

Ambulatory Blood Pressure, Sleep Quality, and Acute Mountain Sickness in the Setting of Acute High Altitude Exposure (CHAMPS*)

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*Colorado High
Altitude Monitoring
Pressure Study

Background

- Acute high-altitude exposure may increase 24-hour ambulatory blood pressure (ABP); however, there is large individual variability in blood pressure changes with altitude¹⁻⁴.
- Poor sleep quality is associated with sleeping at high altitude and acute mountain sickness (AMS)¹⁻², however, this association controversial.
- Lake Louise Score questionnaires are used to define AMS and in 2018, sleep was removed from the LLS criteria for AMS³.
- BP measured at the time of altitude-related symptoms has no association with AMS, but nocturnal BP might⁴.

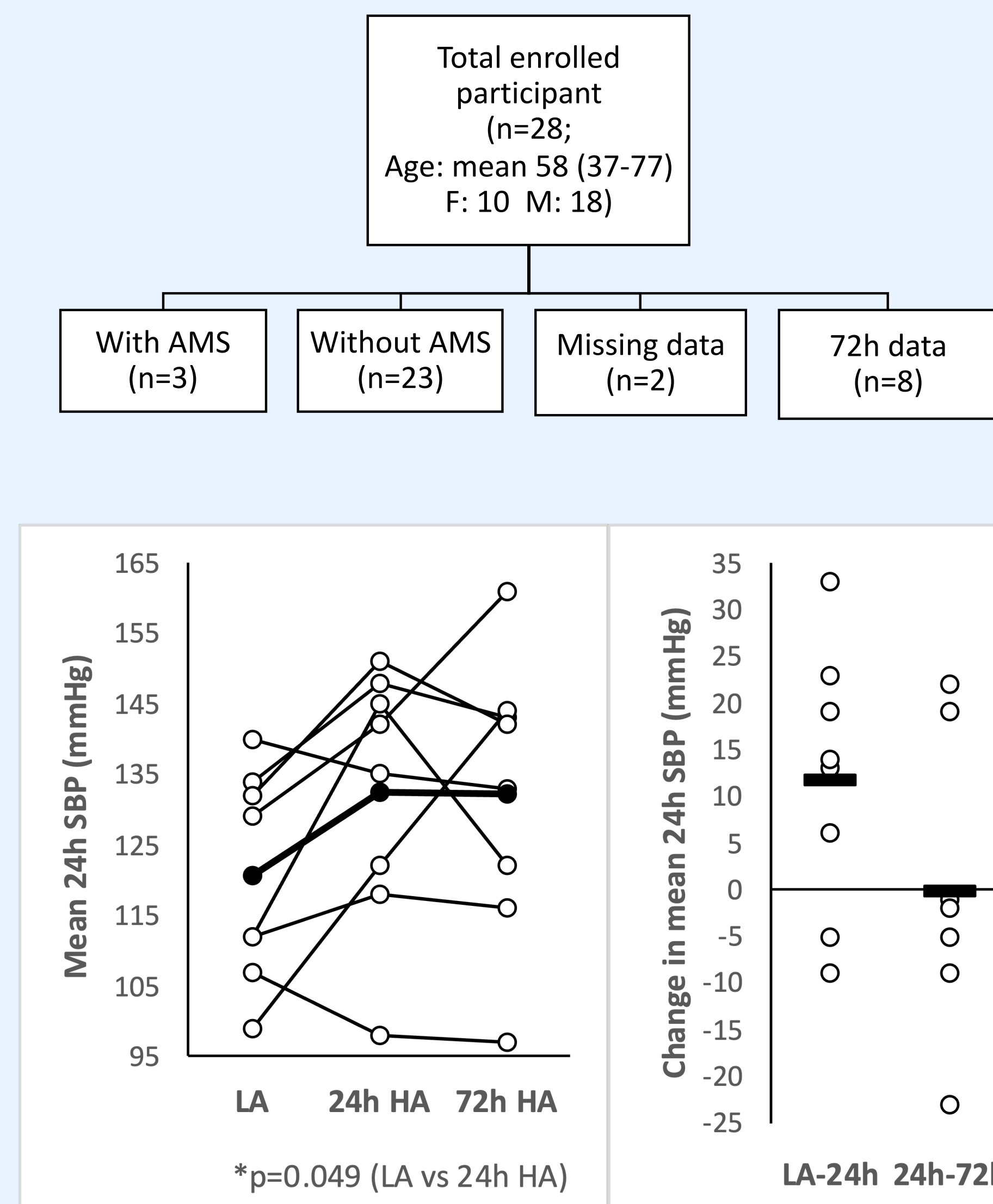
Objective

To compare 24-hour ABP at low altitude versus the first 24 hours at high altitude and after 72 hours as well as sleep quality and 24-hour ABP in high altitude travelers with and without AMS

