

# IN VITRO CHEMOPROTECTIVE AND ANTICANCER ACTIVITIES OF PROPOLIS IN HUMAN LYMPHOCYTES AND BREAST CANCER CELLS

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**Abstract:** Propolis has been used in folk medicine for centuries due to its healing properties. Ethanolic extracts of propolis (EEP) are rich sources of phenolic acid and flavonoids. Natural phenolic compounds may exert chemoprotective activity in cancer cells due to their ability to scavenge free radicals. The aim of this *in vitro* study was to investigate the genotoxic and anti-mutagenic effects of the EEP on human peripheral blood lymphocytes (PBLs) and their cytotoxic potential on the human breast cancer cell line (MDA-MB-231 cells). Both cell cultures were treated with six concentrations (1, 10, 50, 100, 250 and 500 µg/ml) of EEP1 and EEP2, separately and in combination with mitomycin C (MMC). Our results show that the EEP1 and EEP2 samples of propolis after separate and combined treatments with MMC did not influence the nuclear division index (NDI). In the combined treatment, both tested EEPs significantly reduced MMC-induced micronuclei (MN) in PBLs. At 48 h after exposure of the MDA-MB-231 cell line to a combined treatment of EEP samples with MMC, the IC<sub>50</sub> values were significantly reduced (23.79 and 19.13 µg/ml, for EEP1+MMC and EEP2+MMC, respectively, in comparison to the single treatment. In conclusion, the tested ethanolic extracts of propolis exhibited a certain level of *in vitro* antimutagenic activity in PBLs from healthy subjects, and anticancer activity in breast cancer cell line. The presented findings suggest that the ethanolic extracts of propolis show potential in anticancer therapeutic strategy.

**Key words:** propolis; human lymphocytes; genotoxicity; cytotoxicity; MDA-MB-231 cell line

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## INTRODUCTION

Propolis, which is produced by honeybees (*Apis mellifera*), is a resinous mixture derived from various plant sources. Propolis is used as a bee glue to fix holes and as protection from external intruders. Different constituents of propolis have been identified such as, polyphenols, sesquiter-

pene quinones, coumarins, steroids and amino acids (Khalil, 2006; Park et al., 2002). Propolis has been used in folk medicine from antiquity due to its healing properties. Many studies and research groups have confirmed that propolis possesses numerous biological properties, such as antibacterial, antioxidant, anti-inflammatory, antitumoral, immunomodulatory and anti-HIV-1



















