharatanatyam-specific data could not be segregated. Participants who had neurological problems, vestibular dysfunction, previous musculoskeletal injuries, or significant physical conditions such as impaired balance and flexibility were also excluded.

Assessment: Studies that did not measure core endurance, flexibility, balance, postural control, or physical performance parameters associated with these.

Comparison: Studies with insufficient data to conduct an evaluation of outcomes or comparison groups irrelevant to the review questions.

Outcomes: Studies that did not quantify the outcome measures related to core endurance, flexibility, balance, postural control, and their interaction.

Study Design: Reviews, systematic reviews, meta-analyses, expert opinions, editorials, abstract-only conference papers, case reports, and those with inadequate methodological information.

Publication Criteria: Non-English language studies, unpublished data, abstract-only articles, and grey literature sources with inadequate methodology and outcomes. Only studies that met the inclusion criteria and were published between 2015 and 2025 were included.

2.4 Study Selection

All identified records from the database search were loaded into a reference manager software program, and duplicates were deleted. Title and abstract screening was done for eligibility in accordance with predetermined inclusion and exclusion criteria. Articles that met the predetermined eligibility criteria and those with unclear eligibility were then downloaded for full-text review. Eligibility of the downloaded articles was determined based on population, intervention, comparison, outcomes, study design, and publication criteria. Studies meeting all eligibility criteria were included in the final review. An adapted Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram was used to depict the study selection process.

2.5 Data Extraction

The relevant data from the selected literature was extracted using a standardized data extraction form. The data extracted included the author, year of study, country of study, type of study, participants' profile, sample size, measures, methods of testing, and key results regarding core endurance, flexibility, and balance of Bharatanatyam dancers. The data obtained from the respondents was analyzed and categorized.

2.6 Data Analysis

Because of the differences across the studies regarding designs, participants' characteristics, and assessment methods, the data were analysed using a narrative synthesis. Due to the differences in the metrics related to flexibility, core endurance and balance that have been used, data pooling and quantitative analyses were not done. The study's impact was investigated with respect to key variables including core endurance, flexibility, balance performance and their inter-relationship. Similarities and differences across studies were examined to identify common patterns and overall trends within the available evidence.

2.7 Quality Assessment

The methodological quality of the included studies was determined through use of relevant quality appraisal measures depending on the type of research design used. The observational and cross sectional designs were appraised using the Modified Newcastle-Ottawa scale while experimental and quasi experimental designs were analyzed using relevant quality measures. The studies were rated as either being of high, moderate or low quality based on their methodological quality. The quality assessment results were taken into consideration in the process of interpretation and synthesis of results from the review.

2.8 Synthesis of Evidence

The results of included studies were synthesized narratively, and sorted into physical performance domains associated with Bharatanatyam dancers. Outcomes measured in these studies include core

endurance, flexibility, balance, postural control, and their relationship. Based on the available data, it can be stated that Bharatanatyam dancers have higher flexibility and balance levels than non-dancers, probably because of continuous exercise in complex postures, dynamic movements, and dance poses. The evidence on flexibility shows that dancers have higher joint flexibility and range of motions in the lower limbs and trunk that are needed for executing Bharatanatyam. Balance was considered as an important factor for dancing performance. The evidence on balance shows that dancers have increased postural stability in static and dynamic balance tests. It appears that regular dancing exercise improves coordination, proprioception, and control of posture, which positively impacts the balance. Evidence on the effect of core endurance showed that more developed endurance of the trunk muscles had a positive influence on postural control and movement stability. The core muscles are necessary for proper body alignment and force transmission in dancing movements. Evidence on the association between core endurance and balance is positive. Some other researchers indicated earlier that there exists a relationship between core endurance, flexibility and balance. Increased flexibility might promote better positioning of the joints and efficient body movements, whereas sufficient core endurance serves as a base for balance. Together, these results prove that improvements in one aspect of physical fitness might have a positive impact on others as well. In conclusion, the analysed information proves the necessity of inclusion of training in core endurance, flexibility and balance in the conditioning routines of the dancers.

