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Effectiveness of an educational program on knowledge, attitude and practices of Indian classical dance trainers towards lower limb injury prevention: A quasi-experimental study

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Abstract

Background: Indian classical dance is a physically demanding form of exercise which involves repetitive movements, the maintenance of sustained postures, balance, flexibility, coordination, strength and repeated loading of the lower limbs. The nature of these requirements may lead to musculoskeletal problems, especially if training is carried out with overuse, fatigue, an inadequate warm-up, bad alignment, muscle imbalance or improper training methods. Since dance trainers have a significant role to play in ensuring that the training environment remains safe, they affect aspects such as technique, the amount of work done, warm-up procedures, recovery and the way in which pain or early signs of injury are responded to. Nevertheless, little research has been carried out into the effects of structured injury-prevention education among Indian classical dance trainers.

Objective: The aim is to find out the effect of an educational program on the knowledge, attitudes and practices of trainers in Indian classical dance with regard to the prevention of lower-limb injuries.

Methods: A pre-test–post-test quasi-experimental study was carried out with 40 trainers of Indian classical dance. The participants were selected by means of convenience sampling. A questionnaire which had been reviewed by two faculty members from musculoskeletal physiotherapy and one from community physiotherapy was used to evaluate the trainers' knowledge, attitudes and practices concerning the prevention of lower-limb injuries. This questionnaire was completed by the participants both before and after they had taken part in a structured educational programme. The programme included topics such as the anatomy of the lower limbs, common injuries associated with dance, risk factors for injury, warm-up and cool-down routines, stretching, strength and flexibility exercises, balance and proprioception, protective measures, early management of injury, safe training practices and technical corrections. The knowledge answers were analysed descriptively by means of frequencies and percentages. In order to compare the attitude scores, a paired-samples t-test was used. The practice scores were first examined for normality using the Shapiro–Wilk test and then compared using the Wilcoxon signed-rank test.

Results: The 40 people who took part in the study were all women, the majority of them being between 18 and 29 years of age (77.5%), 57.5% of them teaching Bharatanatyam and 42.5% teaching Kathak. Seventy-two point five per cent of the participants had between one and five years' teaching experience. The answers given demonstrated favourable changes in a number of the injury-prevention areas. The percentage of people choosing the correct response in the case of overuse rose from 87.5% before the intervention to 100% after it. The attitude scores went up from 38.70 ± 3.31 before the intervention to 43.30 ± 2.83 after the intervention. A statistically significant difference was found between the pre- and post-intervention values ($t(39) = -10.9$, $p < 0.001$), the effect size being large (Cohen's $d = 1.72$). The practice scores increased from 41.20 ± 3.95 to 46.60 ± 3.43. The Shapiro–Wilk test showed that the practice data were not normally distributed ($W = 0.938$, $p = 0.030$); hence the Wilcoxon signed-rank test was employed. A statistically significant pre–post difference was detected ($W = 0.00$, $p < 0.001$).

Conclusion: The educational program led to favourable changes in the knowledge, attitudes and reported injury-prevention practices of Indian classical dance trainers. The results show that structured injury-prevention education could serve as a useful approach informed by physiotherapy for increasing awareness and promoting safer practices in dance-training settings.

Keywords: Trainers of dance, the educational programme, Indian classical dance, prevention of injury, the lower limb, physiotherapy, practices, knowledge, and attitude

Introduction

Indian classical dance is a blend of highly coordinated body movements, rhythmic footwork, postures, gestures and expressive movements. The main forms of Indian classical dance are Bharatanatyam, Kathak, Kathakali, Kuchipudi, Manipuri, Odissi and Mohiniyattam. Even though these different styles have varying patterns of movement and technical requirements, most of them involve repeated movements of the lower limbs, the maintenance of sustained positions, changes in direction, balance and controlled transfer of weight.

The physical demands of dance can exert a great deal of stress on the musculoskeletal system, especially the lower limbs, since dancers constantly use their feet, ankles, knees and hips for weight bearing, propulsion, landing, turning and for keeping particular dance positions. If there is repetitive loading without sufficient recovery, this may lead to overuse problems and musculoskeletal injury. Earlier

research carried out on Indian classical dancers found that they suffered lower-extremity and back injuries and stressed the importance of studying the risk factors associated with training [1, 3, 12].