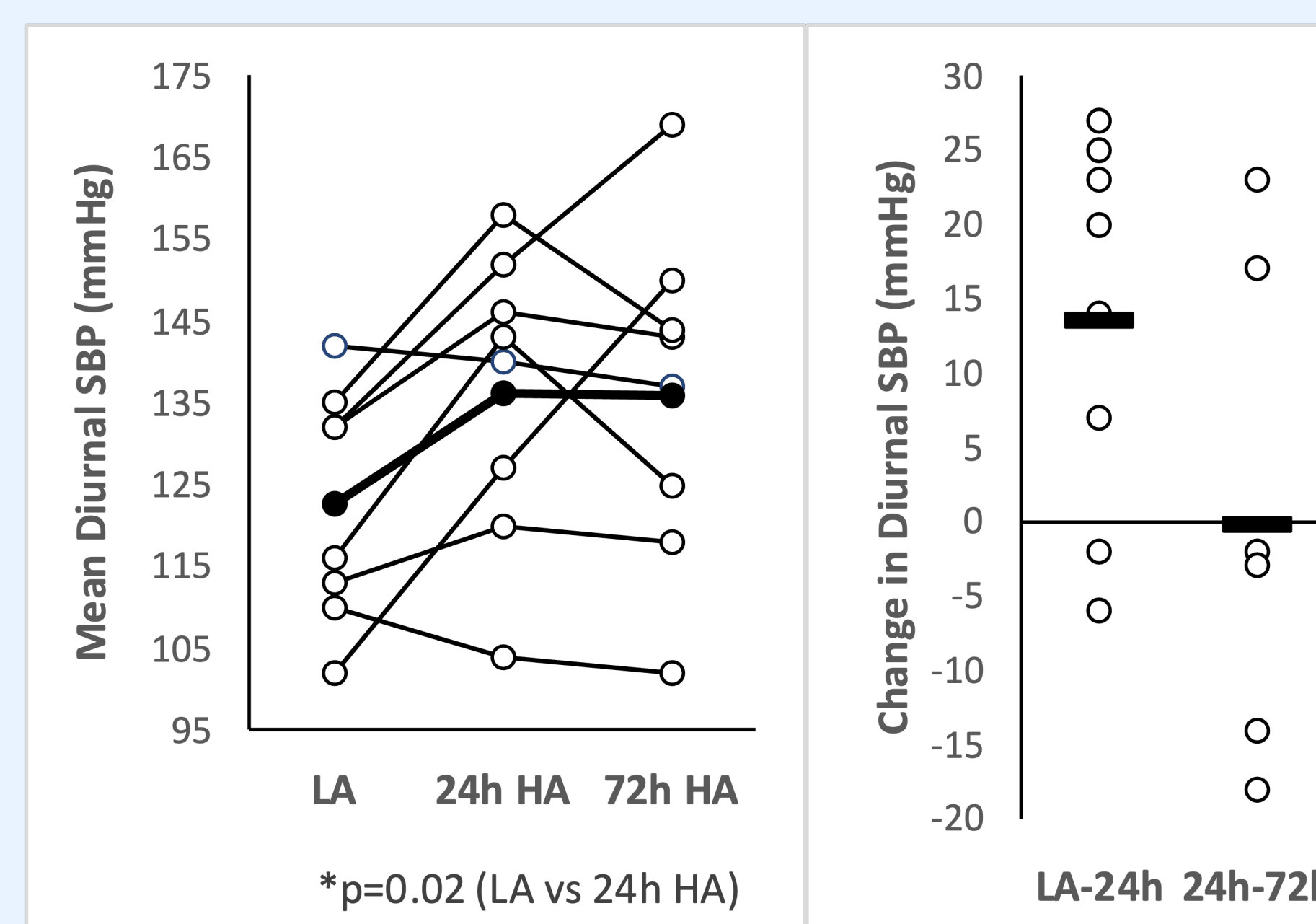
Methods

- Prospective observational cohort study of lowlanders visiting Colorado for ski trips with and without HTN.
- Ascent profile was similar in all participants. Lowlanders flew to Denver and immediately ascended by motor vehicle to 2470-2800m. 24h ABP monitoring began within 4-6 of hours of arrival at high altitude.
- Sleep quality, AMS and 24-hour ambulatory blood pressure (ABP) were measured during first 24h at high altitude and at 72h.
- Sleep quality measured with Groningen Sleep Quality Scale (GSQ), AMS with Lake Louise Score (LLS ≥ 3 defines AMS), and 24h ABP with Welch-Allyn 6100 ABPM.

