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## MENSTRUAL CYCLE PHASES AND PERFORMANCE IN ELITE WOMEN SOCCER PLAYERS

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### INTRODUCTION:

The impact of the menstrual cycle (MC) on performance is one of the most critical topics in female sports. Hormonal fluctuation and symptoms related to different MC phases can influence performance in women soccer players. Indeed, as reported in previous studies, this fluctuation seems to affect parameters related to internal and external load (1,2). To date, different studies tried to investigate this topic, but results are still unclear. The aim of the present study was to investigate the effect of different menstrual phases on distinct performance parameters in an elite women soccer player during standard weekly training in the Italian first division.

### METHODS:

Sixteen female soccer players (Age:  $24.59 \pm 4.11$  yrs; Height:  $1.66 \pm 0.07$  m; Weight:  $59.50 \pm 6.31$  kg) were involved in the current study. Players were pooled according to the MC phases. Four different MC phases were identified: Early Follicular (EC: days 1-7), Late Follicular (LC: days 8-14), Early Luteal (EL: days 15-21) and Late Luteal (LL: days 22-28). Information about MC phases, recovery status, quality of sleep, stress, fatigue, and muscle soreness was recorded by adopting a morning survey. External load parameters were collected during trainings using GPS system (OHCOACH). At the end of each training, the rating of perceived exertion (RPE) was recorded. The players that who took part in four weekly training sessions were selected. Weekly Training was divided in four training sessions: Day 1 (Strength training), Day 2 (Aerobic training), Day 3 (Repeated Sprint Ability - RSA training), Day 4 (Speed Agility Quickness - SAQ training). Weekly training load was the same during the weeks of intervention. One-way ANOVA, followed by Bonferroni post-hoc, was performed to analyze differences between the four MC phases for all the parameters collected.

### RESULTS:

High Speed Running (HSR > 19.8 km/h) distance, Explosive Acceleration (EX ACC > 2.5 m/s<sup>2</sup>) and Explosive Deceleration (EX DEC > 2.5 m/s<sup>2</sup>) distance were significant highest ( $p < 0.05$ ) in the late luteal phase.

### CONCLUSION:

A greater running intensity above 19.8 km/h combined with a greater number of EX ACC and EX DEC in the late luteal phase in female soccer players were evidenced by our results. As reported in previous studies, the distance covered above 19.8 km/h is highly correlated with the high-intensity, intermittent running test commonly performed to evaluate the RSA of soccer players (3). We can speculate that this variation in RSA performance was related to the high levels of progesterone and estradiol of the late luteal phase. This result highlights the important role of female sex steroid hormones as determinant of RSA performance of women soccer players in different phases of MC.

### REFERENCES:

1. McNulty et al. Sports Med, 2020
2. Carmichael et al. Int. J. Environ. Res. Public Health, 2021
3. Rampinini et al. Appl. Physiol. Nutr. Metab, 2009

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