activities are in accordance with our results on HP/HS antimutagenic activities. Indeed, studies suggested that the anti-inflammatory activity of the HP extracts are higher than that of pure HS.[28,41]

Lymphocytes were exposed to HS or HP extracts before (pretreatment), during (co-treatment), and after (posttreatment) treatment with 1-NPy in order to collect much information as possible on the mechanism of antimutagenicity. Inhibition of a chromosome damaging effect can result from (i) a direct interaction between the mutagen and the antimutagen, and this interaction could occur outside and/or inside the cells, (ii) a HS or HP extract induced cellular effect that could enhance a protective mechanism. In pre- and post-treatment protocol, mutagen and antimutagen were not present simultaneously in the culture, suggesting that the antimutagenic effect was consecutive to a HS or HP extract induced cellular effect. In contrast, in co-treatment protocol, both protective cellular effect and direct interaction between mutagen and antimutagen could occur. A classification of possible mechanisms of mutagenesis and carcinogenesis inhibitors has been proposed.[12] The mutagenicity of 1-NPy was reduced in pretreatment (43% ± 17%) and more intensely in the co-treatment (101% ± 11%). The decrease in BMNC rate observed in pretreatment protocol suggests an increase in protective cellular mechanisms mentioned previously, such as stimulation of expression of antioxidant enzymes. The BMNC rate decrease observed in the co-treatment protocol is greater than in the pretreatment, indicating an additional protective mechanism, as a direct interaction between HS and 1-NPy. HP extracts decrease 1-NPy induced BMNC rates in the three treatment protocols [Table 3]. The BMNC rate decrease observed in the co-treatment protocol for HS and HP extract is similar suggesting that antimutagenic activity in co-treatment can be attributed to HS. The BMNC rate decrease is greater for HP extract than HS in pre- and post-treatment, indicating compounds other than HS are probably involved in the cellular effect.

CONCLUSION

Harpagoside and HP extracts are antimutagenic toward the environmental mutagen/carcinogen 1-NPy. This is the first report of antimutagenic properties of HS and HP. The 1-NPy induced chromosomal damage protection was greater using HP extracts than HS, probably due to the presence of natural antioxidants in the extracts. These results underline the interest of aqueous or hydroethanolic extracts of HP usually used in phytotherapy. Further investigations are necessary to deepen the knowledge of the relationships between anti-inflammatory and antimutagenic effects. This correlation could justify the evaluation of other anti-inflammatory plants and natural molecules for their antimutagenic properties.

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