A number of factors can lead to injury in the context of dancing. They are excessive training load, an inadequate warm-up, a lack of flexibility or strength, fatigue, poor alignment, muscle imbalance, incorrect technique, and insufficient recovery. Since alignment has also been found to be an important factor linked to injury of the lower extremities in dancers [8], injury prevention cannot be limited to just dealing with an injury after it has happened.

In this situation the role of a dance trainer is especially important. They are there throughout ordinary practice and thus have the chance to watch technique, notice any changes in movement, alter the exercises, keep an eye on the dancers' level of fatigue and urge the dancers to mention any pain or discomfort they may be experiencing. They can also affect the manner in which the dancers get ready for practice and how they recover afterwards. Research carried out among dance teachers has shown how important it is to have knowledge, beliefs and behaviours concerning safe dance practice [3].

Various studies have looked into different methods of preventing injury in dance. Programs based on strength, endurance, balance and motor-control exercises have been examined among professional and pre-professional dancers [4, 5, 11, 15]. Injury-prevention programmes have also been assessed in professional ballet dancers, the results indicating that structured preventive measures might affect injury-related outcomes [7]. A systematic review which came out in 2026 found that dance-specific injury-prevention strategies have not been sufficiently studied and stressed the importance of having standardized injury surveillance together with further research [9].

Studies which focus on Indian classical dancers also show that musculoskeletal injury is a major issue. Kumar and Shenoy noted that musculoskeletal injuries occur among female Bharatanatyam dancers and stressed the importance of examining the training-related factors connected with injury [6]. Moreover, a systematic review of musculoskeletal pain and injury in Indian classical dancers found shortcomings in the existing evidence and underlined the need for standardized research methods [12].

An individual's knowledge of anatomy and of the ways in which injuries occur may also affect the measures they take to prevent them. Kotler and others looked at the dancers' perception of and actual knowledge of anatomy and discovered that knowledge of anatomy was linked to both previous education in anatomy and to their experience in dance [10]. These results confirm the importance of giving people involved in dance training suitable educational information.

Even though there has been some research carried out on dancers, conditioning programmes and injury-prevention methods, there is still relatively little evidence concerning structured educational interventions aimed specifically at Indian classical dance trainers. Since trainers play an important role as a bridge between scientific injury-prevention knowledge and ordinary dance practice, enhancing their understanding of injury prevention might enable them to include preventive measures into their regular training.

This study has been carried out with the aim of finding out whether a structured educational programme could have an effect on the knowledge, attitudes and practices of trainers of Indian classical dance with regard to the prevention of lower-limb injuries.

Aim

The aim of the study is to examine the effect of an educational program on the knowledge, attitudes and practices of trainers in Indian classical dance with regard to the prevention of lower-limb injuries.

Objectives

1. In order to evaluate the knowledge, attitudes and practices of Indian classical dance instructors with regard to the prevention of lower-limb injuries.
2. This involves evaluating the knowledge, attitudes and practices of trainers in Indian classical dance with regard to the prevention of lower-limb injuries.
3. Compare the knowledge, attitudes and practices before and after the intervention as a result of the educational programme.
4. Prepare and finalize a questionnaire which will be evaluated by two faculty members from the department of musculoskeletal physiotherapy and one faculty member from the field of community physiotherapy.

Hypothesis

The program in the field of education will lead to an improvement in the knowledge, attitudes and practices of trainers in Indian classical dance with regard to the prevention of injuries to the lower limbs.

Materials and Methods

Study Design

The study employed a quasi-experimental, single-group pre-test–post-test design, which consisted of administering the questionnaire to the participants before the educational intervention and then giving them the same questionnaire after the intervention had taken place.

Study Participants and Setting

The study recruited 40 trainers in Indian classical dance through convenience sampling, the participants being obtained from dance training establishments in Thane and Navi Mumbai.

Sample Size

40 trainers who specialised in Indian classical dance took part in the study; the sample size had been established as part of the planned paired pre–post analysis.

