Letter

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Commentary on "Impact of Altitude on Erythrocyte Sedimentation Rate: A Cross-Sectional Study Using National Laboratory Data From Saudi Arabia"

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The erythrocyte sedimentation rate (ESR) remains one of the most frequently requested hematological tests worldwide. Despite its appeal of accessibility and ease of use, the interpretation of its results is deceptively complex due to the influence of demographic, clinical, and environmental factors. In this article of *Discovery Medicine*, Abo Mansour *et al*. [1] provide compelling large-scale evidence that altitude exerts a significant and independent effect on ESR values.

Key Contributions of the Study

Analyzing over 150,000 participants across 13 regions of Saudi Arabia, the authors demonstrate that ESR decreases progressively with increasing altitude, even after adjusting for sex, age, body mass index, and comorbidities. Residents residing at altitudes exceeding 2000 meters were associated with a 34% decrease in the odds of having an elevated ESR compared to those living at sea level [1]. These findings align with physiological principles: at higher altitudes, hypoxia stimulates erythropoiesis and increases hematocrit, thereby altering red blood cell aggregation and sedimentation dynamics [2,3].

The study further reinforces well-established associations: elevated ESR values are more common in women and in older adults, and are also influenced by conditions such as obesity and chronic kidney disease (CKD). Notably, the prevalence of CKD was higher at lower altitudes in this cohort—a finding that contrasts with reports from the Tibetan Plateau [4], underscoring the importance of considering regional context in interpreting epidemiologic trends.

Clinical Implications

The message for clinicians is straightforward: uniform ESR reference ranges are inadequate for populations living at different elevations. Just as hemoglobin thresholds are adjusted according to altitude [5], ESR interpretation must account for geography. Applying sea-level cutoffs in high-altitude regions carries the risks of underestimating inflammatory activity, while applying high-altitude norms at sea level may exaggerate diagnostic suspicion.

The study also highlights more nuanced laboratory variations. While HbA1c levels showed a modest yet consistent increase with altitudes, likely due to prolonged erythrocyte lifespan, thyroid-stimulating hormone (TSH) remained stable, suggesting that not all laboratory markers are equally affected by environmental stressors [1].

Looking Ahead

As the authors note, limitations include the retrospective design and lack of granular data on lifestyle and genetic factors. Still, the study sets the stage for the development of altitude-specific ESR reference ranges, a step that could improve diagnostic accuracy in rheumatology, nephrology, and primary care. Future studies should investigate whether integrating such adjustments into clinical practice improves patient outcomes and reduces misclassification of inflammatory disease.

Conclusion

By demonstrating that altitude independently influences ESR values, Abo Mansour and colleagues [1] remind us that laboratory medicine cannot be divorced from environmental context. Their work advocates for a paradigm shift: to view ESR not as a universal constant, but as a variable embedded within the interplay of biology, disease, and geography.

Availability of Data and Materials

Not applicable.

Author Contributions

JFC conceptualized, wrote, contributed to critical revision of the manuscript for important intellectual content and approved the final version of the commentary. JFC agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

Not applicable.

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Conflict of Interest

Jozélio Freire de Carvalho is serving as one of the Editorial Board members of this journal. We declare that Jozélio Freire de Carvalho had no involvement in the peer review of this article and has no access to information regarding its peer review.

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