



# Anatomy of vertebral artery hypoplasia and its relationship with clinical implications: a systematic review and meta-analysis of prevalence

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## Abstract

**Purpose** The vertebral artery (VA) is a vital branch of the subclavian artery, coursing through the transverse foramina of the cervical vertebrae, and playing a crucial role in irrigating the posterior region of the arterial cerebral circle, also known as the Polygon of Willis. Among the various possible alterations that can affect the VA, vertebral artery hypoplasia (HAV) emerges as a significant variant. This study aims to discern the anatomical features of HAV and its correlation with the clinical conditions of the posterior cerebral circulation.

**Methods** The databases Medline, Scopus, Web of Science, Google Scholar, CINAHL, and LILACS were searched until January 2024. Two authors independently performed the search, study selection, and data extraction. Methodological quality was evaluated with an assurance tool for anatomical studies (AQUA). Pooled prevalence was estimated using a random effects model.

**Results** A total of 24 studies met the established selection criteria, with a total of 8847 subjects. In this study, 6 articles were included for the meta-analysis with a total of subjects. The average prevalence of VAH reported in each study was 11% (95% CI 10–12%); the studies had a heterogeneity of 41% based on the funnel plot and a low risk of bias.

**Conclusion** The prevalence of VAH is low, but in the presence of this condition, the changes are mainly in diameter rather than morphological. If it is present, some clinical safeguards must be taken to avoid complications such as stroke.

**Keywords** Vertebral artery · Encephalic irrigation · Vertebral artery hypoplasia · Variation anatomical · Vascularization brain · Clinical anatomy

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