Hippocampal avoidance whole brain radiation (HA-WBRT) results in improved neurocognitive function (NCF) compared to standard WBRT, but > 50% of patients still experience NCF failure. We examined whether lower biologically effective dose (BED) of HA-WBRT enables better hippocampal sparing without impacting intracranial disease control in patients with non-small cell lung cancer (NSCLC). We conducted an IRB approved, retrospective study of patients with NSCLC receiving HA-WBRT between 2014-2022. Endpoints were distant brain failure free survival (DBFFS), local brain failure free survival (LBFFS), left and right hippocampal mean BED$_1$, and BED$_{1.1}$. Kaplan-Meier survival analysis and Welch’s t-test were performed. Sixty-nine patients treated with HA-WBRT were included, with median follow up of 51.2 weeks. Thirty-six patients received standard HA-WBRT (SD) with median dose of 30 Gy in 10 fractions. Thirty-three patients received reduced BED HA-WBRT (RD), with median dose of 30 Gy in 15 fractions. All patients in the RD group had simultaneous integrated boost (SIB) to gross disease (median 37.5 Gy) while 18/36 in the SD group had an SIB (median 35 Gy). There were no significant differences between SD and RD cohorts in age, systemic therapy use, or targetable mutations. There was no difference in median DBFFS of the SD (23.1 weeks) and RD groups (40 weeks) (p=0.27). There was no difference in LBFFS of the SD (median 26.4 weeks) and RD groups (median 40 weeks), p=0.84. For the left and right hippocampi, both mean BED$_1$ and D1% were significantly lower in the RD group (p<0.001). In this cohort, lower BED HA-WBRT improved hippocampal sparing without compromising intracranial control in patients with NSCLC. Further optimization of HA-WBRT dose and schedule may improve both intracranial control and neurocognitive outcomes. This study is limited by its retrospective nature and potential selection bias. A phase II prospective study to test these concepts is ongoing.