

Study of Stretching Practices before and after Exercise among Amateurs Team Sport Coaches in Burkina Faso

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Abstract

Introduction: Stretching is an essential exercise modality in sports practice, and current scientific guidelines recommend dynamic and static stretching before and after exertion, respectively, to derive their benefits. **Objective:** The study aimed to compare the stretching practices of Burkinabe coaches with scientific findings and to identify associated factors. **Methods:** This was a cross-sectional study conducted using a questionnaire administered to 217 Burkinabe coaches of amateur team sports. **Results:** The results showed that during the warm-up the number of coaches using dynamic stretching was statistically higher than the number using static stretching (59.4% vs. 40.6%; $p = 0.045$). After exertion, the percentage of coaches using static stretching was higher (85.3% vs. 4.1%; $p = 0.016$). The practice of dynamic stretching before exertion was associated with the number of years of coaching experience ($p = 0.047$), qualification level ($p = 0.036$), and the sport coached ($p = 0.028$). **Conclusion:** The results indicated that the stretching practices employed during warm-ups by the majority of the coaches surveyed align with current recommendations. During the cool-down phase, the majority of coaches also use static stretching, even though scientific evidence regarding the benefits of this practice is not well established. The practice of dynamic stretching before exertion was associated with the number of years of coaching experience, qualification level and the sport coached.

Keywords

Dynamic Stretching, Static Stretching, Team Sport Coaches, Burkina Faso

1. Introduction

Stretching is a form of exercise defined as a movement applied by an internal or external force to a muscle group (Gremion, 2005). Stretching exercises are performed in various physical activity and sports programs to develop flexibility, prepare the body for physical exertion, or promote recovery after sports (Babault, Rodot, Champelovier, & Cometti, 2021). Several stretching techniques are used, including static, dynamic, and ballistic stretching, as well as proprioceptive neuromuscular facilitation (Judge et al., 2020).

Static stretching, the most commonly used method, offers the advantage of improving flexibility and range of motion (Babault et al., 2021). However, several studies indicate that isolated static stretching lasting more than 60 seconds per muscle group reduces muscle speed, strength, and power, thereby limiting performance in speed and strength-based sports (Behm & Chaouachi, 2011; Behm et al., 2016). Dynamic stretching is proposed as an alternative due to the benefits associated with improved range of motion and muscle performance (Babault et al., 2021; Opplert & Babault, 2018). Indeed, it effectively improves physical performance, particularly agility, acceleration, vertical jump height, and maximal strength (Opplert & Babault, 2018; Pamboris et al., 2018). Ballistic stretching is rarely practiced, carries a high risk of injury, and its effects on performance are not well established (Lima, Brown, Ruas, & Behm, 2018). Proprioceptive neuromuscular facilitation stretching is not widely known or used, yet it has been observed to effectively increase flexibility and range of motion (Kaya, 2018).

Since 1998, the American College of Sports Medicine has recommended stretching exercises before and after physical activity to enhance performance and facilitate recovery, respectively (Pollock et al., 1998). This recommendation is supported by findings from several studies prescribing dynamic stretching before exercise and static stretching afterward to maximize benefits specifically, boosting performance and safeguarding athletes' health (Behm et al., 2016; Ayala et al., 2019; Babault et al., 2021). Consequently, numerous studies have examined the stretching practices of coaches across various team sports such as soccer, volleyball, basketball, and American football as well as individual sports like tennis, track and field, and cross-country running (Judge et al., 2020; Judge et al., 2011; Judge, Bodey, Bellar, Bottone, & Wanless, 2010; Judge et al., 2009; Judge et al., 2013a, 2013b; Judge et al., 2012).

In Burkina Faso, as in most sub-Saharan African countries, refresher courses enabling coaches to acquire knowledge and skills based on new scientific findings are rare due to limited resources. To our knowledge, the stretching practices of Burkinabe coaches who play a central role in athlete preparation programs have not yet been investigated. For this reason, we deemed it necessary to conduct this study, which aims not only to compare the pre- and post-exercise stretching practices of Burkinabe team sports coaches with current scientific guidelines, but also to identify the factors associated with practices that align with these recommendations.

