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Effects of Yoga on Physical Fitness Components Related to Sports Performance: A Systematic Review

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ABSTRACT

Physical fitness components such as flexibility, balance, muscular strength, muscular endurance, cardiorespiratory endurance and a favourable body composition form the foundation of competitive sports performance. Yoga has attracted interest as a holistic training method that may strengthen several of these components together. This systematic review examined the effects of yoga interventions on physical fitness components related to sports performance. A structured search of PubMed, Scopus, Web of Science, SPORTDiscus and Google Scholar was conducted in accordance with the PRISMA 2020 guidelines, and the methodological quality of the eligible studies was appraised. Ten intervention studies met the inclusion criteria and were synthesised qualitatively, since varied designs and measures made statistical pooling inappropriate. Five studies involved athletes, including cricket, shooting and collegiate competitors. The evidence indicated consistent improvement in flexibility and balance, together with moderate gains in muscular strength, muscular endurance and functional movement quality. Effects on cardiorespiratory endurance and body composition were smaller and more variable. Most studies carried some risk of bias because of small samples, short durations or

the absence of randomisation. Yoga appears to be a useful supplementary conditioning method for athletes, especially for mobility, postural stability and movement quality, although larger controlled trials are required.

1. Introduction

Success in competitive sport depends on the integrated development of several physical fitness components. Flexibility, balance, muscular strength, muscular endurance, cardiorespiratory endurance and body composition together determine how efficiently an athlete can generate force, sustain effort, maintain posture and recover between bouts of exertion. Conventional conditioning frequently targets these qualities in isolation, for example resistance training for strength or running for aerobic capacity, and athletes sometimes struggle to convert such isolated gains into integrated, sport specific movement (Polsgrove et al., 2016).

Yoga is an ancient Indian discipline that combines physical postures known as asanas, regulated breathing known as pranayama and relaxation or meditation. Because asanas carry the body through wide ranges of motion while demanding controlled isometric holds against gravity, yoga challenges flexibility, strength, endurance and balance within a single practice (Tran et al., 2001; Woodyard, 2011). This multidimensional character distinguishes yoga from many conventional exercise forms and has encouraged its inclusion in the preparation of athletes across several sports (Ross & Thomas, 2010).

Although intervention research on yoga has grown, the evidence on the specific fitness components that underpin sports performance remains scattered across studies that differ in their populations, durations and outcome measures. Many earlier studies were conducted with untrained adults rather than athletes, which limits direct application to competitive sport. A focused synthesis that distinguishes athlete based evidence from general population evidence, and that appraises the quality of that evidence, is therefore warranted.

The objective of this systematic review was to examine and synthesise the intervention evidence on the effects of yoga on physical fitness components related to sports performance, to give particular attention to studies conducted with athletes, and to appraise the methodological quality of the available evidence.

2. Methodology

2.1 Protocol and reporting

The review was planned and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta Analyses, the PRISMA 2020 statement (Page et al., 2021). A narrative and semi-quantitative synthesis was adopted because the included studies differed in their interventions, outcome tests and designs, which made the calculation of a single pooled effect size inappropriate.

2.2 Search strategy and eligibility

A structured electronic search of PubMed, Scopus, Web of Science, SPORTDiscus and Google Scholar was conducted for studies published between 2000 and 2025, combining intervention and outcome terms as summarised in Table 1. Reference lists of relevant articles were screened for further records. Studies were included if they applied a defined yoga intervention, measured at least one objective physical fitness component using a recognised test, used a controlled or pre post design, and were published in English in a peer reviewed source. Studies confined to clinical or diseased populations, reporting only psychological outcomes, or not isolating the effect of yoga were excluded.