Eligibility Criteria

The inclusion criteria were:

- People who are between 18 and 60 years of age.
- Trainers in Indian classical dance who were actively giving lessons.
- A minimum of one year's experience in teaching dance.
- Teaching over three hours each week.
- The ability to understand the study questionnaire and to complete it.
- Availability during the study period.
- Being willing to give written informed consent.

The exclusion criteria were:

- Students or apprentices who were not acting in the capacity of dance trainers.
- Teachers of dances that are not classical.
- An acute injury to the lower limb at the present time.
- Surgery on the lower limbs that had taken place within the last six months.
- Having taken part in a similar injury-prevention educational programme within the last six months.
- Not being able to finish the questionnaire or to attend the educational session.
- Physicians or experts in sports medicine who have the appropriate professional certification.

Ethical Considerations

The study took place only after it had received the necessary ethical approval from the institution. Before taking part, the participants were made aware of the aim and the methods of the study. Each participant gave their written, informed consent. People could choose whether or not to take part, and it was told to them that they had the right to withdraw from the study at any time. The information sheet given to the participants outlined the procedure of the study, how long it would last, the matter of confidentiality and the voluntary character of participation.

Development of the Questionnaire

A Knowledge, Attitude and Practices questionnaire which was developed by the researchers itself was prepared particularly for trainers in Indian classical dance and was then examined by experts; the expert review involved two members of staff from musculoskeletal physiotherapy and one member from community physiotherapy.

The questionnaire had three parts: knowledge, attitude and practices.

The section on knowledge consisted of 10 multiple-choice questions covering lower-limb injuries, overuse, joints that are commonly injured, stretching, warm-up, protective measures, the management of injuries in their early stage, alignment and posture, fatigue and muscle imbalance, and the importance of basic anatomy.

The attitude section included 10 statements on a Likert scale relating to the importance of injury prevention, the trainers' responsibility in ensuring dancer safety, the consequences of ignoring pain, the role of technique, confidence in one's ability to prevent injury, and the need for injury-prevention education as well as the value of injury-prevention workshops.

The practice portion included 11 items which dealt with warm-up and cool-down procedures, posture and alignment correction, the teaching of strategies for injury prevention, encouragement of people reporting pain, modifying exercises during recovery, consulting healthcare professionals, monitoring fatigue and overuse, keeping injury-prevention knowledge up to date, and the normal length of time required for warm-up and cool-down.

The descriptive analysis was carried out on the knowledge component since the study protocol called for response-frequency analysis rather than a total knowledge score, and the attitude and practice components were assessed by using the questionnaire scoring system.

Educational Intervention

After the pre-intervention assessment, the participants were given a structured educational programme concerning the prevention of lower-limb injuries.

The educational content included:

1. A description of the basic anatomy of the lower limbs, including the foot, ankle, knee, and hip.
2. The kinds of injuries linked to dancing.
3. Factors which increase the risk of injury.
4. Signs and symptoms of injury.
5. The importance of preventing injury.
6. The principles relating to warming up and cooling down.
7. Stretching and flexibility.
8. Strength training.
9. Balance and proprioception.
10. Protective measures.
11. Early injury management.
12. Safe training guidelines.
13. Technique correction and adjustment.
14. The importance of trainers taking responsibility for the safety of dancers.

Encouraging long-term health and encouraging people to take part in dance.

The aim of the course was to give practical information which could be added to ordinary dance-training sessions rather than concentrating only on theoretical information.

Procedure

Once the participants who were eligible had been identified, they were given a full explanation of the study procedure and provided with written informed consent.

At the beginning, the participants filled out the self-developed KAP questionnaire as a means of assessing their situation before the intervention. This questionnaire was designed to evaluate their current level of knowledge, their attitudes, and the practices they had reported regarding the prevention of lower-limb injuries.

The educational program was then given to the participants, the session including the educational material that had been planned, on the subjects of anatomy, injury risk factors, preventive strategies and safe training practices.

After the educational intervention had been completed, the participants were asked to fill in the same questionnaire as part of the post-intervention assessment.

The responses before and after the intervention were then entered into a data sheet for analysis.

Statistical Analysis

The data were input and verified with the aid of Microsoft Excel, and the statistical analysis was carried out using Jamovi.

The frequencies and percentages for each question were used to analyse the knowledge component, and the distributions of the responses before and after the intervention were compared in a descriptive manner.