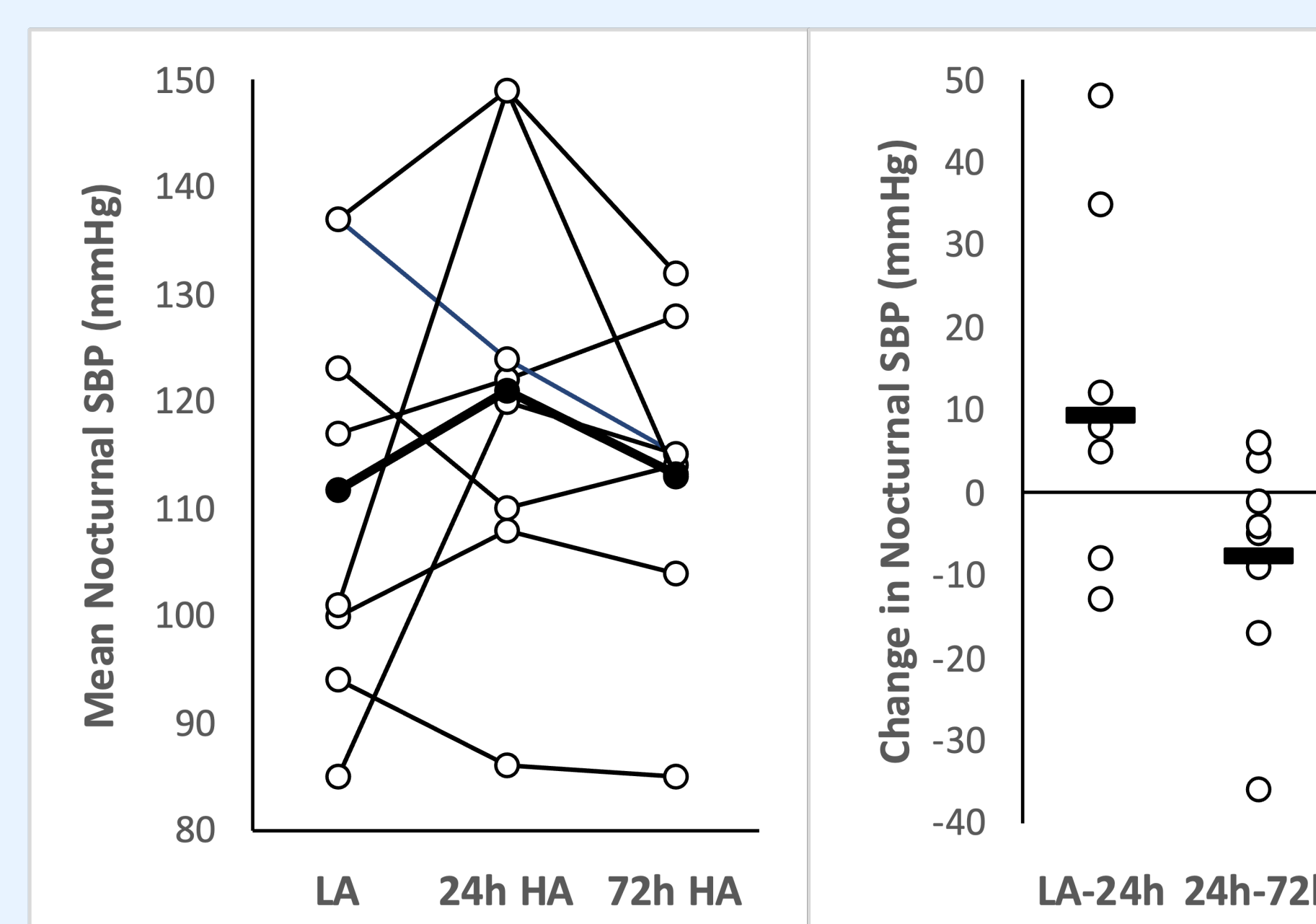
Results



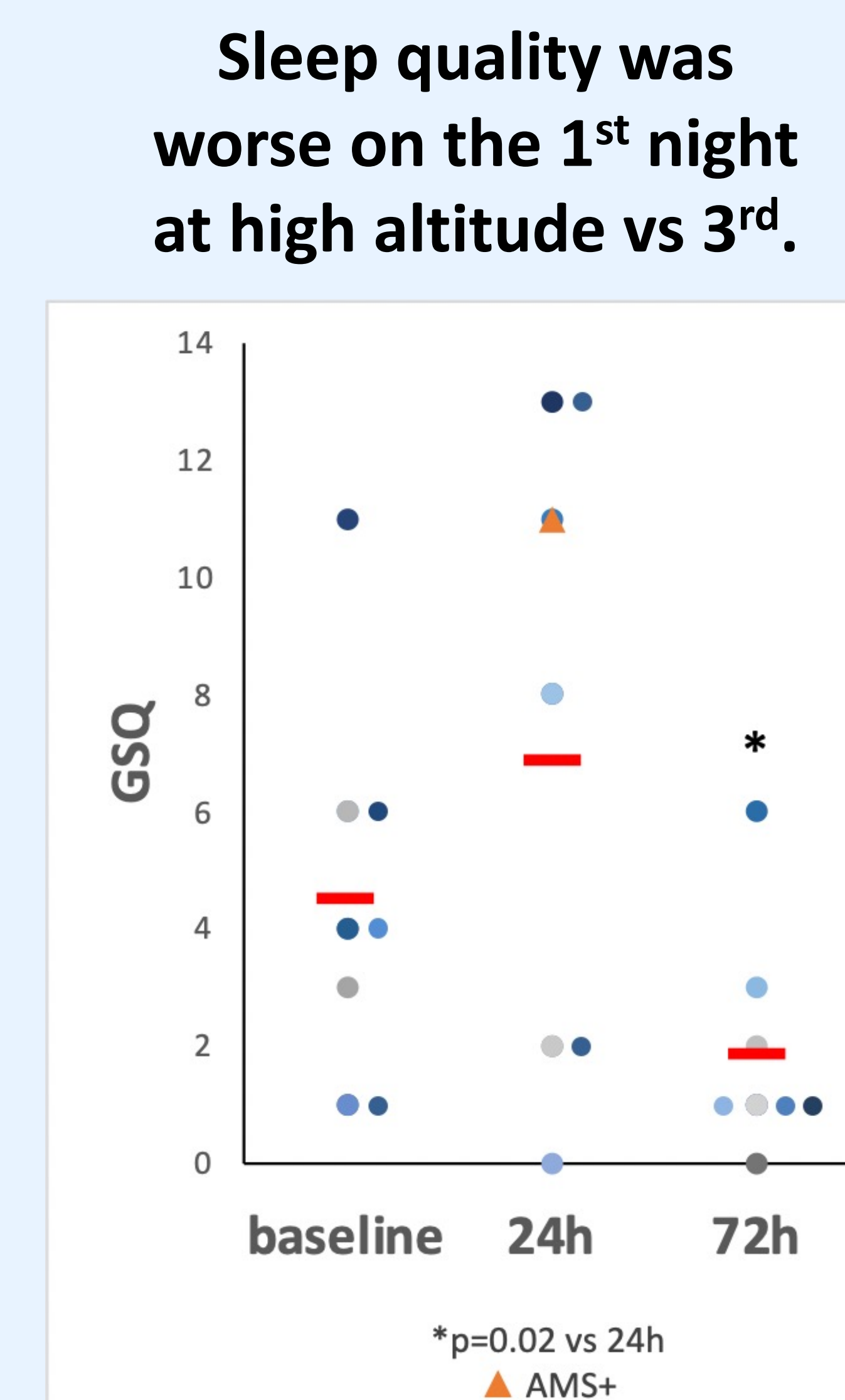
