



The Impact of Circadian Rhythm on Prognosis in Stage III NSCLC Patients Undergoing Radiotherapy: A Retrospective Analysis

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INTRODUCTION

Radiotherapy is a cornerstone treatment but can cause radiation-related lymphocyte depletion. Peripheral blood lymphocytes exhibit distinct circadian rhythms, with counts peaking during the body's resting period (nighttime). We hypothesized receiving radiotherapy at different times affects patient prognosis by impacting lymphocyte counts.

METHODS

We retrospectively analyzed patients with stage III NSCLC who underwent a complete course of IMRT at our institution between 2017 and 2020. Nighttime RT was defined as treatments delivered between 7:00 PM and 5:59 AM. RCS model was used to explore the association between the proportion of nighttime radiotherapy sessions and overall survival. The optimal cutoff was determined by log-rank tests. The robustness of findings was validated using PSM, IPTW, and bootstrap resampling. Cox regression and mediation analyses were performed to assess the role of lymphocyte decline.

DISCUSSION AND CONCLUSION

A higher proportion of nighttime radiotherapy was significantly associated with worse overall survival in stage III NSCLC patients. The decline in lymphocyte count was an independent prognostic factor, showing the survival difference associated with treatment timing.

REFERENCES & ACKNOWLEDGEMENTS

Bray, F. *et al.* Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin* **74**, 229-263 (2024).
Leiter, A., Veluswamy, R. R. & Wisnivesky, J. P. The global burden of lung cancer: current status and future trends. *Nat Rev Clin Oncol* **20**, 624-639 (2023).
Gensheimer, M. F. *et al.* Individualized Stereotactic Ablative Radiotherapy for Lung Tumors: The iSABR Phase 2 Nonrandomized Controlled Trial. *JAMA Oncol* **9**, 1525-1534 (2023).

RESULTS

Eighty patients were included. The RCS model showed a nonlinear association between the proportion of nighttime RT and OS, with risk increasing when the proportion exceeded ~34% (Figure 1A). Using a 34% cutoff, 13 patients were classified into the nighttime group and 67 into the daytime group. Nighttime RT was significantly associated with worse OS (HR 2.56, 95% CI: 1.28-5.13, $p=0.006$; Figure 1B). This association remained robust after PSM (HR 2.50, $p=0.05$), IPTW (HR 3.39, $p<0.001$), and bootstrap validation. A greater absolute decrease in lymphocyte counts during RT was an independent predictor of worse OS (HR 1.76, 95% CI: 1.08-2.87, $p=0.023$). Stratified analysis revealed the negative effect of nighttime RT was pronounced in patients with a lower degree of lymphocyte depletion (HR 5.73, $p=0.005$) but was attenuated in those with greater depletion (HR 1.61, $p=0.27$; Figure 2), suggesting a partial mediating effect.