2. Methods

This was a cross-sectional study conducted with Burkinabe coaches of amateur team sports. The participants were active coaches holding a national or international qualification certificate recognized by their respective national federations. Prior to the study's implementation, correspondence outlining the objectives and describing the survey procedure was sent to the national technical directorates of the various federations to request their authorization.

2.1. Participants

Coaches of amateur team sports who appeared on the official lists of the participating national federations and volunteered for the study were selected. The federations involved were the Burkinabe Basketball Federation (FBBA), the Burkinabe Football Federation (FBF), the Burkinabe Handball Federation (FBH), and the Burkinabe Volleyball Federation (BVB). A total of 217 coaches who agreed to participate voluntarily were included in the study. They included 26 basketball coaches, 91 football coaches, 62 handball coaches and 38 volleyball coaches.

2.2. Data Collection

The 217 participating coaches completed a self-administered questionnaire between January and May 2025. The questionnaire took the form of a survey sheet containing questions regarding sociodemographic characteristics and stretching practices during training sessions and competitions. The questions regarding stretching practices focused on: knowledge of the various stretching techniques: dynamic stretching, static stretching, ballistic stretching, and proprioceptive neuromuscular facilitation stretching; the stretching technique used before and after exercise; The Reasons for stretching before exercise: performance, injury prevention and flexibility. Reasons for stretching after exercise: recovery, injury prevention, and flexibility. A pre-test was conducted prior to administering the questionnaire, ensuring not only the relevance of the questions but also their comprehension by the respondents. The questionnaire was administered at various training grounds with the consent of the participating coaches. It was conducted either before or after training sessions, depending on the respondents' availability.

2.3. Variables Studied

The dependent variables selected for this study were the stretching techniques used in the warm-up and cool-down protocols. The stretching technique variable was operationalized into two modalities dynamic stretching and static stretching as these are the two techniques most commonly used in sports coaching (Judge et al., 2012; Judge et al., 2013b). Four independent variables were studied: years of coaching experience, level of education, coaching certification level, and type of sport coached. Years of coaching experience were operationalized into two categories: <10 years and ≥ 10 years. Level of education was categorized into three levels: primary, secondary, and university. Coaching certification level was divided

into two categories: national and international. Finally, the type of sport was categorized into two groups: football and “hand sports”. The hand sports included in the study were basketball, handball, and volleyball.

2.4. Ethical Considerations

Before the study began, a meeting was held with the participating coaches to explain the study’s objectives, benefits, and procedures. Coaches were assured that the data collected would be used confidentially, anonymously, and exclusively for the study’s stated objectives, prior to providing their free, informed, and written consent.

2.5. Statistical Analysis

The collected data were processed using SPSS software (IBM Statistics, Version 25). Descriptive statistics for continuous quantitative variables were presented as mean (m) $\pm$ standard deviation (s), while categorical variables were presented as absolute and relative frequencies. The chi-square test (χ^2) was used to compare proportions between coaches and to determine associated factors. The significance level for statistical tests was set at $p < 0.05$.

3. Results

3.1. Sociodemographic Characteristics of the Surveyed Coaches

The surveyed coaches (**Table 1**) had a mean age of 43.9 ± 8.06 years, ranging from 32 to 58 years. The majority were men (96.3%), had less than 10 years of coaching experience (54.8%), held a secondary education qualification (48.8%), and possessed a national-level qualification (56.2%). Coaches of hand-based sports constituted the largest group (58.0%).

Table 1. Sociodemographic characteristics of the surveyed coaches (n = 217).

		Number	%
Gender	Men	209	96.3
	Women	08	3.7
	Total	217	100
Years of experience	>10 years	119	54.8
	≤ 10 years	98	45.2
	Total	217	100
Level of education	Primary	26	12.0
	Secondary	106	48.8
	University	85	39.2
	Total	217	100

Continued

Qualification level	National	122	56.2
	International	95	43.8
	Total	217	100
Sport discipline	Football	91	40.0
	Hand-based sports	126	58.0
	Total	217	100

3.2. Stretching Techniques Used during Warm-Up and Cool-Down

During the warm-up (**Table 2**) the number of coaches using dynamic stretching was statistically higher than the number using static stretching. (59.4% vs. 40.6%; $p = 0.045$). For the cool-down, the percentage of coaches who used static stretching was also higher than those who used dynamic stretching (85.3% vs. 4.1%; $p = 0.016$).

