

## **A systematic review of electrocardiographic changes in healthy high-altitude populations**

Una revisión sistemática de los cambios electrocardiográficos en poblaciones sanas de gran altitud

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**ABSTRACTO:** High-altitude environments are characterized by decreased atmospheric pressures at which individuals exhibit a reduced volume of maximal oxygen uptake and arterial partial pressure of oxygen, both of which lead to hypobaric hypoxia. While acute exposure may temporarily offset cardiovascular homeostasis in sea-level residents, native highlanders have become accustomed to these high-altitude conditions and often exhibit variations in normal ECG parameters. As part of the "Altitude Non-differentiated ECG Study" (ANDES) project, this paper aims to systematically review the available literature regarding ECG changes in healthy highlander populations. After searching the PubMed, Medline, and Embase databases, 286 abstracts were screened, of which 13 full-texts were ultimately included. This process was completed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines. Major ECG deviations in native healthy highlanders include right QRS axis deviation, right ventricular hypertrophy signs, and more prevalent T-wave inversion in the right precordial leads. Notably, they exhibit a prolonged QTc compared to sea-level residents, although within normal limits. Evidence about increased P-wave amplitude or duration, variations in PR interval, or greater prevalence of complete right bundle branch block is not conclusive. This review provides ECG reference standards that can be used by clinicians, who should be aware of the effects of high-altitude residence on cardiovascular health and how these may change according to age, ethnicity, and other factors.