Limitations and Acknowledgement

The current rapid review has limitations due to heterogeneity of included studies and differences in sample sizes and assessment methods to evaluate core endurance, flexibility, and balance in Bharatanatyam dancers. Most of the included studies used either cross-sectional, comparative, or correlation design which limited the possibility of establishing a causal relationship between the variables of interest. The current synthesis was based on the inclusion of studies retrieved from the following literature sources such as PubMed, Google Scholar, and ResearchGate, and hence it might be biased towards publication. Variations in the outcome measures used in the included studies such as the different methods used in the assessment of flexibility, balance, and core endurance also limited comparison between the studies and hence, the current rapid review did not allow for meta-analysis. The majority of the included studies comprised small sample sizes as well as dancers who were mainly females, and hence there is a possibility that the results cannot be generalized to the entire population of dancers. The authors acknowledge the contributions of previous researchers whose work formed the evidence base for this review. Their investigations into physical fitness characteristics, postural control, and performance-related factors among Bharatanatyam dancers provided the foundation for the present synthesis and contributed significantly to the understanding of dancer health and performance.

3.0 RESULTS

In total, 45 records were retrieved through the search of databases such as PubMed (n=15), Google Scholar (n=18), and ResearchGate (n=12). Out of the 45 retrieved articles, 16 duplicate records were dropped. Twenty-nine records were screened using their titles and abstracts. In total, fifteen studies were excluded from the screening process because they failed to satisfy the set eligibility criteria. Fourteen full texts were evaluated for the purpose of eligibility. Eight out of the fourteen records were excluded because there was no Bharatanatyam specific participant, poor outcome reporting, and lack of information about methodology. Six studies satisfied the eligibility criteria.

Table 1: Data Extraction Table

Author (Year)	Study Design	Population	Outcome Measures	Key Findings	Evidence Synthesis
Shukla A, Kalsait A, Deshmukh K, Caudhari S. (2024)	Correlational Study	Bharatanatyam dancers	Core Endurance, Balance	Significant positive correlation between core endurance and balance	Supports a direct association between core endurance and balance in Bharatanatyam dancers
Penkar & Sadhale (2020)	Comparative Study	Bharatanatyam dancers and non-dancers	Balance Assessment	Dancers demonstrated significantly better balance than non-dancers	Dance training positively influences balance performance
Giri et al. (2025)	Experimental Study	Bharatanatyam dancers	Core Strength, Dynamic Balance	Whole-body vibration improved core strength and dynamic balance	Improved core function contributes to enhanced balance
Sharma M, Nuhmani S, Wardhan D, Muaidi QI. (2018)	Comparative study	Amateur Bharatanatyam dancers, trained Bharatanatyam dancers, and non-dancers	Lower-extremity flexibility tests	Trained dancers showed greater lower-limb flexibility than amateur dancers and non-dancers.	Regular dance practice contributes to improved flexibility required for Bharatanatyam performance
Jyothi S, Sujaya B. (2020/2021)	Comparative cross-sectional study	female Bharatanatyam dancers and non-dancers	Goniometric assessment of hip, knee, and ankle ROM	Dancers demonstrated significantly greater hip flexion and abduction ROM than non-dancers.	Bharatanatyam practice enhances lower-limb flexibility, particularly at the hip joint.
Sabaanant S, Thevanthy T. (2015)	Narrative/fitness analysis	Bharatanatyam dancers	Physical fitness components (strength, flexibility, balance, coordination)	Emphasized that flexibility, balance, muscular strength, and coordination are essential for Bharatanatyam	Supports the importance of comprehensive physical conditioning for optimal dance performance.

				performance	
--	--	--	--	-------------	--

Table 2: Summary of Findings

Variable	Evidence from Included Studies	Overall Finding
Core Endurance	Assessed in correlational and experimental studies	Positively associated with postural control and balance
Flexibility	Evaluated in comparative studies	Greater flexibility observed in dancers than non-dancers
Static Balance	Assessed in balance studies	Bharatanatyam dancers demonstrated superior static balance
Dynamic Balance	Evaluated across multiple studies	Enhanced dynamic balance associated with dance training
Postural Control	Assessed through observational studies.	Improved body alignment and postural stability
Interrelationship	Examined through correlational findings	Core endurance, flexibility, and balance appear to function synergistically

3.1 Study Characteristics

Six of the studies were included which were either cross-sectional, comparative, correlational, experimental, or observation in nature. Subjects in the studies consisted of Bharatanatyam dancers of different experiences, mainly female subjects and with sample sizes of about 30 to 100 subjects. The above dependent variables measured for the studies included core endurance, flexibility, static balance, dynamic balance, postural control, and physical performance.