The attitude scores were given a summary based on the mean, standard deviation, median and range, and a paired-samples t-test was used to compare the attitude scores before and after the intervention.

The investigators used the Shapiro–Wilk test to assess whether the practice data were normal; since the practice data did not meet the requirement of normality, the

Wilcoxon signed-rank test was carried out for the comparison between pre- and post-.
The result was regarded as being statistically significant if the p-value was less than 0.05, and Cohen's d was given for the attitude outcome.

Results

Participant Characteristics

The study had forty participants, all of whom were women.
Of the 40 participants, 31 (77.5%) were between the ages of 18 and 29 years, 4 (10.0%) were between 30 and 39 years of age, 4 (10.0%) were between 40 and 49 years of age and one participant (2.5%) was between 50 and 59 years of age.
Regarding dance style, 23 participants (57.5%) taught Bharatanatyam and 17 participants (42.5%) taught Kathak.
As for teaching experience, 29 people (72.5 per cent) had between 1 and 5 years' experience, 9 (22.5 per cent) had between 6 and 10 years' experience and 2 (5.0 per cent) had more than 10 years' experience.

Table 1: Distribution of the respondents by sex.

Gender	Number	Percentage
Female	40	100.0%

Interpretation: All participants were female (100%)

Table 2: Distribution of the respondents by age.

Age Range	Number	Percentage
18–29	31	77.5%
30–39	4	10.0%
40–49	4	10.0%
50–59	1	2.5%
Total	40	100.0%

Interpretation: 77.5 per cent of the participants were between the ages of 18 and 29 years.

Table 3: The distribution of the respondents according to the type of dance taught.

Dance Style Taught	Number	Percentage
Bharatanatyam	23	57.5%
Kathak	17	42.5%
Total	40	100.0%

Interpretation: Of the participants, 57.5% taught Bharatanatyam. The remaining 42.5% taught Kathak.

Table 4: Distribution of the respondents according to the number of years of experience.

Years of Experience	Number	Percentage
1–5 years	29	72.5%
6–10 years	9	22.5%
Total	38	95.0%

Over 10 years – 2 – 5.0%

In terms of their teaching experience, the majority of the participants—72.5%—had between 1 and 5 years' experience, 22.5% had between 6 and 10 years' experience and 5% had more than 10 years' experience.

Knowledge Findings

The descriptive analysis of the knowledge component involved the use of frequency and percentage distributions for each question.
With regard to the first knowledge question, all 40 participants chose the correct answer both before and after the intervention. This shows that the participants already had a good level of basic awareness of the role of the lower limbs in dance-related injuries.
With regard to the question concerning overuse as a main cause of lower-limb injury, 35 of the participants (87.5%) had chosen the correct response before the intervention took place. After the educational programme, all 40 participants (100%) had selected the right response. This shows an improvement in awareness of the role of overuse as a factor in dance-related injury.
There was also a change in the answers given about the joint most commonly injured. Earlier on, the responses were spread out over a number of options, but after the intervention the distribution showed a clear tendency towards the correct response. This indicates that awareness has improved regarding the lower-limb area most frequently affected by dance-related injury.
The answers given about stretching also changed as a result of the intervention, shows the distribution after the intervention had an increased number of participants choosing the right kind of stretching to do before dancing.
With regard to the question about warm-up, 36 of the participants (90%) chose the correct response before the intervention, while all 40 of them (100%) chose the correct response after the educational program.
There was a clear change in the way people responded with regard to protective measures. Initially, 27 participants (67.5%) chose the correct response, but after the intervention, all 40 participants (100%) gave the correct response.
There was also an improvement in the responses concerning the early management of injury. In the distribution after the intervention, more participants chose the correct response than had done in the assessment before the intervention.
At both assessments the 40 participants chose the correct response when it came to alignment and posture. This shows that they had a good level of awareness at the start of the study of the relationship between alignment, posture and injury risk.
The number of people choosing the correct response with respect to fatigue and muscle imbalance rose from 35 participants (87.5%) before the intervention to all 40 participants (100%) after the intervention.
The participants also chose the correct response with regard to the importance of basic anatomy both before and after the educational program.
The findings relating to descriptive knowledge indicated favourable improvements in a number of areas, especially concerning overuse, stretching, warm-up, the use of protective measures, the management of injury in its early stages, fatigue and muscle imbalance. In some cases, awareness levels at the beginning were already high and did not change as a result of the intervention.