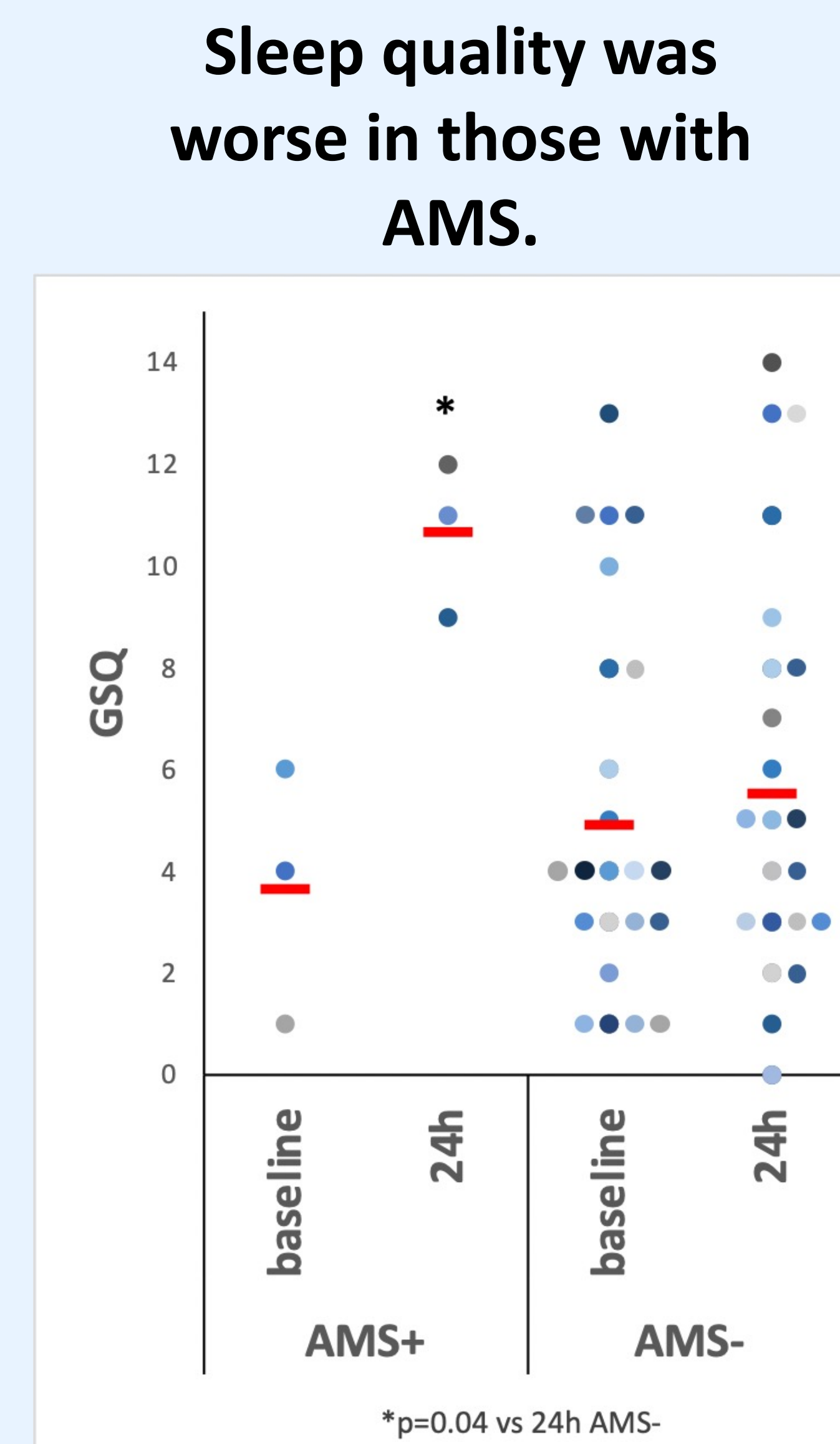
Mean 24h SBP increased in the 1st 24h at HA but did not change further after 72h at HA.