3.2 Core Endurance Outcomes

The results of studies on core endurance showed that Bharatanatyam dancers were characterized by excellent trunk muscle endurance and balance. It has been noted that core endurance played an important role in keeping body posture while performing prolonged dance poses and movements. The higher trunk endurance level increased the movement control and lowered the postural instability.

3.3 Flexibility Outcomes

Research on flexibility indicated that there is more flexibility among Bharatanatyam dancers than non-dancers. It seemed that frequent practice of stretching and dynamic movement helped improve flexibility. The effect of improved flexibility was observed mostly in lower limbs and trunk because they play a key role in mastering Bharatanatyam movements.

3.4 Balance and Postural Control Outcomes

The majority of included research studies have stressed that balance is an important factor in the performance of Bharatanatyam. It was found that dancers were better in their static and dynamic balance in comparison with non-dancers. The development of balance was caused by repeated exercises of dancing posture, weight shifts, and body movements.

3.5 Interrelationship Between Core Endurance, Flexibility, and Balance

The literature suggests an interrelation between core endurance, flexibility and balance. As for the studie

s that analyzed the connection between the mentioned physical traits, it was revealed that dancers having higher levels of core endurance had better balance performance. In addition, appropriate flexibility assisted in efficient movement execution and postural control.

3.6 Summary of Findings

According to the results, Bharatanatyam dancers were found to have better flexibility, balance, and posture control as compared to non-dancers. The result of the research indicated the roles of endurance, flexibility and balance in the effective performance of the dance movements. The relationship between core endurance, flexibility, and balance is shown.

4.0 DISCUSSION

The present rapid review was conducted with the objective of the available information on the relationship between core endurance, flexibility, and balance in Bharatanatyam dancers. The results of the inclusion trials indicate that there is a high correlation between these elements of performance, essential for improving performance in dance, posture, and the efficiency of movement. The studies included showed balance as an outcome. Bharatanatyam dancers can control their body posture in different positions, and apply some weight transfer and weight shifting and in the control of weight transfer in moving from one position to other. While maintaining the Araimandi position and executing complex foot movements require many postural adjustments, it helps to create balance. The finding aligns with existing studies that show enhanced proprioception and motor coordination due to dance training. Flexibility was yet another component found among those discussed in the analyzed research articles. The Bharatanatyam dancers were found to have higher levels of flexibility compared to the control group of individuals who did not perform any Bharatanatyam dance moves. Flexibility could be promoted by constant stretching and holding the particular posture during Bharatanatyam practice. Good flexibility is very important for obtaining proper postures while performing Bharatanatyam dance steps. In addition, the findings indicated the importance of core endurance in the maintenance of postural control and balance. There were studies on the relationship between trunk muscle endurance and balance where positive correlations were found between the two. Core muscles give the body a stable foundation for movement such that force can be effectively transferred between the upper and lower limbs while the spine remains aligned. Since the dance requires static postures and transitions, core endurance seems to be important in the maintenance of high-quality movements and postures without any deviation due to fatigue. An additional intriguing observation involves the correlation between core endurance, flexibility, and balance.

These variables do not operate independently but rather interact with each other to contribute to dance performance. Improved core endurance can enhance balance through increased stability of the trunk while improved flexibility helps in proper positioning of the joints and effective movement. From the physiotherapy standpoint, these results highlight the necessity to include comprehensive conditioning programs among the components that need to be considered for Bharatanatyam dancers. Conditioning programs that involve improvement of core strength, flexibility, and balance may increase dancer's performance and decrease the risk of injury. However, some limitations have to be discussed even despite the positive findings. First of all, the included studies showed high heterogeneity in research design, sample characteristics, and measuring tools. In addition, most of the studies used cross-sectional or observational designs. It does not allow us to determine the causality between the analyzed variables. Moreover, in most cases, the studied dancers were females, thus, limiting the possibility to generalize

the results obtained. Further longitudinal and experimental designs with larger participants can again be studies on the causal relationship between core endurance, flexibility, and balance through Bharatanatyam dancers in the future. Through the standardization of the methods used to assess these variables, it becomes possible to compare results from different studies, thereby increasing the body of literature. The investigation of injury prevention measures and performance enhancement programs aimed at improving physical fitness may prove to be very useful for physiotherapeutic practice. Overall, analysis of the research finding reveals that core endurance, flexibility and balance are significant with regard to Bharatanatyam dance performance as per the study given in this paper.

