

# Chronotypes, Nocturnal Melatonin Level and Excessive Daytime Sleepiness in Parkinson's Disease

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**Objective:** To determine whether subjective propensity towards morningness or eveningness is associated with a specific nocturnal melatonin profile in persons with Parkinson's disease (PD)

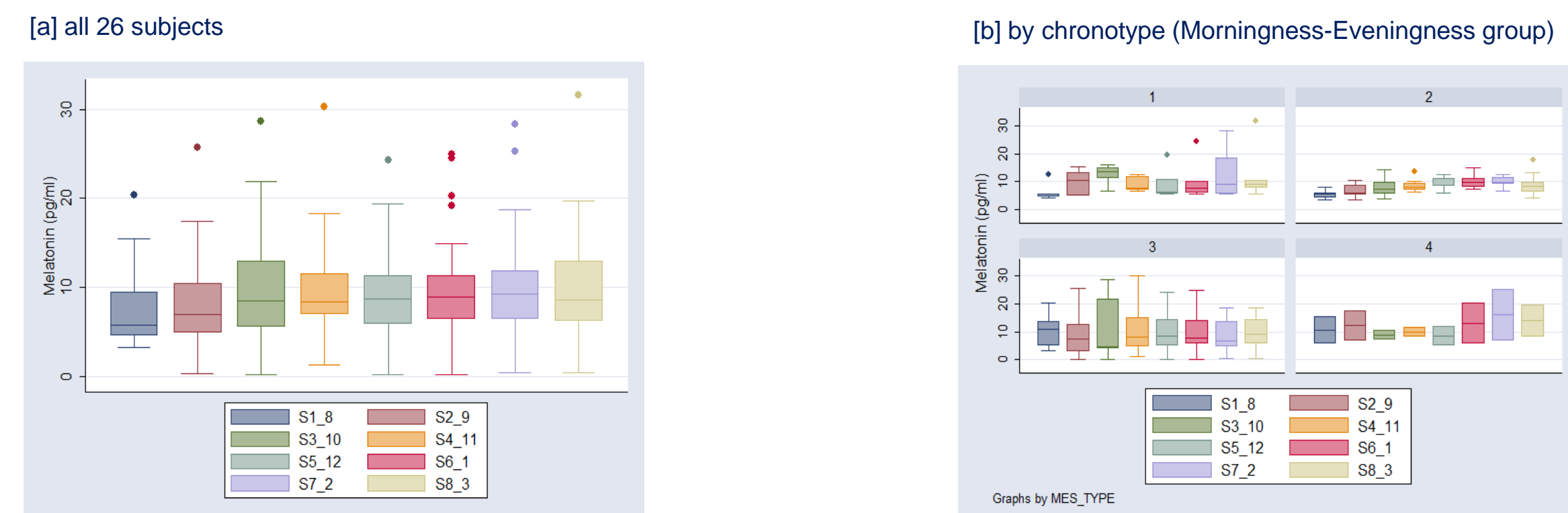
**Background:** Circadian dysrhythmia may underlie several sleep-wake cycle associated symptoms in PD. Effective strategies to address this derangement require better understanding of melatonin secretion patterns and identification of subjective markers that may predict these patterns in persons with PD.

**Design/Methods:** 26 Veterans with PD completed the Horne and Ostberg's Morningness-Eveningness Questionnaire, 14 day sleep diary and provided hourly saliva samples from 8pm to 3am at the facility sleep lab for melatonin assay. Comparisons were made by chronotype for the peak melatonin level and collection hour (the hour at which the assay showed the highest level of melatonin). Additionally, the total collection hours were grouped as quartiles and compared [8-9pm, 10-11pm, 12-1am, and 2-3am] for the chronotypes. Chronotype groups were also compared for the presence of: a) depression (Zung Self-Rating Depression Scale [standardized score] ) and b) excessive sleepiness (Epworth Sleepiness Scale), plus: age at the time of questionnaire completion, disease severity (Hoehn & Yahr), cognition (UPDRS Mentation score), median bedtime and median rise time. (SPSS, Kruskal-Wallis Test)

