

# The Physiological Profile of a Division III Field Hockey Goalkeeper and the Metabolic Cost of Practice - A Case Study

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## INTRODUCTION

- Field Hockey is a popular invasion field sport, that is played worldwide by males and females.
- In the United States, field hockey is almost exclusively played by females.
- The NCAA supports almost 300 programs across all three Divisions.
- Over 7000 athlete compete in collegiate field hockey, across all NCAA Divisions
- NCAA Division III consists of ~164 programs and ~3580 athletes, representing the largest division.
- Elite female field hockey players typical cover 5540±521m, sprint 125±28m, and report 13±9m·min<sup>-1</sup> of high speed distance in 44±7 min competition play (5).
- Field players report VO<sub>2max</sub> values of 53.5±4.3 ml·kg<sup>-1</sup>·min<sup>-1</sup> (1)
- Soccer goalkeepers have reported 96% of competitions standing or walking/jogging (6).
- Ice hockey goalkeepers reported lower physiological values than their skating counterparts (3).
- Goalkeeper playing demands differ significantly from their field based counterparts.
- Due to low roster numbers and unique demands, goalkeepers are typically excluded of research analysis.

## RESEARCH QUESTIONS

- In needs analysis, goalkeepers are often identified as having different needs than field players, but are they that different?
- What is the physiological characteristics of a Division III field hockey goalkeeper?
- What is the metabolic impact of practice for a field hockey goalkeeper?
- How does a goalkeeper compare to field players and norms?



## RESEARCH PURPOSE

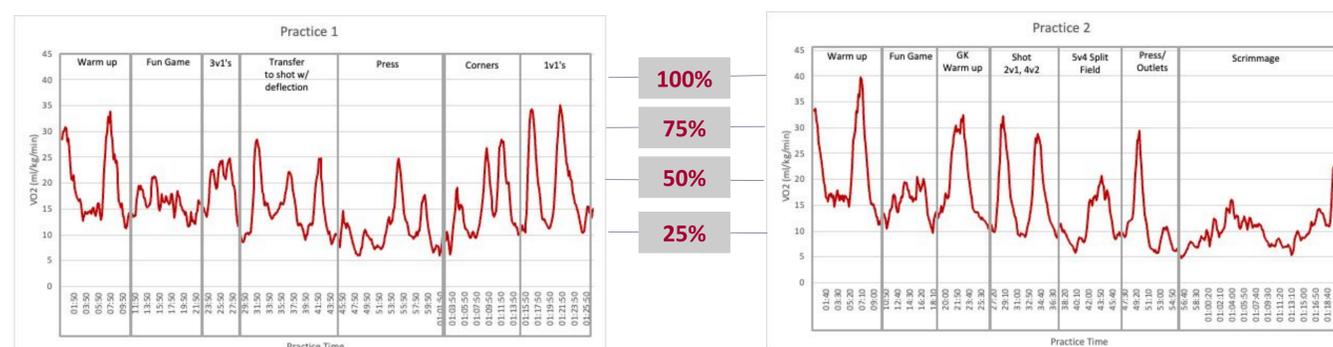
To determine the physiological profile of a Division III field hockey goalkeeper and the metabolic cost during practice.

