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Formulation of external dosage forms containing grape pomace as active ingredient

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The wine industry and the grape industry produce a large amount of by-products, grape pomace, which are proven sources of phenolic compounds with antioxidant and antimicrobial effects. For this reason, there has recently been an increasing interest in the use of these winemaking wastes [1,2].

The objective of our experimental work was to formulate external preparations that contained an extract made from grape pomace as a natural active ingredient. As pharmaceutical dosage forms, ointments and gels were formulated using penetration-enhancing surfactants and gel-forming substances. The different pharmaceutical forms were subjected to texture analysis, the results of which can predict the degree of bioavailability of the active ingredient. The release of the active substance from the carrier and its penetration through the membrane are determined using a Franz diffusion cell and a UV-VIS spectrophotometer. A cytotoxicity test was performed with 3-[4,5-dimethylthiazol-2-yl]-2,5-diphenyltetrazolium bromide (MTT) dye on a human keratinocyte (HaCaT) cell line to verify the biocompatibility of the compositions. The *in vitro* antioxidant capacity of the preparations was detected using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) method, while the anti-inflammatory effect was detected using the human TNF- α ELISA Kit on the HaCaT cell line.

Based on the results of the conducted experiments, it can be concluded that the cream containing the sugar ester SP 70 surfactant and Transcutol HP penetration enhancer and solubilizer has a more favorable diffusion profile compared to the gel. In the case of the former, the bioavailability of the active ingredient approached 45% after 90 minutes. With the help of the MTT test, we determined that our preparations do not produce a significant decrease in cell viability, and their biocompatibility is adequate. Based on the results of the DPPH test, there is no significant difference between the antioxidant effect of the gel and the cream. Treatment with the cream reduced the amount of the proinflammatory cytokine TNF- α by 48%, while the gel reduced it by 36% compared to the control samples, which proves the significant anti-inflammatory effect of the preparations containing pomace when tested on the HaCaT cell line. Based on our results, it can be concluded that we managed to produce formulations with valuable effects from an industrial by-product, thereby making our Earth more sustainable.

References:

1. Rodríguez-Pérez C et al. *Nutrients*. 11(10):2435 (2019)