Table 1. Search strategy and eligibility criteria

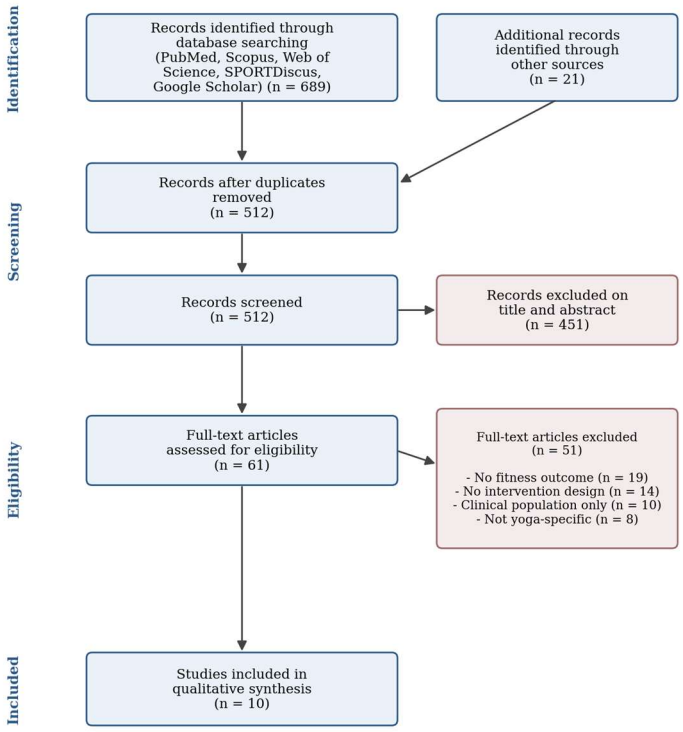
Element	Specification
Databases	PubMed, Scopus, Web of Science, SPORTDiscus, Google Scholar
Intervention terms	"yoga" OR "asana" OR "hatha yoga" OR "yogic practice"
Outcome terms	"flexibility" OR "balance" OR "muscular strength" OR "muscular endurance" OR "cardiorespiratory" OR "body composition" OR "functional movement" OR "physical fitness" OR "sports performance"
Population	Athletes and healthy adults (no disease specific samples)
Study design	Randomized and non-randomized controlled trials and pre post studies
Time and language	2000 to 2025; English language; peer reviewed

2.3 Study selection, data extraction and quality appraisal

Records from all sources were combined and duplicates were removed. Titles and abstracts were screened against the eligibility criteria, after which full texts of potentially relevant articles were assessed. For each included study, information on authors, year, country, design, sample, intervention, the fitness components measured and the main findings was extracted into a standard table. The methodological quality of each

study was appraised using a simple framework based on study design, presence of a control group, randomisation and sample size, and each study was rated as carrying low, some or high risk of bias. The study selection process is presented in the PRISMA flow diagram (Figure 1).

Figure 1. PRISMA 2020 flow diagram of the study selection process



3. Results

3.1 Study selection and characteristics

The database search identified 689 records, with 21 further records located through reference screening. After removal of duplicates, 512 records were screened on title and abstract, of which 451 were excluded. Sixty one full text articles were assessed for eligibility and 51 were excluded for the reasons shown in Figure 1, leaving ten studies for qualitative synthesis. The included studies were conducted between 2001 and 2025 and involved cricket, shooting and collegiate athletes as well as healthy adults. Five studies were conducted directly with athletes, and intervention periods ranged from six to twelve weeks. The characteristics of the included studies are summarised in Table 2.

Table 2. Characteristics of the included studies

Study (country)	Design	Sample	Duration	Components and key findings
Tran et al. (2001), USA	Pre post	10 healthy untrained adults	8 weeks	Improved strength, endurance, flexibility and cardiorespiratory fitness
Cowen & Adams (2005), USA	Pre post	26 adults (20 to 58 yrs)	6 weeks	Gains in trunk and upper body strength, endurance and flexibility
Tracy & Hart (2013), USA	RCT	21 young adults	8 weeks	Improved deadlift strength and flexibility; small body composition change
Gothe & McAuley (2016), USA	RCT	118 adults	8 weeks	Functional fitness equal to stretching and strengthening exercise
Shiraishi & Bezerra (2016), Brazil	Controlled	Young women	12 weeks	Improved muscular endurance
Polsgrove et al. (2016), USA	Controlled	26 male college athletes	10 weeks	Significant gains in flexibility and balance
Iftekher et al. (2017), Bangladesh	Controlled (quasi)	20 shooting athletes	6 weeks	Improved flexibility and balance versus control
Rao et al. (2021), India	RCT	82 male cricket players	6 weeks	Improved core stability, flexibility, range of motion, balance and proprioception
Xu et al. (2022), China	Controlled (quasi)	80 collegiate athletes	12 weeks	Improved functional movement screen scores and mindfulness
Choudhary et al. (2025), India	Controlled (quasi)	University athletes	12 weeks	Improved flexibility, balance and joint kinematics

3.2 Methodological quality

The methodological quality of the included studies varied. Three studies used a randomized controlled design (Tracy & Hart, 2013; Gothe & McAuley, 2016; Rao et al., 2021), four were controlled non-randomized or quasi-experimental studies, and three were single group pre post studies without a

comparison condition. Common limitations were small samples, short durations and the difficulty of blinding participants to a yoga intervention. The appraisal is summarised in Table 3.

