

Does Melatonin Improve Sleep Following Primary Total Hip Arthroplasty: A Randomized, Double-Blind, Placebo-Controlled Trial

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INTRODUCTION:

Sleep impairment following total hip arthroplasty (THA) is common and may decrease patient satisfaction and early recovery. Standardized postoperative recommendations for sleep disturbance have not been established. We aimed to assess whether melatonin use could promote healthy sleep and reduce sleep disturbance in the acute period following THA.

METHODS:

Patients undergoing primary, elective THA between July 2021 and March 2024 were prospectively enrolled and randomized to receive either 5mg of melatonin nightly or placebo for 14 days postoperatively. Participants recorded their nightly pain on the visual analogue scale (VAS), number of hours slept, and number of nighttime awakenings in a 14-day sleep diary starting the night of surgery (postoperative day [POD0]). Sleep disturbance was assessed preoperatively and on POD14 using the patient reported outcome measurement information system sleep disturbance (PROMIS-SD) form (with higher scores representing greater sleep disturbance). Epworth Sleepiness Scores (ESS) were collected on POD14 to assess sleep quality.

RESULTS:

In our study, 139 patients successfully completed the protocol, with 64 patients in the placebo group and 75 patients in the melatonin group. Melatonin patients experienced significantly more hours of sleep on POD 2 (placebo: 5.7 ± 2.4, melatonin: 6.5 ± 1.7, P = 0.017) and averaged over POD 1 to 3 (placebo: 5.7 ± 2.0, melatonin: 6.1 ± 1.6, P = 0.136), although this was not statistically significant. Both groups demonstrated comparable hours of sleep from POD4 and onward. Fewer night-time awakenings in the melatonin group were observed on POD 2 (placebo: 3.1 ± 2.0, melatonin: 2.7 ± 1.5, P = 0.282), although this was not statistically significant. The melatonin group demonstrated significantly lower postoperative PROMIS-SD scores (placebo: 56.3 ± 9.2, melatonin: 52.5 ± 9.3, P = 0.040). Although not statistically significant, the melatonin group demonstrated lower postoperative ESS scores (placebo: 6.8 ± 4.5, melatonin: 6.0 ± 4.0, P = 0.348).

DISCUSSION AND CONCLUSION:

Melatonin may promote longer sleep in the immediate postoperative period after THA, although these benefits wane after POD 3. Disturbances in sleep should be expected for most patients, although melatonin may have an attenuating effect. Melatonin is safe and can be considered for THA patients experiencing early sleep disturbances postoperatively.

Table 1: Baseline Characteristics

Demographic	Placebo (n=64)	Melatonin (n=75)	P-Value
Mean Age (years) [range]	62.5 [18-83]	62.7 [12-83]	0.949
Sex, n (%)			0.497
Male	24 (37.5)	27 (36.0)	
Female	40 (62.5)	48 (64.0)	
Race, n (%)			0.750
White	46 (71.9)	54 (72)	
African American	6 (9.4)	10 (13.3)	
Asian	3 (4.7)	3 (4.0)	
Hispanic/Latino	3 (4.7)	3 (4.0)	
Other	4 (6.3)	3 (4.0)	
Insurance, n (%)			0.933
Commercial	37 (57.8)	41 (54.7)	
Medicare	23 (35.9)	29 (38.7)	
Medicaid	4 (6.3)	5 (6.7)	
BMI (kg/m ²) [range]	29.0 [18.6-55.0]	29.3 [15.3-49.4]	0.687
Smoking Status, n (%)			0.815
Never	40 (62.5)	46 (61.3)	
Former	22 (34.4)	25 (33.3)	
Current	2 (3.1)	4 (5.3)	
ASA Class, n (%)			0.921
1	11 (17.2)	11 (14.7)	
2	41 (64.8)	33 (43.7)	
3	9 (14.1)	11 (14.7)	
Mean CCI (SD)	3.0 (2.8)	2.3 (2.2)	0.236
Primary diagnosis, n (%)			0.166
OA	61 (95.3)	75 (100.0)	
Post-Traumatic OA	1 (1.6)	0	
AVN	2 (3.1)	0	

BMI, body mass index; CCI, Charnock-Concordia Index; SD, Standard Deviation; ASA, American Society of Anesthesiologists; OA, Osteoarthritis; AVN, Avascular Necrosis

Table 2: Primary Outcomes of Placebo and Melatonin Groups

	Placebo	Melatonin	P-Value
Average Hours Slept (SD)			
POD1	4.9 ± 2.6	5.3 ± 2.3	0.353
POD2	5.7 ± 2.4	6.5 ± 1.7	0.017*
POD3	6.3 ± 2.1	6.5 ± 1.6	0.351
POD1-3	5.7 ± 2.0	6.1 ± 1.6	0.136
POD4-6	6.4 ± 2.0	6.4 ± 1.5	0.967
POD7-9	6.4 ± 1.8	6.6 ± 1.5	0.483
POD10-14	6.6 ± 1.7	6.7 ± 1.4	0.507
Average # Nightly Awakenings (SD)			
POD1	3.1 ± 2.3	3.2 ± 1.9	0.717
POD2	3.1 ± 2.0	2.7 ± 1.5	0.282
POD3	2.7 ± 1.4	2.7 ± 1.6	0.899
POD1-3	2.9 ± 1.6	2.9 ± 1.4	0.939
POD4-6	2.6 ± 1.4	2.6 ± 1.4	0.784
POD7-9	2.3 ± 1.2	2.4 ± 1.4	0.743
POD10-14	2.2 ± 1.2	2.1 ± 1.1	0.423
PROMIS Sleep Disturbance (SD)			
Preoperative	55.9 ± 7.9	53.2 ± 9.8	0.602
Postoperative	56.3 ± 9.2	52.5 ± 9.3	0.040*
Delta	2.1 ± 9.8	0.3 ± 9.8	0.346
Patients (%) with increased sleep disturbance	23 (35.9%)	28 (40.0%)	0.923

POD, postoperative day; PROMIS, patient-reported outcome measure information system

Table 3: Secondary Outcomes of Placebo and Melatonin Groups

	Placebo	Melatonin	P-Value
Average Nightly Pain Score (SD)			
POD1	4.7 ± 2.7	5.4 ± 2.6	0.148
POD2	4.3 ± 2.4	4.8 ± 2.7	0.226
POD3	4.0 ± 2.3	4.2 ± 2.5	0.323
POD1-3	4.3 ± 2.3	4.8 ± 2.4	0.200
POD4-6	3.3 ± 2.1	3.7 ± 2.4	0.498
POD7-9	2.9 ± 2.1	3.0 ± 2.3	0.788
POD10-14	2.4 ± 1.9	2.1 ± 2.0	0.369
Average Epworth Sleepiness Score (SD)			
POD14	6.8 ± 4.5	6.0 ± 4.0	0.348

POD, postoperative day; SD, standard deviation

Table 4: Nightly Awakenings of Admitted Patients on POD1

	Placebo	Melatonin	P-Value
Average Nightly Awakenings (SD)			
POD1	2.9 ± 2.3	3.2 ± 1.6	0.500

POD, postoperative day; SD, standard deviation

Table 5: Nightly Awakenings of Patients Discharged to Home on POD1

	Placebo	Melatonin	P-Value
Average Nightly Awakenings (SD)			
POD1	3.3 ± 2.3	3.3 ± 2.2	0.934

POD, postoperative day; SD, standard deviation