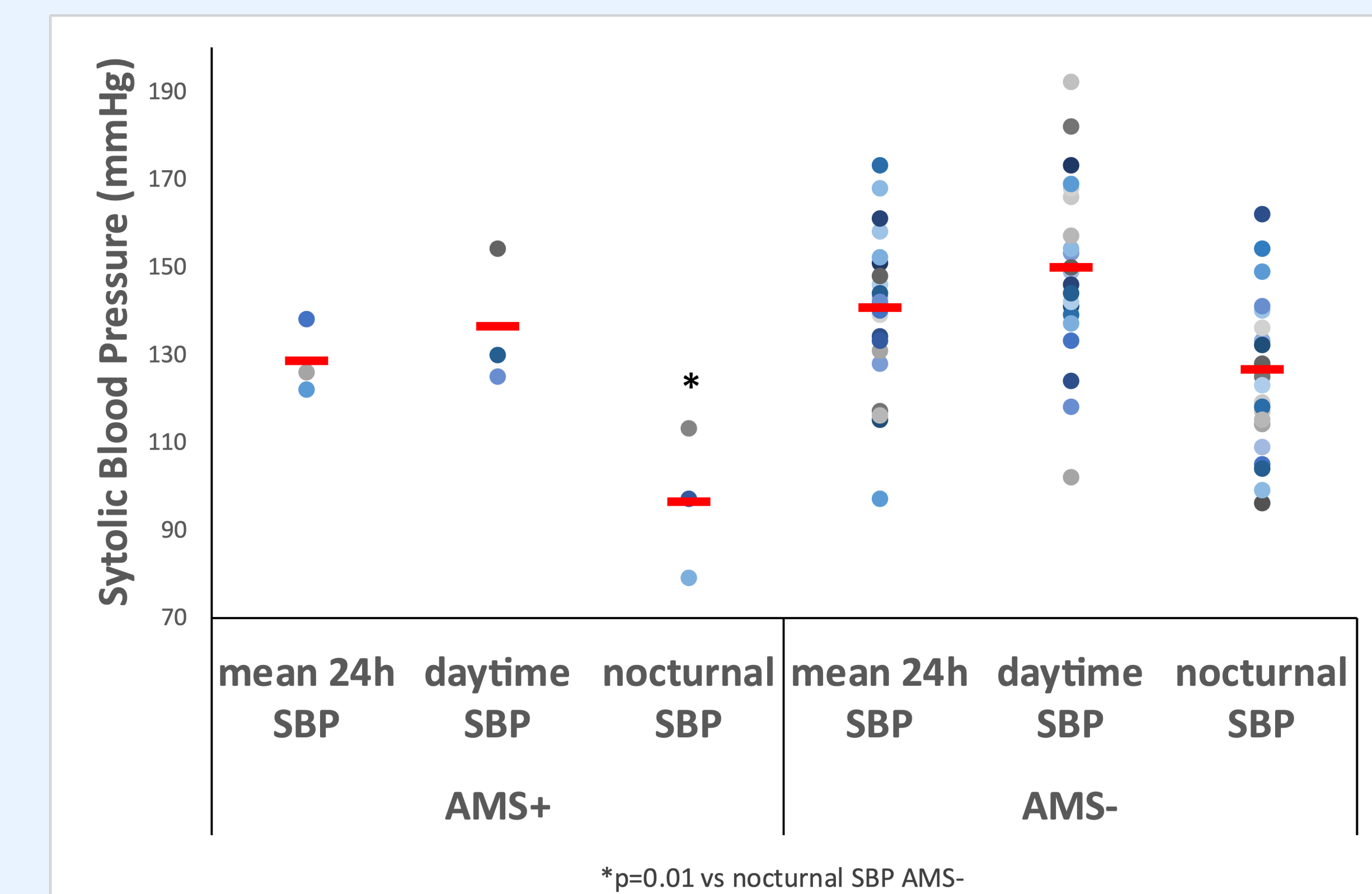
Mean diurnal SBP increased in the 1st 24h at HA vs LA but did not change further after 72h at HA.



Mean nocturnal SBP was similar in the 1st 24h at HA vs LA and after 72h at HA.



Mean 24h and daytime SBP did not differ by AMS status. AMS+ had lower nocturnal BP.



Conclusions

- 24h-ABP was elevated at HA, due to increases in diurnal ABP and remained elevated after 72 hours of acclimatization.
- Clinical effects of elevated BP during high-altitude sojourns still need to be elicited.
- Participants with AMS had worse sleep quality.
 - This supports the inclusion of a sleep quality question in the LLS questionnaire.
- Sleep quality did improve after time at high altitude.
- Surprisingly, mean nocturnal systolic blood pressure (SBP) was lower in those who develop AMS.
- More participants needed to validate these findings given small cohort size. The study will be continuing into the future.

Acknowledgements

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