

Warm-Up Activities in Competitive Sports: An Observational Study in the German Federal Basketball League

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Abstract

The aim of this study was to determine what warm-up activities were used in competitive sports such as in the German federal male basketball league, the Basketball-Bundesliga, and if there is any potential for optimization. Eight teams were observed in seven matches in the time period between the 21st of January and the 15th of April during the 2016/2017 regular season. Every warm-up activity of each team was observed from 70 minutes before the match started until 30 minutes after the match had ended, including all warm-up activities of all players, either on his own or with other teammates. The warm-up activities used in the German federal male basketball league displayed a broad range of stretching, running and other activities and we detected some discrepancies between what was used and what current research suggests as suitable warm-up activities for basketball. One of the biggest concerns was that three teams used static stretching 30 to 10 minutes before the match started. This might cause potential negative effects on the performance of athletes and possibly would expose them to unnecessary physical injuries. Our findings raise the question why professionals in competitive sports are not using scientific knowledge and what has to be changed to get such knowledge into practice. Our results point out that most teams did not put emphasis on warming-up procedures, ignoring that such procedures have the potential to release a higher performance of athletes and to reduce the risk of injury. Further studies with an international scope are suggested. The question why professionals in competitive sports do not use scientific knowledge and what need to be done to overcome this discrepancy between theory and practice should be answered.

Keywords: *Competitive Sports; Warm-Up Activities; Stretching; Potential Negative Effects; Risk of Physical Injury*

Abbreviation

BBL: (German) Basketball-Bundesliga

Introduction

Since the performance of athletes in competitive sports already is at a very high level, even small changes in preparation/warm-up or other variables can decide whether a team or athlete will win or lose a competition. Therefore, it is of utmost importance to constantly develop new strategies to improve the physical and mental capacity of athletes and check these by respective research projects before implementing them into practice to make sure that they are effective and safe.

The permanent pressure on athletes and organizations around them to win has a major effect on their performance and health. There is a dichotomy of interest. On one hand, key players have to play most the time to make sure that the team has the biggest chance of winning, on the other hand those players need sufficient rest to recover and avoid injuries. The desire for a high performance and a concurrent

minimized risk of injury represent a major task for athletes and organizations around them, and sometimes it is a very thin line between a maximized performance and the occurrence of an injury. Therefore, research regarding this range of topics is of utmost importance in competitive sports.

Because of the required wide range of needed physical and mental abilities in basketball, as well as in most team sports, warming-up is extremely important to reach a high level of performance and concurrently minimize the risk of injury.

An ideal warm-up program helps the athletes releasing their full set of abilities and to compete with the lowest possible risk of injury.

A study by Akdag [1] analyzed warm-up habits in the German federal football league in the season of 2013/2014, but up to date there are no similar empirical findings or studies regarding warm-up habits neither in German basketball nor in other professional basketball leagues in the world. Therefore, we decided to determine warm-up programs used by the best basketball teams in Germany. In long-term, it might be possible to identify the best warm-up programs in competitive sports in order to improve the performance of athletes and minimize the risk of physical injuries.

Materials and Methods

In this study an observation was chosen for data collection since there is no other way to gather information on all warm-up activities used in practice. In seven matches eight teams of the German Basketball Bundesliga (BBL) were observed during the time period between the 21st of January and the 15th of April of 2017. Each team was observed in the EWE Arena in Oldenburg, where the home team, the EWE Baskets Oldenburg, perform all their home matches. Therefore, the EWE Baskets Oldenburg participated in each of the matches. The other teams which were observed, because they were visiting, were Alba Berlin, Brose Bamberg, Eisbären Bremerhaven, Fraport Skyliners Frankfurt, Medi Bayreuth, MHP Riesen Ludwigsburg and Ratiopharm Ulm. Six of eight teams were able to achieve a place in the playoffs that season. In those six teams the title-winning team and the runner-up were included.

For each match, the observer was sitting next to the playing field in the press area. The observation always started 70 minutes before the match began and lasted until 30 minutes after the match ended to be able to see every warm-up and recovery methods used.

The observation form was a self-prepared computerized table including the categories Time, Exercise, Explanation, Intensity (1 - 10), Density (1 - 5), Count of Players and Comments. Therefore, all important information regarding all preparation and warm-up activities could be recorded.

The observed methods and exercises were separated into five categories, named Stretching, Running exercises, Exercises with the ball, Throwing the basketball and Other exercises.

Results

The key findings are presented in table 1. A showcase of an observed warm-up activity can be seen in figure 1.

Type	Type of Exercise	70 - 30 minutes pre-match	30 - 10 minutes pre-match
A1	Stretching (static)	7	3
A2	Stretching (dynamic)	7	6
B	Running Exercises	1	6
C	Exercises with the Ball	1	4
D	Throwing the Basketball	7	8
E	Other	5	0

Table 1: Number of teams performing warm-up activities of different categories as preparation for the basketball match during the time slots 70-30 and 30-10 minutes pre-match.



Figure 1: Showcase of an observed warm-up activity (stretching).

During the first timeslot of 70-30 minutes pre-match nearly every team is using static (A1) or dynamic (A2) stretching techniques as a warm-up method. Additionally, all teams and all athletes constantly throw the basketball to the basket (D). Besides that, in five teams there were a number of players, independent from their position (guard, forward, center), performing other warm-up activities (E) like using a fascia roll or different strength exercises. Every team, except one (MHP Riesen Ludwigsburg), left the field 45 minutes before the start of the match and returned 30 minutes prior the match, most likely to get last tactical instructions. Because of the fact that one team left earlier than the other teams, namely between 60 - 40 minutes pre-match, the table shows that one team did running exercises and exercises with the ball into the first timeslot. The MHP Riesen Ludwigsburg started with their running-routine and exercises with the ball 40 minutes before the match started.

