Characterization of Asymptomatic B-lines in High Altitude Trekkers

Background:
Pulmonary B-lines can be seen on lung ultrasound (LUS) and indicate the presence of pulmonary edema, as is seen in high altitude pulmonary edema (HAPE), a severe condition resulting from rapid ascent to high altitude. While asymptomatic B-lines have been observed in high altitude travelers without clinical HAPE, their prevalence and relationship to high altitude physiology remains poorly understood. This study aims to characterize B-line development in high altitude travelers and its relationship to altitude and physiologic changes.

Methods:
This observational study investigated adult trekkers in the Khumbu Valley region in Nepal. 8-point LUS was performed to obtain a B-line quantification score. Altitude (2,610-5,364m), vital signs, and Lake Louise Score (LLS) for acute mountain sickness (AMS) were also recorded. A subset of participants were followed longitudinally as they ascended. Regression analyses were performed comparing B-line score to altitude, pulse oximetry (SpO2), and LLS.

Results:
88 subjects were enrolled, and 21 of these were followed longitudinally. There was a significant positive correlation between altitude and B-line score ($r=0.18$, $p=.049$) in the general population, however this finding was not significant in the longitudinal group ($r=0.21$, $p=0.13$). B-line score was inversely correlated with resting SpO2 ($r=-0.3$, $p=0.0008$). There was no significant relationship between B-line score and LLS ($r=0.14$, $p=0.12$). Of the 52 scans with B-lines present, 17 scans (32.7%) had B-lines in the anterior/superior zones and 42 scans (80.8%) had B-lines in the lateral/inferior zones.

Conclusions:
LUS B-line scores were higher with increases in altitude, and resting SpO2 was found to decrease with higher B-line scores. B-lines were most commonly found in the inferior and lateral lung zones. B-line scores were not correlated with development of symptoms of AMS. More research is needed to elucidate the clinical significance of these asymptomatic findings.