Table 2. Stretching techniques used by coaches before and after exercise (n = 217).

		Number	%	p
Warm-up	Dynamic stretching	129	59.4	0.045
	Static stretching	88	40.6	
	Total	217	100	
Cool-down	Dynamic stretching	9	4.1	0.016
	Static stretching	185	85.3	
	No stretching	23	10.6	
	Total	217	100	

%; percentages corresponding to the counts. p: value indicating the statistical significance of the difference between coaches prescribing dynamic and static stretching before and after exercise.

3.3. Factors Associated with Performing Dynamic Stretches before Exercise among the 129 Coaches (n = 129)

During the warm-up (**Table 3**), the practice of dynamic stretching was associated with years of coaching experience, the coach's qualification level, and the type of sport ($p < 0.05$). Coaches with less than 10 years of experience (62.8% versus 37.2%; $p = 0.047$), those with international rather than national qualifications (64.1% versus 34.9%; $p = 0.036$), and football coaches practiced dynamic stretching more frequently (67.4% versus 32.6%; $p = 0.028$).

Table 3. Factors associated with the practice of dynamic stretching during warm-up (n = 129).

		Number	%	p
Years of experience	<10 years	81	62.8	0.047
	≥10 years	48	37.2	
	Total	129	100	

Continued

Education level	Primary	13	10.1	0.686
	Secondary	52	40.3	
	University	64	49.6	
	Total	129	100	
Qualification level	National	84	64.1	0.036
	International	45	34.9	
	Total	129	100	
Sport discipline	Football	87	67.4	0.028
	Hand sports	42	32.6	
	Total	129	100	

%; percentages corresponding to the sample sizes. p: value indicating the statistical significance of the difference among coaches prescribing dynamic stretching before exercise.

4. Discussion

The aim of the study was not only to compare the pre- and post-exercise stretching practices of Burkinabe team sport coaches with current scientific guidelines but also to identify factors associated with practices that align with these recommendations. The study's main limitation lies in the voluntary nature of participation, which precludes the generalization of the results. Other limitations include the inability to account for the number of repetitions of dynamic stretching exercises or the duration of static stretching exercises per muscle group. Nevertheless, the study yielded satisfactory results, providing insight into the stretching practices of Burkinabe team sports coaches in light of current scientific data.

Current scientific guidelines recommend dynamic stretching within the warm-up protocol to enhance athletic performance (Behm et al., 2016; Ayala et al., 2019). The results revealed that the proportion of surveyed coaches using dynamic stretching during warm-ups was statistically high (59.4%), indicating that, overall, these coaches' stretching practices during warm-ups align with current scientific recommendations. These findings corroborate those of studies conducted with American soccer coaches (Judge et al., 2020). On the other hand, they are opposed to the results recorded among the American football, volleyball, and basketball coaches (Judge et al., 2009; Judge et al., 2010; Judge et al., 2011).

The primary goal of a warm-up is to optimize athletic performance and reduce the risk of injury (Behm & Chaouachi, 2011). Dynamic stretching contributes to this goal by better preparing the athlete for the subsequent performance (Babault et al., 2021; Ayala et al., 2016). Dynamic stretching is associated with peripheral and neural adaptations within the neuromuscular system (Opplert & Babault, 2019; Vieira, Opplert, & Babault, 2021). Peripheral adaptations involve a decrease in muscle viscoelasticity and a shift in the musculotendinous unit (Pamboris et al., 2018), resulting in reduced musculotendinous stiffness and improved joint range of motion (Samukawa, Hattori, Sugama, & Takeda, 2011; Vieira et al., 2021).

Neural adaptations relate to the influence of efferent nerve impulses on the muscle—mediated by changes in corticospinal excitability and spinal motoneuron activity—which positively affect the capacity for muscle force production (Opplert & Babault, 2019; Opplert et al., 2020; Trajano, Nosaka, & Blazevich, 2017; Vieira et al., 2021). Furthermore, dynamic stretching helps increase muscle temperature and blood flow, thereby facilitating a better supply of necessary nutrients to the muscles (Bishop, 2003).

