Review J Clin Neurosci. 2024 Dec 10:132:110977. doi: 10.1016/j.jocn.2024.110977.

Online ahead of print.

# Evaluating the safety and efficacy of proton radiotherapy for intracranial pediatric ependymomas: A single-arm meta-analysis

Lucca B Palavani [1], Gabriel Semione [2], Gustavo de Oliveira Almeida [3], Henrique L Lepine [4], Pedro Borges [5], Bernardo Vieira Nogueira [6], Gisele Lúcia [7], Márcio Yuri Ferreira [8], Anna Pereira [9], David Abraham Batista da Hora [7], Matheus de Jesus Leone Pereira [10], Fabio Torregrossa [11], Fernando De Nigris Vasconcellos [12], Raphael Bertani [13], Raphael Bastianon [14], Carolina Benjamin [15], Cleiton Formentin [16]

Affiliations

PMID: 39662113 DOI: 10.1016/j.jocn.2024.110977

## Abstract

**Background:** Ependymomas account for 6% to 10% of childhood central nervous system tumors. This study aimed to evaluate the safety and efficacy of proton radiotherapy in intracranial ependymoma patients.

**Methods:** We performed a systematic review and single-arm meta-analysis. We searched Medline, Embase, Cochrane, and Web of Science for eligible trials. Random-effects model was used to calculate the risk ratios (RRs), with 95% confidence intervals (CIs). Statistical analyses were performed using RStudio version 4.2.3.

**Results:** Ten cohorts comprising 908 patients with ependymoma were included. The patient population had an average age of 3.5 years, and 53.4 % were male. In terms of proportion, nine outcomes were analyzed: 3-year Progression-Free Survival (PFS; Proportion = 0.63; 95 % CI [0.40-0.87]; I2 = 95 %), 5-year Local Control (LC; Proportion = 0.79; 95 % CI [0.69-0.90]; I2 = 85 %), 5-year Event-Free Survival (EFS; Proportion = 0.65; 95 % CI [0.52-0.78]; I2 = 95 %), 5-year Overall Survival (OS; Proportion = 0.83; 95 % CI [0.77-0.90]; I2 = 82 %), 2-year OS (Proportion = 0.91; 95 % CI [0.88-0.94]; I2 = 0 %), 3-year OS (Proportion = 0.92; 95 % CI [0.89;0.95]; I2 = 43 %). Additionally, neurological (Proportion = 0.17; 95 % CI [0.07-0.27]; I2 = 97 %), dermatological (Proportion = 0.20; 95 % CI [0.00-0.44]; I2 = 82 %), and brainstem complications (Proportion = 0.03; 95 % CI [0.01-0.04]; I2 = 31 %) were investigated.

**Conclusion:** While proton radiotherapy appears safe and effective based on current data, these results should be approached cautiously, as broad confidence intervals in some adverse event rates suggest variability in outcomes.

**Keywords:** Intracranial ependymomas; Proton therapy.