5.0 LIMITATIONS

The following limitations should be kept in mind while considering the results obtained from this rapid review. One limitation was the unavailability of literature for the study of core endurance, flexibility and balance relationship among Bharatanatyam dancers. Most of the studies included only one variable at a time. Second, there was marked heterogeneity among the included studies in respect of study design, patient population, sample size, and assessment techniques. Outcome measures and testing protocols differed between studies for assessing core endurance, flexibility, and balance skills, precluding any form of direct comparison or quantitative analysis of the results. The third limitation relates to the type of research design used in the studies selected for inclusion, with most of them being cross-sectional, comparative, or observational study.

Assessing the causal links between core endurance, flexibility, and balance is difficult due to this. Moreover, the number of subjects involved in the studies was small, and most of them were female Bharatanatyam dancers. Moreover, the current systematic review considered only the articles written in English and from selected databases such as PubMed, Google Scholar, and ResearchGate. This means that studies that were published in other languages or were found in other databases might not be considered. Despite these flaws, the paper offers an excellent review of existing studies and the significance of core endurance, flexibility, and balance as interrelated components in Bharatanatyam dancing is emphasized.

6.0 FUTURE RECOMMENDATIONS

Longitudinal and experimental studies need to be conducted in the future to study the cause-and-effect relationship between core endurance flexibility and balance in Bharatanatyam dancers. It is highly recommended to conduct large-scale and representative sample studies involving males and females of all ages and different levels of training in order to generalize the findings. It is necessary to use standardized methods of measuring core endurance, flexibility and balance in order to compare the results of various studies. The simultaneous investigation of all these factors is recommended.

In addition, future studies should include research on the efficacy of physiotherapy sessions, core stability programs, flexibility training, and balance training in Bharatanatyam dancers. These investigations link between physical fitness factors and injuries sustained by dancers may help build evidence-based approaches for training and rehabilitation purposes.

Future reviews may also incorporate studies from a wider range of databases and include advanced quantitative analyses such as meta-analysis when sufficient homogeneous evidence becomes available.

7.0 CONCLUSION

According to the findings of this rapid review, Bharatanatyam dancers show better flexibility, balance and postural control compared to non-dancers. It was observed that across all of the studies that were included, Bharatanatyam training had a positive influence on physical performance characteristics. Flexibility is essential for performing a dance. Studies provide evidence that indicates core endurance is significant for balance and postural control. Dancers who had more trunk muscle endurance had better balance performance. This emphasizes the importance of the core musculature to maintain specific postures in dance and control dynamic movements. Nonetheless, studies assessing flexibility reported greater joint mobility among Bharatanatyam dancers. Thus, facilitated movement efficiency, and functions enhanced balance and other benefits. The evidence reviewed also indicates an interrelationship between core endurance, flexibility, and balance. Strengthening the core is thought to provide stability for the movement. Increasing flexibility was found to enhance joint range of motion and movement efficiency. These have been shown to improve standings and dynamic balance postural control and dance performances. According to physiotherapy, the findings indicate the necessity of incorporating exercises for core endurance, flexibility, and balance in conditioning and rehabilitation programmes of Bharatanatyam dancers. It is possible that injuries to musculoskeletal tissues may be reduced by such approaches. The studies available on this topic provide critical information; however, they are considered limited owing to their small sample sizes, methodological differences, and the predominance of observational study designs. Consequently, stronger evidence on the cause and effect relationship among core endurance, flexibility, and balance of Bharatanatyam dancers require further well-designed longitudinal and experimental studies. To conclude, a review observed that core endurance, flexibility, and balance are interlinked physical fitness components and they can significantly contribute to the postural control and movement efficiency to Bharatanatyam dance.

