Early Birds Versus Night Owls: Morning/Evening Preference and Its Association with Sleep Problems, Fatigue, and Emotional Well-Being Among RA Patients

Alyssa Wohlfahrt, Jing Cui, Michelle Frits, Christine Iannaccone, Jonathan Coblyn, Nancy Shadick, Michael Weinblatt, Yvonne Lee

Section of Clinical Sciences, Division of Rheumatology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA

BACKGROUND

- Individuals often have an innate time of day preference for peak biological activity
- This preference has been defined in the literature as chronotype
- Studies have shown that individuals with an evening preference (chronotype) often report more sleep problems, greater pain, and a higher incidence of depression
- Rheumatoid arthritis (RA) is a disease that characteristically manifests with a circadian pattern, with symptoms being worst in the early morning and improving later in the day
- Identifying the association between time of day preference and sleep problems, pain, and depression may lead to the development of treatment strategies that target circadian preference to improve outcomes for RA

OBJECTIVE

- **Objective:** To examine the association between morning/evening chronotype and measures of sleep, pain and emotional well-being among RA patients with sleep problems
- **Hypothesis:** RA patients with evening chronotype will have more sleep problems, greater fatigue, increased pain, and worse emotional well-being

MATERIALS & METHODS

- Study Population
  - 191 RA patients
    - Participating in the Brigham Rheumatoid Arthritis Sequential Study (BRASS)
    - With sleep problems (Medical Outcomes Study (MOS) Sleep Problems Index II score > 35)
- Questionnaires administered between March and June 2012
  - Horne-Ostberg Morningness-Eveningness Questionnaire (MEQ) to determine morning/evening preference
  - Multidimensional Health Assessment Questionnaire (MDHAQ)
  - 5-Item Mental Health Index (MHI-5)
  - MOS Sleep Scale to assess:
    - Sleep quantity (duration of sleep)
    - Sleep adequacy (sufficient sleep)
    - Somnolence (daytime sleepiness)
    - Sleep disturbance (difficulty initiating and maintaining sleep)
- Morningness-Eveningness Chronotype
  - Evening Preference: MEQ ≤ 52
  - Intermediate Preference: MEQ 53 – 64
  - Morning Preference: MEQ ≥ 65
- Statistical Analysis
  - Tests: Multivariable linear regression models
  - Outcomes: Sleep quantity, sleep adequacy, somnolence, sleep disturbance, MDHAQ fatigue, MDHAQ pain scale, MHI-5
  - Independent variables: Time of Day Preference (referent = evening chronotype)
  - Covariates: Age, sex, serology, and disease activity (DAS28-CRP)

BRASS
Brigham and Women's Hospital Rheumatoid Arthritis Sequential Study.

Dr. Lee is supported by NIH grants AR057578, AR064850 and by the Katherine Swan Ginsburg Fund. BRASS is supported by Crescendo Biosciences, Bristol Meyers Squibb, and UCB

Supported by the National Institutes of Health NIAMS National Institute of Arthritis and Musculoskeletal and Skin Diseases

RESULTS

Figure 1. Time of Day Preference in a RA Patients with Sleep Problems (MOS > 35).

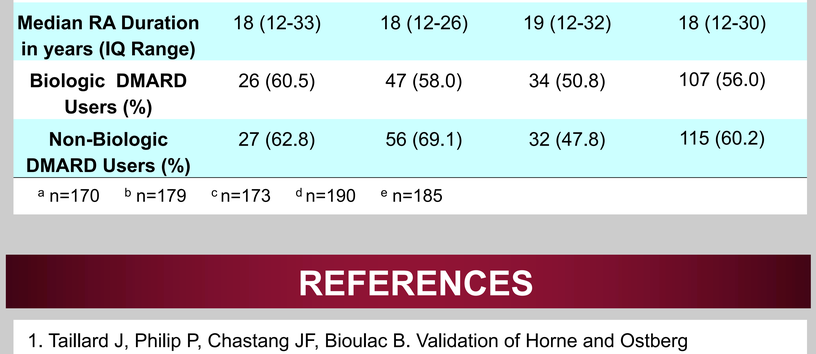

Table 1. Study population characteristics based on chronotype.

