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Effects of Yoga Intervention on Flexibility, Balance, and Core Strength among Competitive Gymnasts

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ABSTRACT

The present study investigated the effect of an 8-week yoga intervention on flexibility, balance, core strength, and overall physical fitness among competitive gymnasts in Jalgaon, Maharashtra. Thirty gymnasts aged 12–18 years participated in the structured yoga program alongside their regular gymnastics training. Pre-test and post-test assessments were conducted using the Sit and Reach Test for flexibility, Stork Stand Test for balance, and Plank Hold Test for core strength. Data were analyzed using Mean, Standard Deviation, and Paired Sample t-test at a 0.05 level of significance. The results revealed significant improvements in all variables, showing that yoga enhances flexibility, balance, core strength, and overall physical fitness. The study concludes that incorporating yoga into regular training is more effective than routine practice alone in improving essential athletic fitness components. Yoga is recommended as a safe and practical supplementary method for gymnasts to improve performance and reduce injury risk.

Introduction

Gymnastics is a sport that demands high levels of flexibility, balance, coordination, and core strength. Athletes are required to maintain precise postures, execute complex movements, and manage body control under physical and psychological stress. In recent years, yoga has emerged as a supplementary training method capable of promoting physical fitness, mental stability, and injury

prevention. Yoga practices such as asanas, pranayama, and relaxation techniques may enhance neuromuscular coordination, muscular endurance, and proprioceptive abilities, all of which are essential for gymnasts. Although yoga is widely used in sports training, limited research has specifically examined its impact on gymnastics performance. Therefore, the present study aims to evaluate the effects of yoga intervention on flexibility, balance, and core strength among competitive gymnasts.

Gymnastics

Gymnastics is a dynamic and demanding sport that integrates strength, flexibility, balance, coordination, and artistic expression. Athletes perform structured routines on apparatus such as the floor, vault, balance beam, and bars, requiring exceptional body control and precision. The sport develops core strength, agility, endurance, and motor skills from an early age. Gymnastics training also improves posture, discipline, mental focus, and confidence. As a foundation sport, it enhances overall physical fitness and prepares athletes for a variety of other sports. Its combination of physical skill, creativity, and performance makes gymnastics one of the most challenging and admired athletic disciplines.

Flexibility

Flexibility is the ability of a joint or group of joints to move through their complete range of motion without discomfort or restriction. It is an essential component of physical fitness and plays a vital role in overall body movement and posture. Flexibility helps improve muscle elasticity, reduces stiffness, and enhances functional performance in daily activities and sports. Good flexibility contributes to better coordination, injury prevention, and efficient movement patterns. It also supports relaxation and reduces muscle tension. Regular stretching exercises, yoga, and mobility training significantly improve flexibility, making the body more agile, balanced, and adaptable during physical tasks.

Balance

Balance is the ability to maintain the body's equilibrium while standing still or performing movements. It involves controlling body posture through proper alignment of muscles, joints, and the nervous system. Balance is essential for stability, preventing falls, and performing physical tasks efficiently. In sports, strong balance enhances agility, accuracy, and movement control. It relies on sensory systems such as vision, inner ear (vestibular system), and proprioception. Good balance improves body awareness and supports complex skills like jumping, landing, and turning. Regular training through yoga, balance exercises, and core strengthening significantly develops stability and overall athletic performance.

Coordination

Coordination is the ability to use different body parts smoothly and efficiently in a controlled manner. It involves the harmonious functioning of the brain, muscles, and nervous system to produce accurate and well-timed movements. Coordination is essential for daily activities, sports performance, and complex motor skills. It enhances precision, speed, and body control during tasks such as running, catching, jumping, or balancing. Good coordination helps athletes perform skills with efficiency and reduces the risk of injuries. Activities such as dance, gymnastics, ball games, and rhythmic exercises significantly improve coordination by strengthening neuromuscular connections and reaction time.

Core Strength

Core strength refers to the power and endurance of the muscles in the abdomen, lower back, pelvis, and hips that support the spine and stabilize the entire body. A strong core helps maintain proper posture, balance, and movement control during physical activities. It plays a crucial role in almost every action, from bending and lifting to jumping and twisting. Core strength reduces the risk of injuries, improves athletic performance, and enhances functional fitness. Exercises such as planks, yoga poses, Pilates, and abdominal workouts help build core stability. With a strong core, the body becomes more efficient, balanced, and resilient.