The second timeslot of 30 - 10 minutes pre-match shows a different pattern. Every team, except one (Fraport Skyliners Frankfurt), showed a warm-up running routine (B) in which the whole team participated. Additionally, every team did exercises in which all athletes throw the basketball to the basket (D), namely layups or other exercises in which the players had to finish the exercise with a throw to the basket. Four teams included exercises with the ball (C) into their warm-up procedures. Interestingly, three teams used static stretching (A1) for certain players 30-10 minutes pre-match and six teams used dynamic stretching (A2) for certain players to prepare them for the match. There were no players or teams using any other exercises (E) as part of their warm-up. Three out of eight teams did a layup-exercise two minutes prior the match.

Every observed team did a combination of a running and layup exercise five minutes before the match as well as during the half time break. No team did any exercises or other methods for preparation during the basketball match for their substitutes. If a player was substituted he was just sitting on the bench prior to it. Only three teams performed cool-down/recovery activities after the match. Those activities contained invariably static stretching exercises and only a few (3 - 5) of the players of each team participated in those activities.

Discussion

The results are separated into two timeslots (70 - 30 and 30 - 10 minutes pre-match) since the effects of warm-up activities probably cannot be retained for a longer period of time, namely 70 - 30 minutes pre-match. Those activities in the first timeslot (70 - 30 minutes pre-match) might help the players getting ready for the match mentally, but not physically. This might explain why most of the players did exercises on their own and mostly no structured procedures were used in the first timeslot. Nevertheless, the question occurs why players or teams were using static stretching at any point in their warm-up procedures since it is proven that those exercises prior to a competition have a negative effect on their performance and possibly raise the risk of injury [2]. To answer this question coaches and players need to be asked to find out about the reasons. Hillebrecht [3] showed that exercises like sprints have to be implemented into the warm-up to compensate those negative effects of static stretching.

Besides this, the analysis focused on the second timeslot (30 - 10 minutes pre-match). At this time prior to the match mostly all team-members participated in the same exercises. But there was no equality concerning stretching exercises if done at this time, maybe because only a certain number of players were involved in such activities.

Every team, except one (Fraport Skyliners Frankfurt), started their warm-up procedure with general running exercises and combined them with other general exercises, as proposed for example by Schröder [4]. As mentioned before, there is a big concern behind the use of static stretching as part of the warm-up activities. Because of the fact that only a few players participated in static stretching activities we did not see any systematic use of such exercises. In our opinion, there is no use for any static stretching exercises in preparation prior to a competition, whereas dynamic stretching exercises might be useful. Hillebrecht [3] found out that dynamic stretching had no negative effects on performance and Fletcher [5] suggested that dynamic stretching was preparing the athlete in a better way for upcoming activities than other stretching techniques. Nevertheless, Hillebrecht [3] also stated that not using stretching exercises at all might produce the best results in preparing for a competition. Concerning the prevention of injuries, Thacker, *et al.* [6] found out that stretching had no positive effects regarding the prevention of injuries. If the main reason for stretching exercises is to be more flexible, the question arises how long those positive effects will last. Since the time between the execution of the stretching exercises and the start of the match is too long, the effects most likely will be lost before the match starts. Overall, the use of stretching exercises as part of a warm-up regimen is questionable and therefore might be a potential point of optimization for the observed teams.

The question if the observed warm-up strategies reached an ideal amount of physical stress for preparing the players for the upcoming requirements is hard to answer. By observing the teams, it seems that only a few teams used activities simulating match-like-situations and even if such match-like exercises were executed, their intensity and density seemed not high enough to prepare for the upcoming match.

The timeslot (30 - 10 minutes pre-match) in which most of the warm-up activities were executed seem to be suitable, but the fact that there was a break between ten to two minutes pre-match raises the question if all warm-up activities done before are reasonable since all the positive effects might be gone until the start of the match [2]. Although the break was implemented because of the introduction of the teams to the audience, each team should make adjustments helping to preserve the positive effects of their warm-up procedures during that time.

The halftime break also has potential for optimization since every team is just doing layups for a short period of time directly before the start of the 3rd quarter. Lovell, *et al.* [7] found out, that performance was decreased after a halftime of competitive soccer without

warm-up activities before the start of the second half. Thus, there is potential for improvement in the BBL concerning the warm-up activities during halftime. A possible solution might be whole-body vibration training, as used in the study by Lovell, *et al.* [7], which improved the performance of the athletes after being used in the half time break.

It is alarming that no player of all observed teams executed any kind of warm-up activities while sitting on the bench prior a possible substitution. Since players were sitting there for some time, often a whole quarter, they joined the match without any preparation and therefore probably had a reduced physical capacity and a higher risk of physical injuries.

Conclusion

Warm-up activities executed in the German BBL show a potential for optimization and therefore a more effective prevention of physical injuries. The exercises and methods used need to be examined further with a strong relation to their use in practice to find out if they are safe, have positive effects and how and when they could be used perfectly. Exercises like static stretching were already proved to have negative effects when using them directly before a competition. Those exercises need to be removed from warm-up routines. In our opinion warm-up procedures have to be implemented more systematically and with more respect to scientific knowledge. Our results show that most teams did not put emphasis on warming-up procedures. By performing state-of-the-art procedures it seems to be possible to produce higher performance of athletes and reduce the risk of physical injuries. However, the question why professionals in competitive sports do not use scientific knowledge and what needs to be done to overcome this discrepancy between theory and practice should be answered.

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Conflict of Interest

The authors declare that there are no conflicts of interest.

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