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## REM SLEEP ACROSS THE MENSTRUAL CYCLE IN WOMEN WITH PREMENSTRUAL DYSPHORIC DISORDER

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**Abstract:** Polysomnographic recordings every third night in women suffering from Premenstrual Dysphoric Disorder for one entire menstrual cycle was performed to examine the differences in REM sleep across the menstrual cycle. Time spent in the 1<sup>st</sup> REM sleep period increased significantly from the early follicular phase to the late luteal phase. It is hypothesized that in this clinical population, melatonin resistance could occur during the luteal phase.

### INTRODUCTION

Existing evidence demonstrates that sleep structure varies across the menstrual cycle in healthy women [1]. These variations could be more severe in women suffering from premenstrual dysphoric disorder (PMDD) [2]. Decreased melatonin levels have been implicated in the increase of REM sleep in animal models [3]. Furthermore, it is hypothesized that women suffering from PMDD experience a relative resistance to melatonin during the luteal phase of the menstrual cycle, which may be involved in the physiopathology of PMDD [4]. Explanations for such a resistance include a decrease in melatonin binding sites [5], an interaction with abnormal gonadal steroids [6] or another as yet unknown mechanism. In a previous study of women with premenstrual tension, REM sleep was significantly higher during the late luteal phase as opposed to the early follicular phase [7] though this has not been replicated in other studies. In healthy women however, the percentages of REM sleep reportedly decreases across the menstrual cycle [8]. The current study aims to test whether there exists a variation in polysomnographic sleep recordings of PMDD sufferers across the follicular and luteal phases of the menstrual cycle.

### METHODS

Five women (ages 28-41) with a clinical diagnosis of PMDD maintained regular sleep/wake habits over one entire menstrual cycle. Sleep/wake times outside of the laboratory were kept constant and confirmed by wrist actigraphy. Daytime napping was prohibited during the entire study. Every third night of one entire menstrual cycle, sleep was polysomnographically recorded in the laboratory using a standard montage. Participants' menstrual cycles varied from 25 to 29 days. Intrinsic sleep disorders were ruled out during the first sleep recording.

### RESULTS

Mean sleep length in the laboratory was 8h12min  $\pm$  10 minutes. A Wilcoxon signed ranks test was performed to compare polysomnographic sleep scores of the early follicular (first week) and the late luteal (last week) phases of the menstrual cycle. During the early follicular phase, the minutes spent in the 1<sup>st</sup> REM period was 16.67 (SD= 10.44), while that of the late luteal phase was 19.00 (SD= 11.68). The scores were found to vary significantly between the phases of the menstrual cycle ( $p= 0.023$ ) (Figure 1). Interestingly, participant's 1<sup>st</sup> REM periods during the luteal phase tended to be more fragmented ( $M= 2.93$ ,  $SD= 2.49$ ) than those during the follicular phase ( $M= 3.20$ ,  $SD= 1.74$ ) (Figure 2).

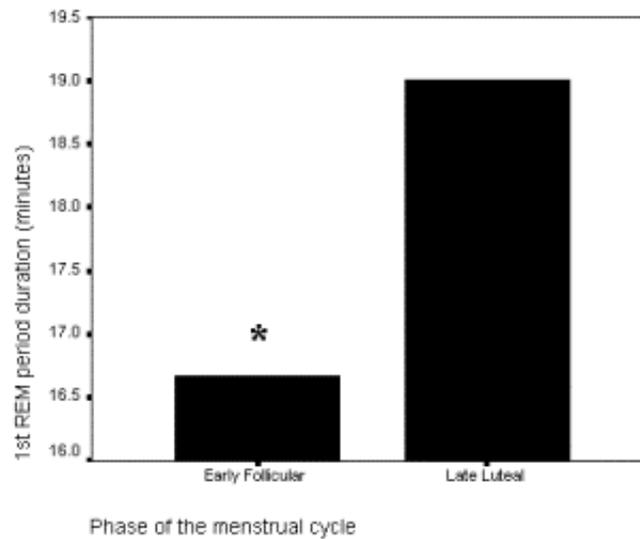


Figure 1. 1<sup>st</sup> REM period duration in minutes across both phases of the menstrual cycle

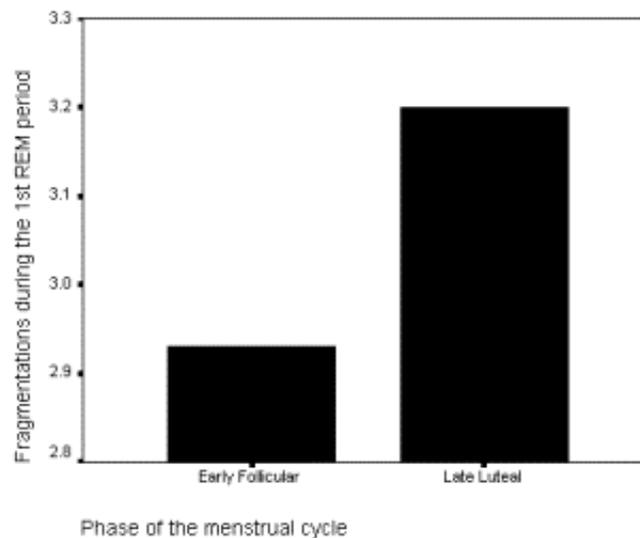


Figure 2. Fragmentation of the 1<sup>st</sup> REM period across both phases of the menstrual cycle

## DISCUSSION

The present study indicates that the 1<sup>st</sup> REM period does lengthen significantly during the late luteal phase in women with PMDD as opposed to the early follicular phase. Fragmentation of this REM period also increases. The current results are not surprising since various aspects of sleep vary across the menstrual cycle [1]. Though studies on healthy women report increases in the amount of time spent in REM sleep from the follicular to the luteal phase of the menstrual cycle [1], evidence exists to show the opposite with respect to women suffering from premenstrual tension [7]. It was hypothesized that similar results would emerge from polysomnographic analysis of the PMDD sufferers across the menstrual cycle. The implications of these findings are not yet understood but could potentially be linked to a decreased sensitivity to endogenous levels of melatonin and/or a complex interaction between reduced melatonin and progesterone secretion. These results are consistent with previous reports that REM sleep abundance is associated with low melatonin secretion [3] and coupled with deficient circadian melatonin rhythms [9]. Though the results require closer scrutiny using spectral analyses and a sample of healthy controls for comparison, they may have interesting implications for the treatment of PMDD using melatonin.

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