**Table 1: Mean Melatonin levels (pg/ml) for chronotype groups by saliva collection time**

DLMO Saliva Collection Time	All subjects N=26	1 Definitely Morning type N=6	2 Moderately Morning type N=10	3 Neither type N=8	4 Moderately Evening type N=2
Initial collection 8:00pm Mean (Std Dev)	7.5 (4.4)	6.3 (3.1)	5.4 (1.3)	10.4 (5.9)	10.6 (6.9)
9:00pm	8.4 (5.5)	9.8 (4.8)	6.5 (2.1)	9.0 (8.2)	12.2 (7.5)
10:00pm	9.7 (6.2)	12.6 (3.4)	7.9 (3.0)	10.1 (10.7)	8.8 (2.4)
11:00pm	9.5 (5.4)	8.9 (2.6)	8.6 (2.2)	10.9 (9.4)	9.9 (2.3)
12:00am	9.4 (5.1)	9.1 (5.4)	9.2 (2.2)	10.1 (7.8)	8.4 (4.9)
1:00am	10.3 (5.9)	10.2 (7.2)	10.0 (2.3)	10.1 (8.0)	13.1 (10.1)
2:00am	10.6 (6.4)	12.7 (9.1)	9.8 (1.9)	8.8 (6.6)	16.1 (13.0)
3:00am	10.3 (6.3)	12.2 (9.6)	8.9 (4.0)	9.8 (6.0)	14.0 (8.1)

