BERBERINE INHIBITS CELL VIABILITY IN GLIOBLASTOMA MULTIFORME CELL LINES SENSITIVE AND RESISTANT TO STANDARD THERAPY

Heloiza Winck Soares[1]; Luisa Donato Bortoluzzi[1]; Luana Suéling Lenz[1]; Micheli Mainardi Pillat[1]

[1]*Federal University of Santa Maria, Santa Maria, RS, Brazil (UFSM)*

INTRODUCTION: Glioblastoma multiforme (GBM) is a common and lethal malignant brain tumor of the central nervous system (CNS), and its treatment is often ineffective. Currently, therapy involves surgical resection followed by administration of temozolomide (TMZ) and radiotherapy. However, resistance to TMZ calls for new treatment approaches. Berberine (BBR), a compound extracted from plants, has been studied as an alternative treatment for CNS tumors due to its bioactivity, small molecular size (allowing it to cross the blood-brain barrier), and antitumor properties. OBJECTIVE: To evaluate the in vitro cell viability of BBR, both in comparison to and in combination with TMZ, in therapy-sensitive and -resistant GBM cell lines. MATERIALS AND METHODS: The A172 (TMZ-sensitive) and U138 (TMZ-resistant) GBM cell lines were used. Cells were cultured in DMEM High medium with 10% fetal bovine serum and maintained under optimal conditions at 37 °C with 5% CO_2. BBR and TMZ solutions were dissolved in DMSO (100 mM) and diluted in culture medium. Cell viability was assessed using the MTT assay. Cells were treated with BBR and/or TMZ (5, 20, and 50 μM) and incubated for 24, 48, and 72 hours, as well as for 5 and 7 days. Absorbance was measured at 570 nm using a spectrophotometer. RESULTS AND CONCLUSION: The A172 cell line was used due to its sensitivity to TMZ and the U138 line due to its resistance. BBR significantly reduced cell viability in both cell lines, especially at the 20 μM concentration, with a more pronounced effect observed at 72 hours (acute treatment) and 5 days (chronic treatment). TMZ showed effects only after prolonged exposure, highlighting the faster action of BBR—an important advantage given the rapid growth of GBM. BBR demonstrated a dose- and time-dependent cytotoxic effect, including in TMZ-resistant cells. These findings underscore BBR's therapeutic potential as an alternative or adjuvant in GBM treatment, particularly in overcoming TMZ resistance. Further studies are necessary to elucidate its mechanisms and validate its efficacy in vivo.

Keywords: Berberine; Chemotherapeutic potential; Glioblastoma multiforme; Temozolomide.