## METHODS & RESULTS

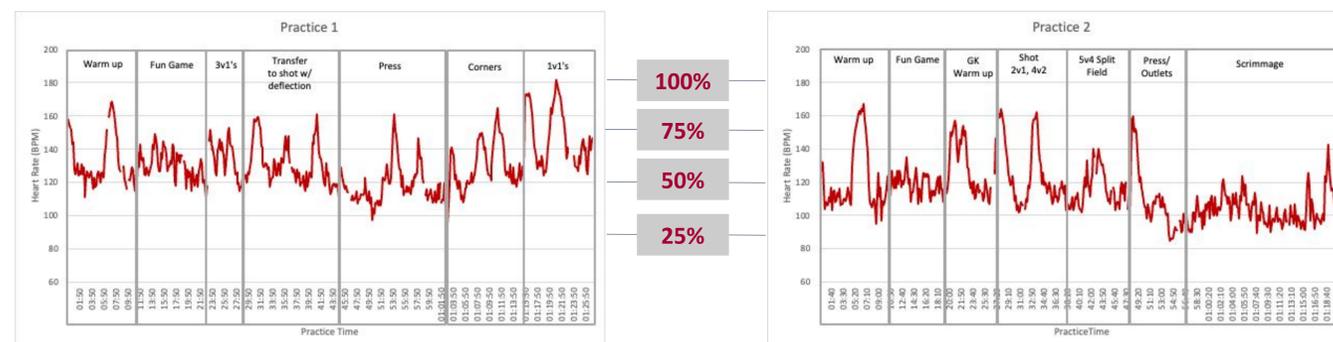
Maximum Strength	1 Repetition Maximums (1RM)	<ul style="list-style-type: none"> <li>Barbell Back Squat 122.5 kg</li> <li>Barbell Bench Press 65.5 kg</li> <li>Hang Power Clean 77.1 kg</li> </ul>
Absolute Power	Countermovement Vertical Jump (CMVJ)	<ul style="list-style-type: none"> <li>Mean Vertical Displacement 42.6 cm</li> <li>Maximum Power (Lewis) 908.5 W</li> </ul>
Anaerobic Power	30 sec Wingate Anaerobic Test (WAnT)	<ul style="list-style-type: none"> <li>Mean Power 556 W</li> <li>Peak Power 641 W</li> <li>Anaerobic Capacity 8.7 W·kg<sup>-1</sup></li> <li>Anaerobic Power 10 W·kg<sup>-1</sup></li> </ul>
Aerobic Power	Graded Cycle Ergometry	<ul style="list-style-type: none"> <li>Max Aerobic Capacity (VO<sub>2max</sub>) 40.9 ml·kg<sup>-1</sup>·min<sup>-1</sup></li> <li>Maximum Heart Rate (HR<sub>max</sub>) 180 BPM</li> </ul>

## PRACTICE RESULTS

### Oxygen Consumption



### Heart Rate Response



## PARTICIPANT

- 1 female NCAA Division III field hockey goalkeeper
- 3-year starter, logging 71 total starts with career save percentage of 0.749, 53-15 record, and 17 shutouts.
- 1st Team All-Conference, NFHA 2nd team All-Region

Age	Height	Weight	Percent Body Fat (%BF)
22 Years	165.3 cm	64.1 kg	24.1 %

## DISCUSSION

- Similar height, weight and %BF of other female collegiate athletes (1, 2, 5)
- Greater than 90 % rank in Anaerobic Capacity output (4).
- Compared to other DIII female field hockey athletes, >2SDs in back squat strength but within 1SD in bench press and VJ displacement (2)
- Compared to collegiate female field hockey players (DI), lower reported VO<sub>2max</sub> (40.9 vs 55.77±4.7ml·kg<sup>-1</sup>·min<sup>-1</sup>)
- Peak practice VO<sub>2</sub> reached 97.1% (39.73 ml·kg<sup>-1</sup>·min<sup>-1</sup>)
- Average VO<sub>2</sub> during practice was 15.02 ml·kg<sup>-1</sup>·min<sup>-1</sup> or 36.7 % of VO<sub>2max</sub>
- Maximum HR during practice was 167 bpm or 92.8% of HR<sub>max</sub>
- Average HR during practice was 123 bpm or 68.3% of HR<sub>max</sub>
- Limited research in field hockey and goalkeepers limit comparisons

## CONCLUSION

- With unique playing demands compared to field players, the goalkeeper reported superior lower body strength and anaerobic capacity compared to field players and normative values.
- Given the activity of goalkeepers, expected lower aerobic capacities compared to field players.

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