The Impact of Playing Surface on DOMS in MLS Players During Training

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This study does not replicate common knowledge. It has the purpose of engaging skills and practicing the procedures of the research process.

ABSTRACT

In professional soccer, *artificial turf* (AT) and *natural grass* (NG) have been compared but no difference exists between the two. No comprehensive training studies have attempted to measure *delayed onset muscular soreness* (DOMS) quantitatively to aid in comparison. *Major League Soccer* (MLS) players performed two separate 4-week extensive training programs on AT and NG with a detraining period between each trial to ensure accurate comparison of the occurrence of DOMS on each playing surface. Infrared thermal imaging of players' quadriceps and hamstring groups, and blood sampling of creatine-kinase (CK) and myoglobin (Mb) were sampled pre- and post-training sessions to quantitatively measure DOMS. Hooper-Mackinnon questionnaires were taken daily and correlated to quantitative data. The purpose of this study was to examine the impact of playing surface on DOMS in MLS players during training.

INTRODUCTION

- 94% of MLS players prefer NG over AT (Poulos et al., 2014)
- Negative characteristics of AT (Poulos et al., 2014)
  - Stiff ground makes it more difficult to cut
  - Fast pace movement of the ball
  - Increased muscular soreness post-training and post-match
- No injury prevalence, impact, or match fitness study have produced results that differentiate AT from NG in professional soccer players.
- Attempting to quantify DOMS during training could help explain expressed differences between AT and NG.
- Variables to quantify DOMS:
  - *Hooper-Mackinnon Questionnaire:* subjective survey that measures sleep, stress, fatigue, and DOMS
  - *Infrared Thermal Imaging (IRT):* assess skin temperature of quadriceps and hamstrings pre- and post-training for inflammation
  - *Blood Sampling:* comparing CK and Mb levels pre- and post-training for indication of muscle damage

PURPOSE & HYPOTHESIS

Purpose

The purpose of this study is to determine whether there is a significant difference between the occurrence of DOMS on an AT playing surface and a NG playing surface when engaging in frequent soccer training sessions.

Hypothesis

It is hypothesized that there will be a statistically significant lower DOMS correlation score in the players when training on NG compared to AT.

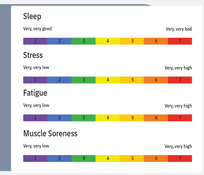
STUDY INFORMATION

- Volunteer players were recruited through their home clubs, all volunteer names were compiled into 3 age stratums: 15-22; 23-27; 28+
- 15 Male Professional Soccer Players were randomly selected 5 from each age stratum 15-22; 23-27; 28+
- All training facilities, testing facilities, medical staff and coaching staff were provided by Atlanta United

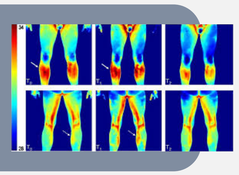


METHODS

1. Volunteer players and staff assembled to be briefed on the study, and familiarize with protocol, schedule, and equipment.
2. Each day, players would sample blood, have thermal images taken, and complete a Hooper-Mackinnon survey (Pictured right) 1-hour prior to training



3. For the first 4 weeks, players conduct 1.5-hour trainings on NG 6 days/week.
   1-hour post-training, blood and IRT are retaken.



4. Throughout the 4-weeks, Individual blood samples, IRT, and survey scores are analyzed through SPSS and Pearson Correlation to track DOMS. At the end of the first 4 weeks, group data is analyzed for correlations that indicate occurrence of DOMS.
5. Following NG trial, players undergo a 4-week detraining period. After this period, steps 2-4 were repeated for the second 4-week trial that is played on AT.

REVIEW OF LITERATURE

- DOMS can begin 6-8 hours post-exercise and can last 24-72 hours (Silva et al., 2018)
- If untreated, DOMS can lead to further overuse and traumatic injuries (Ekstrand et al., 2011)
- IRT can measure DOMS by analyzing change in skin temperature, which shows inflammation in muscle regions (Cerezci Duygu et al., 2019).
- Due to their increase in levels post-match, CK and Mb have been deemed objective measures of muscular damage (Devrnja et al., 2018).
- Use of subjective questionnaires are important for understanding individual's DOMS levels and help training programs adjust to players needs (Moalla et al., 2016)

DISCUSSION & ACKNOWLEDGMENTS

- **Application of Study:** The results of this study were applicable to the study of differences in AT and NG in male professional soccer players. Results of this study provided additional information for research looking to quantify DOMS.
- **Limitations:** This study was limited to professional male soccer players. This study's results are applicable to professional soccer players but require further research before being generalized to its population.
- **Future Research:** For the purpose of future research, replicating this study is important to confirm results with the population of professional male soccer players. It is recommended further research analyzes different populations, such as women, different age groups, and different sports.
- I would like to thank the MLS, involved club organizations, and volunteer players for their willingness to partner and participate in this study. I would like to specifically thank Atlanta United for providing facilities, equipment, professional coaches, and medical staff necessary to oversee the procedure of the study. I would like to thank Dr. Hartman, my writing fellow, and peers for their involvement in refining the structure and layout of this study.

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