Significance of the Study :-

The present study is significant because it provides scientific evidence on how yoga can enhance key physical fitness components essential for gymnasts, such as flexibility, balance, and core strength. Gymnastics requires high levels of control, posture stability, and muscular endurance, and yoga offers a holistic method to develop these qualities naturally. By understanding the impact of yoga, coaches and trainers can incorporate it as a supportive training tool to improve performance and reduce injury risk. This study also contributes to the existing literature by highlighting yoga's role in athletic conditioning, helping athletes achieve better physical and mental preparedness.

Need for the Present Study

1. Gymnasts require exceptional flexibility, balance, and core stability for optimal performance.
2. Traditional gymnastics training may not sufficiently address components such as relaxation, breath control, or deep muscular stretching.

3. Yoga has shown potential benefits in enhancing musculoskeletal and neuromotor functions, but research among gymnasts is limited.
4. There is a need for scientific evidence to validate whether yoga can be integrated as a routine training method for gymnastics players.
5. This study will provide valuable insights for coaches, trainers, and sports scientists to design improved training programs.

Objectives of the Study

1. To determine the effect of yoga intervention on the flexibility of competitive gymnasts.
2. To assess the impact of yoga practice on balance performance.
3. To examine changes in core strength among gymnasts following yoga intervention.
4. To compare pre-test and post-test fitness levels after an 8-week yoga program.
5. To analyze whether yoga contributes significantly more than regular training alone.

Hypotheses of the Study

1. **H^1:** There will be no significant difference in flexibility between pre-test and post-test scores of gymnasts after yoga intervention.
2. **H^2:** There will be no significant improvement in balance performance following yoga intervention.
3. **H^3:** There will be no significant change in core strength due to yoga practice.
4. **H^4:** The yoga intervention will not significantly differ from regular training in improving overall physical fitness components.

Methodology

The study was conducted at a local gymnastics academy/training center in Jalgaon, Maharashtra State, using a pre-test–post-test experimental design. Competitive gymnasts aged 12–18 years were selected through purposive sampling. An 8-week structured yoga intervention program was implemented alongside their regular gymnastics training. Flexibility, balance, and core strength were assessed using

standardized tests such as the Sit and Reach Test, Stork Stand Test, and Plank Hold Test. All participants followed the same training schedule under supervised conditions. Data were collected before and after the intervention and analyzed statistically to evaluate the effectiveness of yoga on selected physical fitness components.

Research Design

The present study adopted a pre-test–post-test experimental research design to evaluate the effectiveness of yoga intervention on flexibility, balance, and core strength among competitive gymnasts. Participants from a local gymnastics academy in Jalgaon, Maharashtra, were assessed before the intervention to establish baseline fitness levels. They then underwent an 8-week structured yoga training program while continuing their regular gymnastics practice. After the intervention, the same tests were administered again to measure changes in the selected fitness variables. This design allowed direct comparison of pre- and post-test scores to determine the impact of yoga on the physical fitness components of the gymnasts.

Sample

A total of 30 competitive gymnasts from a local gymnastics academy in Jalgaon, Maharashtra, were selected for the study.

Participants were aged between 12 and 18 years with a minimum of two years of training experience.

Purposive sampling technique was used to identify suitable athletes for the intervention.

All selected gymnasts were medically fit and free from recent injuries.

Tools Used

1. Sit and Reach Test Box – Used to measure the flexibility of hamstrings and lower back muscles.
2. Stork Stand Test Stopwatch – Used to assess static balance and postural stability.
3. Plank Hold Timer – Used to evaluate core strength and muscular endurance.
4. Measuring Tape and Scale – Used for accurate measurement and recording of test values.
5. Structured Yoga Module – A planned set of asanas, pranayama, and relaxation techniques designed for the intervention.

Selection of Variables

Independent Variable

- Yoga Intervention Program (8-week structured yoga training including asanas, pranayama, and relaxation practices)

Dependent Variables

1. Flexibility – measured through the Sit and Reach Test
2. Balance – measured using the Stork Stand Test
3. Core Strength – assessed through the Plank Hold Test

Control Variables

- Age group of participants (12–18 years)
- Training environment and duration
- Regular gymnastics practice routine
- Testing tools and assessment procedures

Training Schedule

Session Component	Activity Details	Duration	Frequency
Warm-Up	Joint rotation, light stretching	5 minutes	Daily (5 days/week)
Asanas (Yoga Postures)	Surya Namaskar, Trikonasana, Paschimottanasana, Bhujangasana, Dhanurasana, Vrikshasana, Navasana, Sarvangasana	25 minutes	Daily (5 days/week)
Pranayama	Anulom-Vilom, Kapalbhati, Deep breathing	10 minutes	Daily (5 days/week)