Attitude Findings

The attitude part was measured by using the attitude section of the questionnaire which was prepared by the researchers itself.
The mean attitude score before the intervention was 38.70 ± 3.31, the median being 38 and the range extending from 31 to 49.
After the educational program, the average attitude score rose to 43.30 ± 2.83, the median being 43 and the range extending from 37 to 49.
The absolute difference between the mean scores when they have been rounded was about 4.60 points out of a maximum of 50.

Table 5: A comparison of the attitude scores before and after the intervention.

Assessment	Number	Mean	SD	Median	Minimum–Maximum
Before the intervention	40	38.7	3.31	38	31–49
After the intervention	40	43.3	2.83	43	37–49

The mean attitude score rose from 38.70 ± 3.31 prior to the educational intervention to 43.30 ± 2.83 afterwards, which represents an improvement of about 4.6 points in the attitude score. The results show that the participants developed a more favourable attitude towards lower-limb injury prevention as a result of the educational programme.

Table 6: Paired Samples t-Test for Pre and Post Attitude Score

Comparison	Mean Difference	t	df	p-value	Cohen's d	95% Confidence Interval (lower)	95% Confidence Interval (upper)
Pre -Post	-4.58	-10.9	39	<0.001	-1.72	-5.43	-3.72

A paired-samples t-test revealed a statistically significant difference between the attitude scores before and after the intervention ($t(39) = -10.9$, $p < 0.001$). The mean attitude score rose by 4.58 points as a result of the educational intervention. The large effect size (with a magnitude of Cohen's $d = 1.72$) shows that there was a considerable improvement in the participants' attitudes after the intervention.

Practice Findings

The practical part was evaluated by means of the practice section of the questionnaire.

The average practice score before the intervention was 41.20 ± 3.95 and the median score was 41.

After the intervention, the average practice score rose to 46.60 ± 3.43, the median being 46.

The average score obtained before and after the intervention differed by 5.40 points, out of a possible maximum of 50.

Table 7: A comparison of the scores for practices before and after the intervention

Assessment	Number	Mean	SD	Median
Pre-Intervention	40	41.2	3.95	41
Post-Intervention	40	46.6	3.43	46

The mean practice score rose from 41.2 ± 3.95 prior to the intervention to 46.6 ± 3.43 following it. This represents an improvement of 5.4 points in the practice score as a result of the educational programme, which shows that the participants had adopted better injury-prevention practices after the intervention.

Table 8: Application of the Shapiro-Wilk test to assess the normality of the practice scores

Comparison	W	p-value
Pre–Post Practice	0.938	0.030

The Shapiro–Wilk test yielded a statistically significant result ($W = 0.938$, $p = 0.030$), which meant that the practice data were not normally distributed; for this reason, the non-parametric Wilcoxon signed-rank test was carried out to compare the practice scores before and after the intervention.

Table 9: Application of the Wilcoxon Signed Rank Test to the Pre-Post Intervention Practice Scores

Comparison	Wilcoxon W	p-value	Mean Difference	95% CI of Difference	Rank-Biserial Correlation
Pre-Post Practice	0.00	<0.001	-6.00	-7.50 to-4.50	-1.00

The Shapiro–Wilk test was applied in order to examine whether the practice data were normal, and the result obtained was statistically significant.

$W = 0.938$. $p = 0.030$.

The data obtained from the practice were regarded as not being normally distributed and so the Wilcoxon signed-rank test was employed.

The Wilcoxon signed-rank test demonstrated a statistically significant difference between the pre- and post-intervention practice scores:

$W = 0.00$, $p < 0.001$.

The results show that there was a statistically significant improvement in the practices reported for injury prevention after the educational intervention.

Discussion

The impact of a structured educational program was assessed with respect to knowledge, attitude and practices regarding lower-limb injury prevention among Indian classical dance trainers. Favourable changes were observed across the three components, although the knowledge component was interpreted descriptively rather than inferentially on a score basis.