**Figure 1: Box plots of mean Melatonin levels (pg/ml) for 8 collection times (8:00pm – 3:00am)**

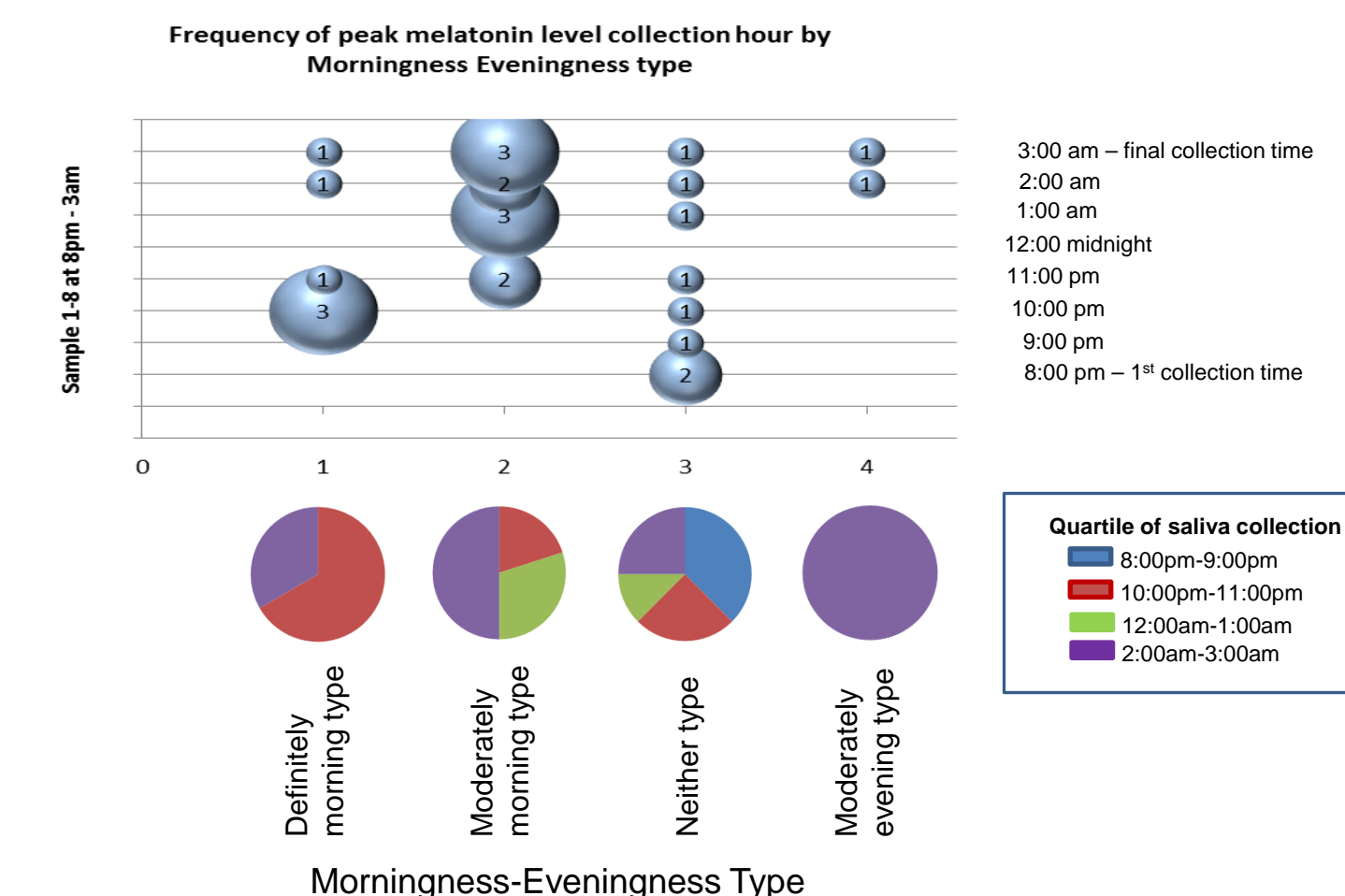


**Results:** There was no difference between the chronotype groups for the peak melatonin hour, (STATA, Fishers exact test) or the peak melatonin level. The chronotype groups did not differ for melatonin levels (STATA, Kruskal-Wallis Test) at any of the 8 hourly collection times. There was no correlation of the peak melatonin time with the subject's median rise time. However, the Morningness-Eveningness score was negatively correlated with the rise time. (SPSS, Spearman's Rho = -0.344, p-value= 0.019) There was no difference between the chronotypes with respect to depression, excessive daytime sleepiness, Parkinson's disease severity, cognition, age, gender and ethnicity.

**Table 2: Descriptive statistics for distribution of study items by Morningness Eveningness (chronotype)**

Study Items	N (All) n=26	Definitely Morning type n=6	Moderately Morning type n=10	Neither type n=8	Moderately Evening type n=2
Depression (Standardized Zung) mean (SD)	47.3 (10.7)	48.3 (13.3)	48.8 (12.2)	45.3 (7.9)	43.8 (0.0)
Sleepiness (Epworth Sleepiness Scale) mean (SD)	12.6 (4.4)	11.5 (3.7)	11.8 (5.5)	14.4 (3.7)	12.5 (0.7)
Age (at questionnaire) mean (SD)	68.7 (6.2)	69.7 (9.0)	67.3 (2.7)	68.2 (7.3)	74.7 (5.0)
Disease Severity (H&Y) median	2	2	2	2.25	2.5
Cognition (UPDRS Mentation) median	1	1	1	1	1
Chronotype (Morningness Eveningness Score) mean (SD)	24.0 (4.5)	29.5 (0.8)	25.1 (1.4)	20.8 (1.8)	14.5 (0.7)
Rise Time (median of 14 days) mean (SD)	7:02 (1:20)	5:38 (0:46)	7:32 (1:19)	7:00 (0:50)	9:00 (0:00)
Bed Time (median of 14 days) mean (SD)	19:59 (5:59)	21:41 (0:33)	19:57 (6:53)	18:06 (7:36)	22:45 (0:21)
Highest Melatonin (pg/ml) mean (SD)	15.1 (7.2)	16.5 (8.3)	12.3 (2.6)	17.2 (9.4)	16.8 (12.0)

**Figure 2: Frequencies by chronotype for peak melatonin level by collection hour and by quartile collection time**



**Conclusion:** Subjective propensity towards Morningness and Eveningness is not predictive of a particular nocturnal melatonin profile or a tendency towards daytime sleepiness in Veterans with Parkinson's disease.

