



A STUDY ON SHOE MODELS FOR BASKETBALL PLAYERS TO RECOVERY INJURIES

S. Krishnamurthi* & Dr. G. Kumaresan**

* Ph.D Research Scholar (Part-Time), Department of Physical Education, Bharathiar University, Coimbatore, Tamilnadu

** Assistant Professor, Department of Physical Education, Bharathiar University, Coimbatore, Tamilnadu

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Abstract:

The focus of this study was to investigate the effects that different basketball shoe outsole tread patterns have on the amount of slip and therefore the performance of the individual while undergoing normal basketball transitions. Tread grooves and therefore patterns must exist on the outsole of a basketball shoe because the chances of contamination and for practical durability. With the existence of so many basketball shoes with varying tread patterns and characteristics it presents the question of whether or not varying patterns affect traction, slip, and therefore athletic performance. This study evaluated the amount of slips of two pairs of basketball shoes with human participants running basketball drills on a hardwood basketball floor. The results indicated that one shoe with a much more unique tread pattern performed better with fewer slips, and fewer severe slips, especially when considering lateral movements than the other shoe which had a tread pattern with similar tread characteristics to many other currently available market shoes.

1. Introduction:

In the 2010-2011 basketball season the NCAA reported that there were 17, 500 men and 15, 708 women that were playing college basketball for their respective college in one of its three divisions. The number of individuals playing basketball in the NCAA then raised in the 2011-2012 season to 17, 890 men and 16, 134 women. This is an increase of two percent and three percent in men and women playing basketball for the NCAA respectively. Over the years the numbers of people playing NCAA basketball has continued to rise. There has been a total increase of 6.25% over the course of just four years to 35, 286 individuals playing basketball in the NCAA (National Collegiate Athletic Association). While these numbers do include NCAA division 1, division 2, and division 3 colleges this is only a portion of people that play basketball competitively. These numbers do not account for NAIA colleges, junior colleges, or community colleges which also have a large number of individuals playing basketball. These numbers also do not include high school students, and those who graduate both high school and college and continue to play in park districts, recreational leagues, or just competitive pick-up games of basketball.

2. Objective of the Study:

Due to extensive experience the preliminary investigator had, a large portion of the problem being addressed in this study came from personal experience. To discover if much of these personal experiences were shared among other basketball players a preliminary survey was conducted. This survey further justified the identification of the problems of slipping, the expectations and the anticipatory response associated with slipping that affects athletic performance on a basketball court. To solve this problem the shoe-floor interface must be considered. An individual cannot always control floor conditions before play, but can control the shoes and the associated tread pattern with those shoes.

3. Shoes:

After examining thirty current market basketball shoes for common tread patterns two pairs of shoes were identified for the purpose of this study. The first is the 2015 Nike Hyper dunk Shoes. This pair of shoes was chosen due to its common characteristics to many other commercially available basketball shoes. The herringbone pattern on a large portion of the outsole, the concentric circles on the ball of the foot, the break lines across the front of the outsole, and the lack of treads on the arch and middle of the heel are all characteristics that can be seen in many basketball shoes. The second pair of shoes chosen is the Under Armour Lockdown Shoes. This shoe was chosen because of its variation in tread pattern. The tread pattern is unlike any other tread pattern consistent with the outsoles of the basketball shoes that were examined in the market analysis. The tread pattern is the shape of an hourglass that is perpendicular to the longitudinal axis of the shoe fit together in a tessellation. This pattern is consistent over the entire outsole of the shoe except for a few break lines.

4. Hypothesis:

Performance based on shoes:

- ✓ Nike Hyper dunk pair of basketball shoes will have a lower percentage of transitions that experience slip.
- ✓ Nike Hyper dunk pair of basketball shoes will have a lower percentage of larger or more severe slips.

- ✓ Hypotheses are formulated because the of the common tread patterns observed in the Nike Hyper dunk Shoes and a large number of the other current market shoes that were analyzed. The Under Armour Lockdown Shoes were expected to not perform as well due to the uniqueness of the tread pattern on the outsole of this shoe.

5. Discussions:

In this study, problem of slipping while performing transitions under dry, non-contaminated court conditions exists. On average each of the participants slipped on thirty-seven percent of all of the transitions that they completed. These drills are often performed regularly in conditioning training and basketball practices; while the transitions can often be seen in regular game play. This problem of slipping during the completion of transitions can be detrimental not only to individual performance but could also put players at risk for injury if the slip is severe enough. Traction and tread pattern, while not always thought to be a high priority of characteristics when purchasing basketball shoes could have one of the largest impacts on athletic performance, particularly on lateral movements. In this study the Under Armour Lockdown basketball shoes had significantly less instances of slips when considering all of the transitions. When broken down by transition it is clear that the shuffle drill in particular seemed to be one of the drills that most influenced this difference.

While the shuffle transitions were the only ones to show a statistically significant difference between shoes, a number of the sprint to sprint transitions of varying lengths were not far from also being significant. This could be explained from the way the body moves as this transitions is made. Almost all of the sprint to sprint transition changes made that had a one hundred eighty degree direction change, planted with the final step being perpendicular to the initial direction and final direction of movement. This last plant step is the same type of plant step taken in the completion of the shuffle to shuffle transitions. One possible explanation for this difference in performance is the amount of available traction based on the tread patterns of each shoe. The tread patterns on the two pairs of shoes of this study are clearly different. Due to the drastic differences in tread pattern it is difficult to identify any single characteristic or group of characteristics that could cause the performance differences between these shoes. One possible explanation to account for the performance differences is based on the idea of the amount of surface area that comes in contact with the floor during the transition which can vary based on differing tread patterns. The influence of tread pattern may influence traction based on the pattern and direction of tread grooves, but it also could influence the amount of surface area that comes in contact with the floor. In both cases tread pattern has an influence on traction and therefore performance.

While the Under Armour Lockdown basketball shoes seemed to perform better than the Nike Hyper dunk shoes, the Nike shoes performed better in one transition type, the sprint to back pedal transition. The Nike shoes were not shown to be statistically different, yet with a larger sample size it is possible that the difference could become more pronounced. This could suggest that the Nike Hyperdunk shoes could be better for transitions involving forward to backward movement changes, while the results of this study indicate that Under Armour Lockdown shoes slip less often during transitions that exhibit a lateral plant step. When broken down by transition type, the one transition type that showed a significant difference in more severe slips was the shuffle transition with the Under Armour Lockdown shoes having fewer instances of severe slips. This would again support the idea that the Lockdown shoes perform well particularly in lateral type movements.

6. Conclusion:

This study has found that between the 2015 Nike Hyper dunk basketball shoes and the Under Armour Lockdown basketball shoes there was a significant difference in the amount of slipping that occurred over a variety of transitions. Particularly in transitions with a lateral type plant step the Under Armour shoes had lower instances of slips. This could be from differences in the shoes, but the most likely factor that could explain these differences is the variation in tread patterns. This study also found that different types of transitions based on movement and direction changes have varying risks for slipping. While the shuffle drill of this study showed the most difference between shoes, the half court transition showed the highest instance of slips occurring. This study also supports the idea that the current values considered for the coefficients of friction of basketball shoes may be too low. There may be a need for more realistic testing of basketball shoes when determining if the coefficient of friction will prevent slip in dynamic transitions.

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