REFERENCES

1. Shukla A, Kalsait A, Deshmukh K, Chaudhari S. Co-relation between core endurance and balance in Bharatanatyam dancers. *Int J Multidiscip Res Growth Eval*. 2024;5(5):487-494.
2. Penkar L, Sadhale A. Balance in Bharatanatyam dancers and non-dancers: A comparative study. *J Soc Indian Physiother*. 2020;4(2):92-96.
3. Giri S, Jamkar M, Jeyakumar S. Effect of whole-body vibration on dynamic balance and core strength in Bharatanatyam dancers: An experimental study. *Int J Res Anal Rev*. 2025;5(3):25-36.
4. Kubal S, Kadam V. Relationship between core strength, core endurance and balance in folk dancers – A pilot study. *Indian J Physiother Occup Ther*. 2021;15(4):157-165.
5. Ambegaonkar JP, Caswell AM, Winchester JB, Shimokochi Y, Cortes N, Caswell SV. Lower extremity hypermobility, but not core muscle endurance, influences balance in female collegiate dancers. *Int J Sports Phys Ther*. 2016;11(2):220-229.
6. Kiefer AW, Riley MA, Shockley K, Villard S, Van Orden G. Multi-segmental postural coordination in dancers and non-dancers. *Exp Brain Res*. 2011;208(2):207-220.
7. Golomer E, Dupui P, Monod H. The contribution of vision and proprioception to dynamic balance in dancers. *J Sports Med Phys Fitness*. 1997;37(4):244-250.
8. Schmitt H, Kuni B, Sabo D. Influence of professional dance training on postural control and balance performance. *Gait Posture*. 2005;22(4):331-339.

9. Hugel F, Cadopi M, Kohler F, Perrin P. Postural control of ballet dancers. *Clin Neurophysiol.* 1999;110(3):524-529.
10. Crotts D, Thompson B, Nahom M, Ryan S, Newton RA. Balance abilities of professional dancers on select balance tests. *J Orthop Sports Phys Ther.* 1996;23(1):12-17.
11. Koutedakis Y, Jamurtas A. The dancer as a performing athlete: Physiological considerations. *Sports Med.* 2004;34(10):651-661.
12. Angioi M, Metsios G, Twitchett E, Koutedakis Y, Wyon M. Association between selected physical fitness parameters and aesthetic competence in contemporary dancers. *J Dance Med Sci.* 2009;13(4):115-123.
13. Twitchett E, Angioi M, Metsios G, Koutedakis Y, Wyon M. Body composition and ballet performance. *Med Probl Perform Art.* 2010;25(1):38-41.
14. Wyon MA, Smith A. A measurement tool for assessing flexibility in dancers. *J Dance Med Sci.* 2009;13(3):85-89.
15. Bennell KL, Khan KM, Matthews BL, De Gruyter ML, Cook E, Holzer K, et al. Hip and ankle range of motion and balance performance in elite dancers. *Clin J Sport Med.* 1999;9(3):173-179.
16. Otari SM, Puntambekar A. A comparative assessment of flexibility of backline and strength of lower limb in Bharatanatyam dancers and non-dancers. *Int J Community Med Public Health.* 2021;8(11):5431-5434. doi:10.18203/2394-6040.ijcmph20214283.
17. McGill SM. Low back stability: from formal description to issues for performance and rehabilitation. *Exerc Sport Sci Rev.* 2001;29(1):26-31.
18. Kibler WB, Press J, Sciascia A. The role of core stability in athletic function. *Sports Med.* 2006;36(3):189-198. doi:10.2165/00007256-200636030-00001.
19. Hrysomallis C. Balance ability and athletic performance. *Sports Med.* 2011;41(3):221-232. doi:10.2165/11538560-000000000-00000
20. Sharma M, Nuhmani S, Wardhan D, Muaidi QI. Comparison of lower extremity muscle flexibility in amateur and trained Bharatanatyam dancers and nondancers. *Med Probl Perform Art.* 2018;33(1):20-25. doi:10.21091/mppa.2018.1005.
21. Jyothi S, Sujaya B. Assessment of lower limb flexibility in female Bharatanatyam dancers. *Indian J Clin Exp Physiol.* 2020.
22. Sabaanant S, Thevanthy T. Physical fitness consideration of Bharathanatyam dance. *Res J Phys Educ Sci.* 2015;3(1):1-4.