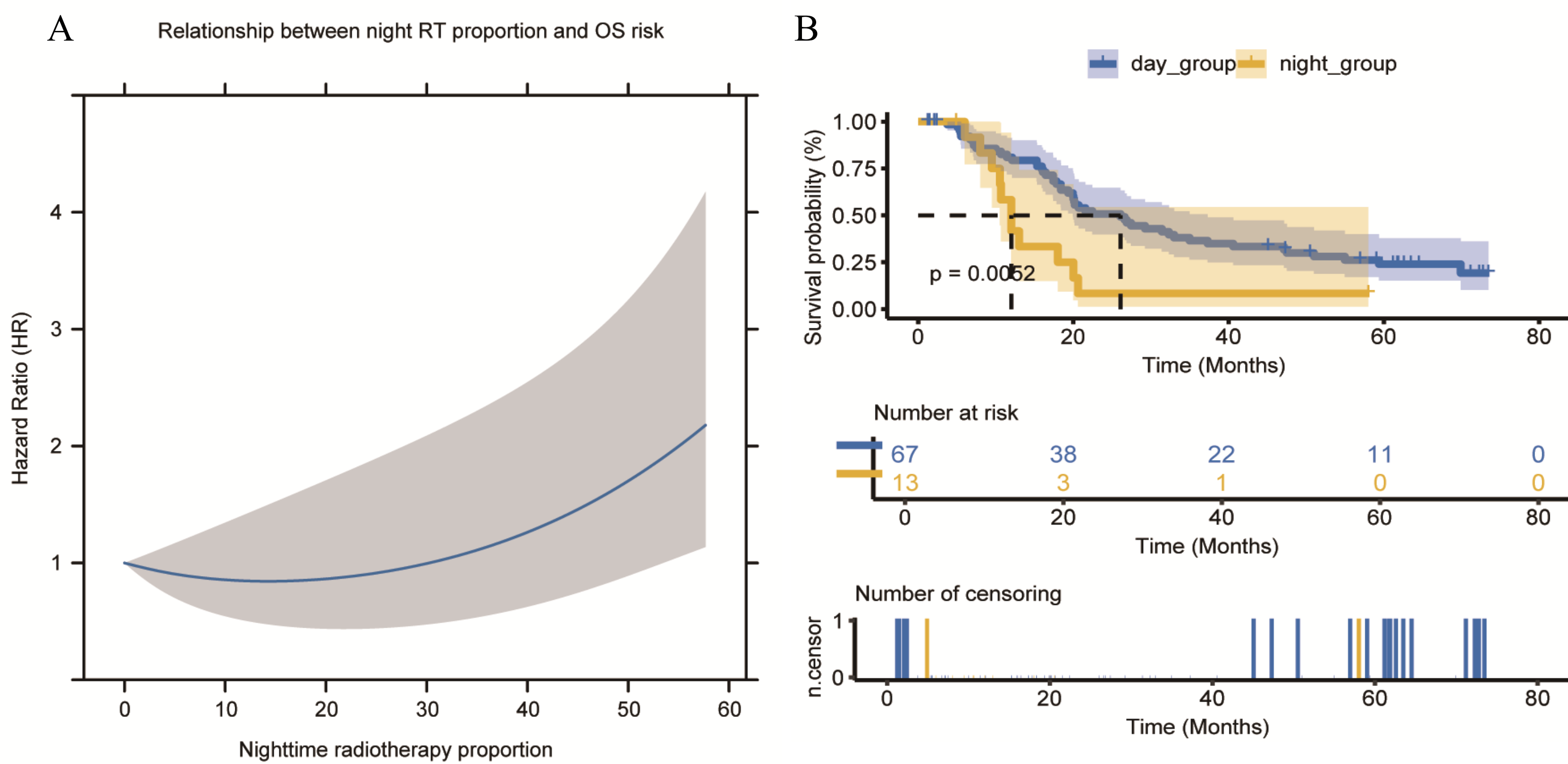


Figure 1: Impact of Nighttime Radiotherapy on Overall Survival.(A) Restricted cubic spline model showing the hazard ratio for OS according to the proportion of nighttime RT sessions. (B) Kaplan-Meier survival curves for patients in the Daytime (34% nighttime) and Nighttime (>34% nighttime) RT groups.

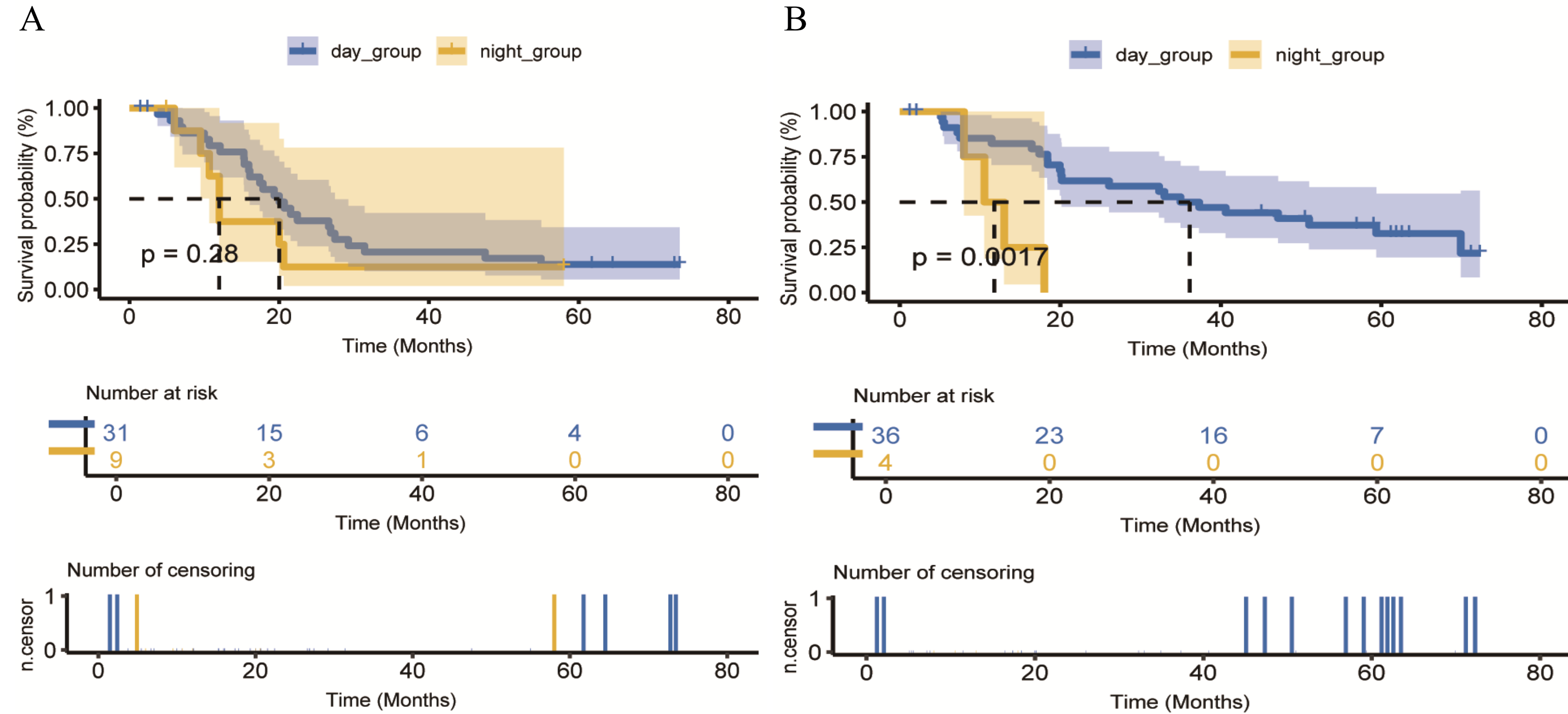


Figure 2: Stratified Analysis by Lymphocyte Decline. Kaplan-Meier survival curves comparing Daytime vs. Nighttime RT groups in patients with (A) a high absolute decrease in lymphocyte counts and (B) a low absolute decrease in lymphocyte counts.