

Incidence and Severity of Necrotizing Soft Tissue Infections at High Altitude in Colorado

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Abstract

Necrotizing soft tissue infections (NSTIs) remain among the most devastating infectious conditions encountered in acute surgical practice, characterized by rapid progression, extensive tissue destruction, and significant risk of mortality if not recognized early. While the pathophysiologic trajectory of NSTIs has been widely studied, the influence of environmental and geographic factors, particularly altitude, has not been thoroughly examined. Colorado offers a unique epidemiologic environment due to its high-altitude population centers, where chronic exposure to hypoxia may influence inflammatory responses, microvascular function, and wound healing^{1, 2, 23}. Because tissue hypoxia is a prominent microenvironmental condition occurring in infections, there is a body of evidence that hypoxia and inflammation are interconnected and should be seen as concurrent processes.² In this retrospective single-center review of 275 patients diagnosed with NSTI, we collected demographic characteristics, comorbidities, laboratory values, LRINEC scores, and clinical outcomes to investigate potential correlations between high-altitude physiology and disease severity. Several comorbidities in this cohort demonstrated a higher prevalence of risk factors for NSTI compared to nationally reported prevalence. Substance use demonstrated the strongest associations, with alcohol use (27.1% vs 9.06%; *OR* 3.74, 95% *CI* 2.84–4.93; $p < 0.001$) and recreational drug use (35.6% vs 14.61%; *OR* 3.24, 95% *CI* 2.50–4.20; $p < 0.001$) occurring markedly more frequently among NSTI patients. Tobacco use was also significantly more prevalent (35.6% vs 27.78%; *OR* 1.44, 95% *CI* 1.11–1.87; $p = 0.007$). Hypertension was significantly more common in the NSTI cohort (50.6% vs 41.47%; *OR* 1.44, 95% *CI* 1.13–1.83; $p = 0.003$), while diabetes prevalence did not differ significantly when compared with a high-risk national comparator population (48.2% vs 53.0%; *OR* 0.82, 95% *CI* 0.64–1.05; $p = 0.13$). Our observations also suggest a trend of higher LRINEC scores being strong predictors of increased rates of surgical debridement (*OR* 3.596, $p = .00$) and limb amputation (*OR* 2.4, $p = .01$). Additionally, β -hemolytic group A *Streptococcus* were associated with multiple aggressive interventions, including debridement ($p = 0.014$), fasciotomy ($p = 0.040$), and amputation ($p = 0.003$). Due to a lack of sample size and power, none of the comorbidities in this cohort produced any significant findings in predicting the presence of NSTI.