Review Clin Transl Oncol. 2026 Mar 17. doi: 10.1007/s12094-026-04290-z.

Online ahead of print.

Efficacy of concurrent hyperbaric oxygen therapy with chemoradiotherapy for glioma: a meta-analysis

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PMID: 41843266 DOI: 10.1007/s12094-026-04290-z

Abstract

Objective: This study aimed to systematically evaluate the therapeutic efficacy and safety profile of concurrent hyperbaric oxygen therapy (HBOT) as an adjunct to chemoradiotherapy in patients with glioma.

Methods: Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, we conducted a comprehensive meta-analysis (PROSPERO registration: CRD420251007610). The search was performed in PubMed, Web of Science, Cochrane, EMBASE, China National Knowledge Infrastructure (CNKI), China Science and Technology Journal Database (VIP), and WanFang (inception to March 2025). Eligible studies were randomized controlled trials (RCTs) assessing tumor response, survival outcomes, quality of life (QoL), and adverse events. Subgroup analyses were performed based on HBOT pressure and session duration. Statistical analysis was performed using Review Manager version 5.3.

Results: Nine RCTs involving 837 patients with glioma were included. Pooled analyses demonstrated that HBOT significantly enhanced objective tumor response rates (odds ratio [OR] = 3.67, 95% confidence interval [CI] 2.59-5.18; $p < 0.00001$) and 3 year overall survival (OR = 0.52, 95% CI 0.33-0.82; $p = 0.005$) when combined with chemoradiotherapy. QoL scores showed marked improvement in HBOT-treated groups (mean difference = 12.33, 95% CI 10.69-13.96; $p < 0.00001$). Subgroup analyses on tumor response demonstrated consistent benefits across HBOT pressures and durations.

Conclusion: This meta-analysis provides evidence that concurrent HBOT with chemoradiotherapy may be associated with superior outcomes compared to chemoradiotherapy alone in glioma patients. These findings warrant verification in large-scale, multicenter Phase 3 trials.

Keywords: Chemoradiotherapy; Glioma; Hyperbaric oxygen therapy; Meta-analysis; Survival; Tumor hypoxia.