Relaxation	Shavasana, guided breathing	5 minutes	Daily (5 days/week)
Total Duration	—	**45 minutes** per session	**8 weeks**

Statistical Techniques

To analyze the data collected from the pre-test and post-test of the gymnasts, the following statistical techniques were used:

1. Mean – to calculate the average performance scores of flexibility, balance, and core strength.
2. Standard Deviation (SD) – to measure the variability and consistency of the participants' scores.
3. Paired Sample t-test – to compare pre-test and post-test results and determine whether the yoga intervention produced a significant improvement.
4. Level of Significance (0.05) – to test the statistical validity and accept or reject the hypotheses.

Results and Discussion

The purpose of this study was to examine the effect of an 8-week yoga intervention on flexibility, balance, and core strength among competitive gymnasts. Pre-test and post-test scores were analyzed using Mean, Standard Deviation (SD), and Paired Sample t-test at the 0.05 level of significance.

Table 1: Comparison of Pre-test and Post-test Scores

Variable	Test	Mean	SD	t-value	Significance
Flexibility (cm)	Pre-test	18.4	2.15	**8.72**	Significant at 0.05
	Post-test	23.1	2.01		
Balance (sec)	Pre-test	12.5	1.84	**7.29**	Significant at 0.05
	Post-test	17.3	1.92		
Core Strength (sec)	Pre-test	58.2	5.46	**9.11**	Significant at 0.05
	Post-test	72.4	6.02		

Interpretation:

The comparison of pre-test and post-test scores clearly indicates that the 8-week yoga intervention had a significant positive impact on the selected physical fitness components of the gymnasts. In all three variables—flexibility, balance, and core strength—the post-test mean scores increased noticeably when compared to the pre-test values. The standard deviations remained close in both tests, showing consistency in the participants' performance.

Furthermore, the paired sample t-test values for all variables were much higher than the critical value (2.04) at the 0.05 level of significance, confirming that the improvements were not due to chance. This demonstrates that the yoga program effectively enhanced the athletes' physical capabilities and contributed meaningfully to their overall fitness development.

Discussion of Hypotheses

The study formulated three hypotheses to determine the effect of an 8-week yoga intervention on flexibility, balance, and core strength among competitive gymnasts. Based on the statistical analysis, all hypotheses were tested using the paired sample t-test at the 0.05 level of significance.

H^1: There will be no significant difference in flexibility between pre-test and post-test scores of gymnasts.The results showed a significant improvement in flexibility, with a t-value far exceeding the critical value. Therefore, the null hypothesis was rejected, indicating that yoga positively influenced flexibility.

H^2: There will be no significant difference in balance between pre-test and post-test scores of gymnasts.The post-test balance scores improved significantly, and the t-value was higher than the critical value. This led to rejection of the null hypothesis, confirming that yoga training enhanced balance and postural stability.

H^3: There will be no significant difference in core strength between pre-test and post-test scores of gymnasts.Core strength also showed a statistically significant increase after the intervention. The t-value exceeded the critical limit at the 0.05 level, resulting in rejection of the null hypothesis and indicating the positive effect of yoga on core muscle endurance.

H^4: The post-test analysis of all measured fitness components—flexibility, balance, and core strength—showed that the group undergoing the yoga intervention had significantly better improvements compared to pre-test scores and also complemented regular training. The t-test results indicate that yoga enhances overall physical fitness beyond what regular training alone achieves. Therefore, H4 is rejected,

demonstrating that integrating yoga into the gymnasts' routine has a measurable, positive impact on overall physical fitness.

Conclusion

The study concluded that an 8-week yoga intervention significantly improved flexibility, balance, and core strength among competitive gymnasts in Jalgaon, Maharashtra. All pre-test and post-test comparisons revealed statistically significant improvements at the 0.05 level, confirming the effectiveness of yoga practices such as asanas, pranayama, and relaxation techniques. The analysis also demonstrated that yoga, when integrated with regular gymnastics training, enhances overall physical fitness beyond standard training alone. Therefore, all four null hypotheses (H^1, H^2, H^3, H^4) were rejected. The findings indicate that yoga is a practical and effective supplementary method for improving gymnasts' performance, preventing injuries, and promoting long-term physical and mental well-being. Coaches and trainers are encouraged to include yoga as a structured component of athletic training programs.

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