The importance of injury prevention in dance is well established, given the exposure to repeated physical demands over prolonged periods. Indian classical dance involves repeated lower-limb loading, specific postures, footwork, changes in direction and controlled movements. Previous studies with Indian classical dancers have reported on lower-extremity and back injuries and have stressed the need for greater attention to training-related risk factors [3, 6, 12].

Knowledge

The knowledge findings demonstrated improvement in several domains following the educational program.

The most evident changes were seen in questions related to overuse, stretching, warm-up, protective measures, early injury management, fatigue and muscle imbalance. For example, the awareness of overuse increased from 87.5% to 100%, and all participants selected the appropriate response regarding warm-up after the intervention.

These findings suggest that a structured educational session can reinforce concepts that may not always be emphasized during traditional dance training. Trainers may have considerable practical experience in teaching dance, but their formal exposure to injury-prevention principles may vary.

Some knowledge areas demonstrated 100% appropriate responses before the intervention. These included awareness that lower-limb injuries are common in dancers, the role of alignment and posture, and the importance of basic anatomy. Given the high baseline response, there was little scope for measurable improvement in these areas. The absence of change in these questions should therefore not be interpreted as a lack of benefit from the intervention.

The findings are consistent with the literature suggesting that education can contribute to injury-prevention awareness among people involved in dance. Research examining dancers' anatomical knowledge has demonstrated an association between anatomy education and knowledge [10]. Similarly, research among dance teachers has emphasized the role of teacher knowledge and behaviours in maintaining safer dance environments [3].

The present study therefore adds to the evidence by focusing specifically on Indian classical dance trainers rather than dancers alone.

Attitude

The attitude component was associated with a statistically significant improvement after the educational intervention. The mean score increased from 38.70 ± 3.31 to 43.30 ± 2.83, and the paired-samples t-test demonstrated a significant pre–post difference ($t(39) = -10.9$, $p < 0.001$).

The large Cohen's d value of 1.72 indicates a substantial standardized difference between the pre- and post-intervention attitude scores.

The change in attitude may be related to the content of the educational program. The session addressed not only the occurrence of injuries but also the trainer's role in preventing them. Topics such as early recognition of symptoms, the importance of warm-up and recovery, technique correction and the long-term consequences of repeated injury may have helped participants consider prevention as part of routine dance training.

This distinction is important. Injury prevention is not simply a response to an injury after it occurs. It also involves recognizing risk factors and modifying the training environment before an injury develops.

The findings are relevant to previous research involving dance teachers. Ball *et al*. investigated safe dance practice knowledge, beliefs and behaviours among dance teachers and highlighted the importance of the teacher's role in promoting safe practices [3]. The present findings similarly indicate that educational exposure may influence the way trainers perceive their responsibility towards injury prevention.

Practice

The practice component also demonstrated a significant improvement. The mean score increased from 41.20 ± 3.95 before the intervention to 46.60 ± 3.43 after the intervention.

Because the Shapiro–Wilk test indicated that the practice data were not normally distributed ($W = 0.938$, $p = 0.030$), the Wilcoxon signed-rank test was used. The test demonstrated a statistically significant pre–post difference ($W = 0.00$, $p < 0.001$).

The intervention included practical topics such as warm-up, cool-down, strength and flexibility, balance and proprioception, safe training methods and technique correction. These topics were directly related to activities that trainers can incorporate into routine classes.

The improvement in reported practice scores may therefore reflect increased attention to preventive behaviours after the educational program. However, the outcome was based on a self-reported practice. It cannot be assumed that a change in questionnaire responses necessarily represents an equivalent change in actual day-to-day behaviour.

Previous research has explored conditioning and injury-prevention programs in dancers. Long *et al*. reported improvements in physical performance and function following dance-specific neuromuscular conditioning and injury-prevention training [4]. Mistiaen *et al*. also investigated additional physical conditioning in pre-professional dancers and reported improvements in physical fitness, while noting the need for further controlled research regarding injury outcomes [5].

Similarly, Vera *et al*. investigated an injury-prevention program among professional ballet dancers using a randomized controlled design [7]. These studies demonstrate the growing interest in structured preventive interventions within dance, although their populations and intervention approaches differ from those of the present study.