	Morning Types (N = 43)	Intermediate Types (N = 81)	Evening Types (N = 67)	Total Study Population (N = 191)
Female (%)	33 (76.7)	67 (82.7)	62 (92.5)	162 (84.8)
Mean Age, years (SD)	63.1 (10.6)	60.9 (10.0)	59.9 (13.1)	61.0 (11.3)
Mean BMI, kg/m² (SD)[a]	26.1 (5.8)	26.3 (4.8)	27.6 (6.0)	26.7 (5.5)
Employed (%)[b]	12 (32.4)	39 (49.4)	23 (36.5)	74 (41.3)
Married (%)[c]	32 (74.4)	50 (61.7)	42 (62.7)	124 (71.7)
Caucasian (%)[d]	42 (97.7)	74 (91.4)	63 (95.5)	179 (94.2)
Seropositive (%)[e]	29 (72.5)	62 (77.5)	44 (67.7)	135 (73.0)
Median RA Duration in years (IQ Range)	18 (12-33)	18 (12-26)	19 (12-32)	18 (12-30)
Biologic DMARD Users (%)	26 (60.5)	47 (58.0)	34 (50.8)	107 (56.0)
Non-Biologic DMARD Users (%)	27 (62.8)	56 (69.1)	32 (47.8)	115 (60.2)

[a] n=170 [b] n=179 [c] n=173 [d] n=190 [e] n=185

Table 2. Adjusted mean values for sleep, fatigue, pain and emotional well-being among RA patients with clinically significant sleep problems.

Clinical Characteristics	Morning* (N = 43)	Intermediate* (N = 81)	Evening (N = 67)
Sleep Quantity (hours)	6.4 (p=0.25)	**6.1 (p=0.01)**	6.8
Sleep Adequacy (0-100 scale, higher = better sleep adequacy)	41.4 (p=0.16)	37.1 (p=0.55)	34.8
Somnolence Scale (0-100 scale, higher = more somnolence)	29.0 (p=0.26)	31.8 (p=0.52)	34.3
Sleep Disturbance Scale (0-100 scale, higher = more disturbance)	44.8 (p=0.81)	48.5 (p=0.54)	46.0
MDHAQ Fatigue Scale (0-100 scale, higher = more fatigue)	53.4 (p=0.99)	52.2 (p=0.83)	53.3
MDHAQ Pain Scale (0-100 scale, higher = more pain)	39.9 (p=0.75)	39.5 (p=0.75)	38.0
Mental Health Index 5 (0-100 scale, higher = better emotional well-being)	77.3 (p=0.07)	71.6 (p=0.51)	69.3

Adjusted for age, sex, serology, & DAS28-CRP

* P values are for comparison between morning preferences and evening preferences and the comparison between intermediate preferences and evening preferences.

LIMITATIONS

- Limited generalizability due to specific population with identified sleep problems
- Cross-sectional design
- Based solely on patient reported measures of sleep (no polysomnograph data)

CONCLUSIONS

- RA patients with an evening chronotype did not report lower ratings of emotional health or higher ratings of pain and fatigue when compared to intermediate or morning preference
- RA patients with evening preference did report sleeping more hours than RA patients with morning or intermediate preference, despite similar sleep adequacy scores
- Additional studies are needed to determine whether morning/evening chronotype can be used to identify subgroups of RA patients at increased risk for sleep problems

REFERENCES

1. Taillard J, Philip P, Chastang JF, Bioulac B. Validation of Horne and Ostberg morningness-eveningness questionnaire in a middle-aged population of French workers. J Biol Rhythms. 2004 Feb;19(1):76-86. PubMed PMID: 14964706.