Approximately 42% of the coaches surveyed use static stretching in their warm-up protocols, which runs counter to current scientific findings (Behm et al., 2016; Ayala et al., 2019). Indeed, it is well established that the use of static stretching during warm-ups impairs muscular performance—specifically speed, power, and strength (Amiri-Khorasani, 2013; Amiri-Khorasani, Osman, & Ashril, 2011). The impairment of muscular performance induced by static stretching is attributed to reduced neuromuscular activation and increased musculotendinous compliance, both of which lower the speed of muscle contraction (Amiri-Khorasani, 2013; Amiri-Khorasani et al., 2011). However, in sports requiring a high degree of static flexibility, short-duration, and low-intensity static stretching may be necessary for trained athletes to reduce the risk of injury (Behm & Chaouachi, 2011).

The study results revealed that a statistically high proportion of the coaches surveyed (85.3%) use static stretching during the cool-down phase, a finding that corroborates the conclusions of several previous studies (Judge et al., 2012; Judge et al., 2013b). Following intense activity, static stretching promotes a state of increased muscle relaxation (Gremion, 2005). The theory regarding the benefits of static stretching for post-exercise recovery is a subject of debate. Indeed, static stretching compresses capillaries and interrupts blood flow, thereby reducing blood volume and negatively impacting recovery (Gremion, 2005). Furthermore, a study conducted with this focus found no reduction in muscle soreness following static stretching exercises performed after an intense running workout (Wessel & Wan, 1994). The adverse effects of static stretching after exercise are linked to changes in muscle neuromechanical properties and may be attributed to the duration and intensity of the exercises (Siatras et al., 2008; Behm & Chaouachi, 2011). Consequently, it is recommended to avoid static stretching exercises lasting longer than 30 seconds per muscle group or exceeding the threshold of discomfort (Siatras, Mittas, Mameletzi, & Vamvakoudis, 2008; Behm et al., 2016).

The chi-square test indicated that coaches with less than 10 years of experience (62.8%) made greater use of dynamic stretching during warm-ups. These findings corroborate the results of a previous study involving tennis coaches (Judge et al., 2012). The failure of more experienced coaches—those with at least 10 years of experience (37.2%) to adhere to the recommendations could be explained by their reluctance to alter their practices, as established coaches are less inclined to change (Judge et al., 2012). Another finding is that coaches holding an international qualification (64.1%) made greater use of dynamic stretching in their warm-up protocols. These results corroborate those of a study conducted with American football

coaches (Judge et al., 2009). They suggest that such qualifications enable coaches to align their practices with recent scientific findings. This may be explained by the fact that international certification programs are based on new scientific evidence and encourage coaches to adopt these findings by adjusting their coaching methods (Judge et al., 2020).

Finally, the results also revealed that soccer coaches predominantly used dynamic stretching exercises during warm-ups (67.4%), a finding that corroborates a recent study of soccer coaches in the United States (Judge et al., 2020). This trend may be attributed to the use of the “FIFA 11+” protocol. The “FIFA 11+” is a warm-up protocol developed by the International Federation of Association Football (FIFA) and made available to coaches at all skill levels (Bizzini, Junge, & Dvorak, 2013). Implementing the “FIFA 11+” protocol—which comprises 15 exercises, including dynamic stretching—requires neither expensive equipment nor specialized technical expertise, making it easy to use within the soccer community (Sadigursky et al., 2017).

5. Conclusion

The results indicated that the stretching practices employed during warm-ups by the majority of the coaches surveyed align with current recommendations. During the cool-down phase, the majority of coaches also use static stretching, even though scientific evidence regarding the benefits of this practice is not well established. Less experienced coaches, those holding international-level qualifications, and football coaches were more likely to adhere to scientific findings regarding stretching recommendations for warm-ups. It would also be appropriate to examine the practices of coaches in individual sports to complement these results.

Author Contributions

Conceptualization, A.T. and A.K.; methodology, A.T. and S.I.; software, A.S.; validation, N.V.Y.; formal analysis, A.T.; investigation, S.Y.; resources, A.R.C.; data curation, A.S.; writing original draft preparation, A.T. and A.K.; writing—review and editing, S.I.T. and A.S.; supervision, N.V.Y.; All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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