The present study focused on education directed at trainers rather than a conditioning program delivered directly to dancers. This is an important distinction, as trainers may influence preventive behaviours across multiple training sessions and among multiple dancers.

Overall Interpretation

When the three components are considered together, the findings demonstrate a favourable response following the educational intervention.

The knowledge component demonstrated improvement in the distribution of appropriate responses in several areas. The attitude component demonstrated a statistically significant improvement with a large effect size. The practice component also demonstrated a statistically significant pre–post improvement.

The findings should nevertheless be interpreted in the context of the study design. Given the single-group pre–post design that lacked a control group, it is not possible to establish with certainty that all observed changes were caused solely by the educational program. Factors such as repeated exposure to the questionnaire, participants' previous experiences, or other external influences may also have contributed to the observed changes.

Despite the limitation, the study provides useful preliminary evidence regarding the potential role of trainer-focused injury-prevention education in Indian classical dance settings.

Further research could also examine the effectiveness of repeated educational sessions, digital education, workshops and physiotherapy-led injury-prevention programs integrated into dance academies.

Clinical and Practical Implications

The findings may have implications for physiotherapy and dance education.

Physiotherapists working with dance populations may consider incorporating short injury-prevention education sessions into dance academies, workshops and community-based programs.

Education can include simple and practical concepts such as:

- Appropriate warm-up and cool-down;
- Recognition of fatigue and overuse;
- Maintaining appropriate alignment;
- Gradual progression of training load;
- Strength and flexibility;
- Balance and proprioception;
- Early recognition of pain or injury symptoms;
- Appropriate modification of training during recovery; and
- Timely referral to physiotherapists or other healthcare professionals.

Dance trainers may be particularly suitable recipients of preventive education because they interact with dancers regularly and can observe movement and training behaviour over time.

Strengths of the Study

There were several strengths to the study.

One strength is the focus on Indian classical dance trainers, a group that has been comparatively less investigated in terms of injury-prevention intervention research.

Another strength is the use of a structured pre- and post-intervention design, which enabled changes in participants' responses to be examined after the educational program.

The educational content also addressed both theoretical and practical aspects of injury prevention, which enabled the program to address knowledge as well as attitudes and reported practices.

The questionnaire was reviewed by physiotherapy faculty members from musculoskeletal and community physiotherapy backgrounds prior to being used in the study.

Limitations

Several limitations should be considered when interpreting the findings.

A small sample size, with only 40 participants, is a limitation.

Furthermore, convenience sampling was used, which may limit the generalizability of the findings to all Indian classical dance trainers.

A third limitation is the single-group pre–post design, without a control group. As such, causal conclusions regarding the educational intervention should be made with caution.

Fourth, the knowledge component was analysed descriptively, rather than an inferential comparison of total knowledge scores. Thus, the observed changes are distributions rather than a statistically tested change in an overall knowledge score.

Fifth, the questionnaire was self-developed and reviewed by experts. Although expert review supported the content of the questionnaire, psychometric validation would strengthen future research.

Sixth, practice outcomes were self-reported, which may differ from actual behaviour during dance-training sessions.

Finally, the post-intervention assessment was conducted shortly after the educational program. Thus, the study was not able to determine if the observed changes in attitude and reported practices were maintained over a longer period of time.

Future Recommendations

Future studies should recruit a larger sample of Indian classical dance trainers from multiple dance academies and geographical regions.

Randomized controlled studies should be conducted with a comparison group to provide stronger evidence regarding the effect of educational interventions.

Furthermore, longer follow-up periods should be incorporated to determine if changes in knowledge, attitude and practices are sustained over time.

Future research should consider direct observation of preventive practices, rather than using self-reported questionnaires.

Prospective injury surveillance could be incorporated to determine if changes in trainers' knowledge, attitudes and practices are associated with changes in actual dance-related injury incidence.

Conclusion

The present study demonstrated favourable changes in knowledge, attitude and reported practices related to lower-limb injury prevention among Indian classical dance trainers following a structured educational program.

Knowledge responses improved in several important injury-prevention domains, including overuse, stretching, warm-up, protective measures, early injury management, fatigue and muscle imbalance.

The attitude score increased from 38.70 ± 3.31 to 43.30 ± 2.83. This was a statistically significant pre–post difference ($t(39) = -10.9$, $p < 0.001$), with a large effect size (Cohen's $d = 1.72$).

