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Harnessing avocado seeds in the production of extracts as a potential raw material for the pharmaceutical and cosmetic industries

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Abstract: Global avocado production generates a high volume of waste, with the seed representing an abundant and underutilized byproduct. Within the framework of a circular bioeconomy, this study conducted a systematic review of the scientific evidence on the potential of avocado seed as a raw material for the pharmaceutical and cosmetic industries. The review followed the PRISMA 2020 methodology to ensure transparency and reproducibility. The search was carried out in high-impact scientific databases (PubMed, ScienceDirect, Scopus, and Scielo), yielding a total of 482 records. Subsequently, a screening process was applied, removing duplicates and filtering by title and abstract. Finally, the pre-selected articles were evaluated in full text according to specific eligibility criteria. This resulted in 62 studies being included in the final evidence base for the qualitative synthesis and analysis of this review. The analysis revealed that avocado seed exhibits remarkable pharmacological and cosmetic potential due to its diverse phytochemical profile. Its potent antioxidant and anti-aging activities are attributed mainly to the high content of proanthocyanidins and flavonoids such as catechin, while its anti-inflammatory effects modulate key cellular pathways. Unique compounds like acetogenins (*e.g.*, *Avocatin B*, *Persenone A*) are responsible for its promising antineoplastic activity by selectively inducing cancer cells death, and for its broad antimicrobial spectrum. These bioactivities enable industrial applications, positioning avocado seed functions as a photoprotective ingredient, natural preservative, sustainable exfoliant, and unique coloring agent through the perseorangin molecule, consolidating it as a multifunctional, high-value raw material within the circular economy. The valorization of the avocado seed represents an innovative strategy based on the circular economy, transforming agro-industrial waste into a high-value raw material. The standardization of sustainable extraction methods will be essential to ensure extract stability and yield, consolidating their potential for developing new bioproducts for use in the pharmaceutical and cosmetic sectors.

Keywords: Antioxidant activity; Avocado seed; Circular bioeconomy; Cosmetic industry; Pharmaceutical applications.