

Essential oils from Côa Valley Lamiaceae species: cytotoxicity on glioblastoma cells

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Objective

Lavandula pedunculata (Mill.) Cav., *Mentha cervina* L. and *Thymus mastichina* (L.) L. subsp. *mastichina* are widely used and fairly representative species of the flora and traditional uses of the Côa Valley, a Portuguese UNESCO World Heritage Site. *L. pedunculata* and *T. mastichina* are used by local populations to preserve olives, as a condiment in traditional cuisine and to aromatize bonfires on Saint John's Eve, while *M. cervina* is mainly used as a spice for river fish dishes. However, despite their popularity among the population and prevalence in the territory of Côa Valley, these aromatic plants are still undervalued and scientific literature on their potential as anti-cancer agents is scarce. Therefore, in this work we aim to study the therapeutic potential of the essential oils (EO) obtained from these three species, by assessing their chemical composition, secretory structures morphology and cytotoxic effect against glioblastoma cell lines.

Methods

Wild-growing *L. pedunculata*, *M. cervina* and *T. mastichina* plants were harvested in the Côa Valley region during the flowering stage. Glandular trichomes morphology was assessed by scanning electron microscopy (SEM) on fresh leaves. EOs were obtained by hydrodistillation, using a Clevenger-type apparatus during 3 hours, according to the European Pharmacopoeia, preserved at 4 °C and the yield determined. Their effect (0,6 - 1 µL/mL) on cell viability was assessed on five glioma cell lines (A172, H4, U118, U373, U87) and a non-tumor cell line (Hek-293), for 24, 48 and 72 hours, through the Alamar blue assay.

Results

SEM analysis of the secretory structures showed an abundance of glandular trichomes namely peltate and capitate-types, thus explaining the high yields obtained for each EO. Moreover, *L. pedunculata* EO presented the most pronounced cytotoxic/antiproliferative activity against tumor cells, with moderate cytotoxicity against non-tumor cells. In turn, *M. cervina* EO exhibited a slightly lower cytotoxic effect against tumor cells and did not affect the viability of non-tumor cells. On the other hand, the EO obtained from *T. mastichina* was the less cytotoxic among the three EOs tested against glioma cells.

Conclusions

The results herein presented suggest that the EOs from *L. pedunculata* and *M. cervina* have a strong and promising antiproliferative potential to be further studied as efficient antitumor agents, whereas the EO from *T. mastichina* revealed a weak to moderate cytotoxic activity against glioma cells.

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