The practice score increased from 41.20 ± 3.95 to 46.60 ± 3.43. The Wilcoxon signed-rank test demonstrated a statistically significant pre–post difference ($W = 0.00$, $p < 0.001$).

Taken together, the findings suggest that a structured educational program may be useful in improving injury-prevention awareness, attitudes and reported practices among Indian classical dance trainers. Trainers have an ongoing role in the daily training environment, so physiotherapy-informed injury-prevention education may be a practical approach to promoting safer dance-training practices.

However, the findings should be interpreted cautiously due to the small convenience sample, absence of a control group, use of a self-developed questionnaire and reliance on self-reported practices. Larger controlled studies with longer follow-up and objective injury outcomes are needed to establish the longer-term impact of trainer-focused injury-prevention education.

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References

1. Masal S, Borkar P. Epidemiology of musculoskeletal injuries in Indian classical dancers: a systematic review. Int J Phys Educ Sports Health,2021:8(3):310-319.
2. Lee S. Evidence-based approaches to reducing dance-related injuries in dance science. Dance Science, 2025.
3. Ball JL, Critchley ML, Black AM, Kenny SJ. Safe dance practice knowledge, beliefs, and behaviors among Alberta dance teachers. J Dance Educ,2024:24(4):276-288.
4. Long KL, Milidonis MK, Wildermuth VL, Kruse AN, Parham UT. The impact of dance-specific neuromuscular conditioning and injury prevention training on motor control, stability, balance, function and injury in professional ballet dancers: a mixed-methods quasi-experimental study. Int J Sports Phys Ther,2021:16(2):404-417.
5. Mistiaen W, Roussel NA, Vissers D, Daenen L, Truijen S, Nijs J. Effects of aerobic endurance, muscle strength, and motor control exercise on physical fitness and musculoskeletal injury rate in preprofessional dancers: an uncontrolled trial. J Manipulative Physiol Ther,2012:35(5):381-389.
6. Kumar LP, Shenoy SJ. Survey of musculoskeletal injuries among female Bharatanatyam dancers in the Udupi District of India. Med Probl Perform Art,2021:36(3):199-206.
7. Vera AM, Barrera BD, Peterson LE, Yetter TR, Dong D, Delgado DA, *et al*. An injury prevention program for professional ballet: a randomized controlled investigation. Orthop J Sports Med,2020:8(7):Article 2325967120937643.
8. Biernacki JL, Stracciolini A, Fraser J, Micheli LJ, Sugimoto D. Risk factors for lower-extremity injuries in female ballet dancers: a systematic review. Clin J Sport Med,2021:31(2):e64-e79.
9. Critchley ML, Rio E, Friesen KB, Räisänen AM, Kenny SJ, Emery CA. Injury prevention strategies in dance: a systematic review. J Dance Med Sci,2026:30(1):65-73.
10. Kotler DH, Lynch M, Cushman D, Hu J, Garner J. Dancers' perceived and actual knowledge of anatomy. J Dance Med Sci,2017:21(2):76-81.
11. Roussel NA, Vissers D, Kuppens K, Fransen E, Truijen S, Nijs J, *et al*. Effect of a physical conditioning versus health promotion intervention in dancers: a randomized controlled trial. Man Ther,2014:19(6):562-568.
12. Prakash AA, Subaskaran D, Akilesh V. Musculoskeletal pain and injury in Indian classical dancers: a systematic review. Med Probl Perform Art,2023:38(3):164-171.
13. Fuhrmann TL, Brayer A, Andrus N, McIntosh S. Injury prevention for modern dancers: a pilot study of an educational intervention. J Community Health,2010:35(5):527-533.
14. Kaufmann JE, Stubbe JH, Nelissen RGH, Gademan MJG. Perspectives of ballet dancers on causes of their injuries and implementation of injury preventive measures by ballet teachers and masters. Med Probl Perform Art,2024:39(2):93-107.
15. Ngo JK, Lu J, Cloak R, Wong DP, Devonport T, Wyon MA. Strength and conditioning in dance: a systematic review and meta-analysis. Eur J Sport Sci,2024:24(6):637-652.