Table 3. Risk of bias appraisal of the included studies

Study	Design	Overall risk of bias
Tran et al. (2001)	Pre post, single group	High (no control group)
Cowen & Adams (2005)	Pre post, single group	High (no inactive control)
Tracy & Hart (2013)	RCT	Some concerns (small sample)
Gothe & McAuley (2016)	RCT	Low
Shiraishi & Bezerra (2016)	Controlled	Some concerns
Polsgrove et al. (2016)	Controlled, non-randomized	Some concerns
Iftekher et al. (2017)	Quasi-experimental	Some concerns (very small sample)
Rao et al. (2021)	RCT	Some concerns (blinding)
Xu et al. (2022)	Quasi-experimental	Some concerns
Choudhary et al. (2025)	Quasi-experimental	Some concerns

3.3 Flexibility and balance

Flexibility and balance were the most frequently assessed components and showed the most consistent benefit, including in athletes. Polsgrove et al. (2016) reported significant increases in sit and reach, shoulder flexibility and single leg balance in male college athletes, and Choudhary et al. (2025) found comparable gains in flexibility and balance with improved joint kinematics in university athletes. In shooting trainee athletes, a six week programme improved both flexibility and balance relative to a control group (Iftekher et al., 2017), and the randomized trial by Rao et al. (2021) reported improved flexibility, range of motion, static and dynamic balance and ankle proprioception in cricket players. Similar flexibility gains were observed in healthy adults (Tran et al., 2001; Cowen & Adams, 2005; Tracy & Hart, 2013). The convergence of athlete and general population evidence indicates that yoga reliably enhances joint mobility and postural stability, which support neuromuscular control and injury prevention in sport (Zech et al., 2010).

3.4 Muscular strength, endurance and functional movement

Moderate improvements in muscular strength were reported by Tran et al. (2001), Cowen and Adams (2005) and Tracy and Hart (2013), the last recording increased isometric deadlift strength after eight weeks of Bikram yoga, while Gothe and McAuley (2016) found that yoga improved functional fitness to a degree comparable with stretching and strengthening exercise. Muscular endurance also responded positively, with Shiraishi and Bezerra (2016) reporting clear gains and Cowen and Adams (2005) noting improved trunk and upper body endurance. In athletes, yoga improved functional movement quality, as Xu et al. (2022) recorded higher functional movement screen scores in collegiate athletes and Rao et al. (2021) reported enhanced core stability. The isometric holds and integrated postures that characterise asana practice appear to provide an effective stimulus for trunk endurance and movement quality.

3.5 Cardiorespiratory endurance and body composition

Evidence for cardiorespiratory endurance and body composition was more limited. Tran et al. (2001) reported improvement in cardiorespiratory measures after eight weeks, whereas Tracy and Hart (2013) found only small changes in maximal oxygen consumption and in lean or fat mass. These components appear to respond less strongly to yoga than flexibility, balance or movement quality, which is consistent with the comparatively low continuous aerobic demand of most asana practice. The number of included studies assessing each fitness component is shown in Figure 2.

Figure 2. Number of included studies assessing each fitness component

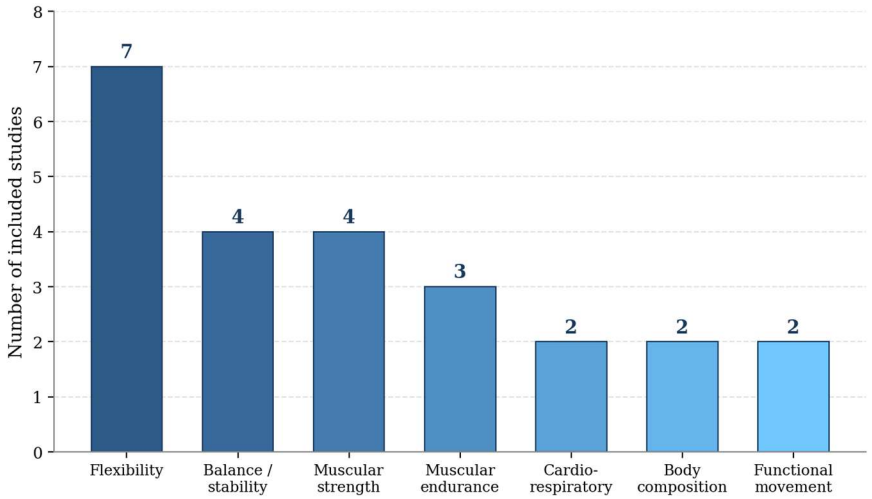


Table 4. Summary of the direction and strength of evidence by component

Fitness component	Overall effect	Strength of evidence
Flexibility	Consistent improvement	Strong; seven studies, including athletes
Balance / stability	Consistent improvement	Strong; four studies, mostly athletes
Muscular strength	Moderate improvement	Moderate; four studies
Muscular endurance	Moderate improvement	Moderate; three studies
Functional movement	Improvement	Moderate; two athlete studies
Cardiorespiratory endurance	Small and variable	Limited; two studies
Body composition	Small and variable	Limited; two studies

4. Discussion

The synthesised evidence indicates that yoga produces its clearest benefits for flexibility, balance and functional movement quality, with moderate effects on muscular strength and endurance and smaller, more variable effects on cardiorespiratory endurance and body composition. Importantly, this pattern held in studies conducted directly with athletes, including cricket, shooting and collegiate competitors, which strengthens the relevance of the findings to competitive sport. The pattern is physiologically coherent, since sustained stretching through wide ranges of motion lengthens connective tissue and improves mobility, while holding balanced postures challenges proprioceptive and neuromuscular control (Tran et al., 2001; Woodyard, 2011).

These effects are practically meaningful. Improved range of motion can support more efficient technique and may reduce the risk of soft tissue injury, while better balance and functional movement contribute to postural control during dynamic actions (Zech et al., 2010). The moderate gains in trunk endurance and core stability are valuable because they underlie the maintenance of posture and the transfer of force during prolonged competition. Because yoga develops several of these qualities at once, it can serve as an efficient

supplementary method alongside sport specific conditioning rather than as a replacement for it (Ross & Thomas, 2010).

The weaker effects on cardiorespiratory fitness and body composition suggest that yoga should not replace aerobic or high intensity training when those adaptations are the priority. Even vigorous heated styles produced only modest aerobic change over short periods (Tracy & Hart, 2013), which implies that yoga is best positioned as a complement that targets mobility, stability and movement quality.

Several limitations temper these conclusions. As shown in the quality appraisal, only three studies used a randomized controlled design, while the remainder were non-randomized or single group studies that are more vulnerable to bias. Samples were generally small, intervention durations were short, yoga styles and outcome tests varied, and blinding is inherently difficult in yoga interventions. The heterogeneity of designs and measures, together with incomplete reporting of means and standard deviations in several studies, was the reason a quantitative meta-analysis was not performed, since pooling such diverse data would have produced a statistically fragile and potentially misleading estimate. Future research should prioritise adequately powered randomized controlled trials conducted with competitive athletes, using standardised yoga protocols, active control conditions and clearly defined performance related outcomes.

5. Conclusion

Regular yoga practice can improve several physical fitness components that underpin sports performance, with the strongest and most consistent benefits for flexibility and balance and useful moderate gains in muscular strength, muscular endurance and functional movement quality. These benefits were observed in athletes as well as in healthy adults, which supports the use of yoga in competitive settings. Effects on cardiorespiratory endurance and body composition were comparatively limited. Yoga therefore represents a practical and time efficient supplementary conditioning method, particularly suited to enhancing mobility, postural stability and movement quality in athletes. Because much of the current evidence rests on small or non-randomized studies, larger and methodologically rigorous trials with athletic populations are needed before firm, generalisable recommendations can be made.

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