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## Safety and efficacy of *Sclerocarya birrea* (A.Rich.) Hochst (Marula) oil: A clinical perspective.

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### Abstract

**ETHNOPHARMACOLOGICAL RELEVANCE:** *Sclerocarya birrea* (A.Rich.) Hochst (Marula) nut oil is a popular ingredient in cosmetics such as skin lotions, lipsticks and foundations. The demand for this African oil increased tremendously such that in 2008 almost US\$ 20 million was spent on Marula oil for cosmetic product manufacturing. The ethnobotanical literature states that the Zulu people in South Africa amongst others applied the oil to maintain a healthy skin. Scientific studies to support the traditional use as well as the inclusion of Marula oil in cosmetic products is lacking. This study evaluated the irritancy potential (safety), the moisturising and hydrating effects as well occlusivity properties (efficacy) of Marula oil after topical application. In addition, the Marula oil used in this study was comprehensively characterised using two-dimensional gas chromatography coupled to mass spectrometry.

**METHODS AND MATERIALS:** Quantification of the fatty acid methyl esters (FAMES) was done using a LECO Pegasus 4D GC × GC-MS. To determine the safety and efficacy of Marula oil healthy caucasian adult female volunteers (n = 20) who complied with the inclusion and exclusion criteria for the irritancy patch, moisture efficacy, hydrating and occlusivity tests were recruited for each study. A 2 × magnifying lamp (visual observation), Chromameter®, Aquaflex® and Corneometer® instruments were used to evaluate and monitor the irritancy level, skin barrier function, transepidermal water loss, hydrating and

occlusive effects of topically applied Marula oil.

**RESULTS:** The GC × GC-MS analysis identified several saturated as well as unsaturated fatty acids. Oleic acid was the major fatty acid constituting 69.0% of the oil followed by palmitic acid (15.3%), linoleic acid (9.2%), palmitoleic acid (4.1%) and stearic acid (1.5%). The clinical study revealed that Marula oil is non-irritant ( $p < 0.001$ ), with moisturising and hydrating properties ( $p < 0.001$ ) when applied to a lipid-dry (xerosis) skin. Additionally the oil exhibited occlusive effects ( $p < 0.001$ ) when applied to normal skin. These findings may be linked to the absorption of the oil into the skin due to the high percentage of oleic acid and the presence of palmitic acid which are known to disturb the stratum corneum intercellular lipids. These fatty acids present in Marula oil are very similar to those present in the epidermis, and can be considered biomimetic.

**CONCLUSIONS:** Marula oil rich in fatty acids exhibits moisturising, hydrating and occlusive properties. As the oil is non-irritating and provides a moisturising effect with moderate prevention of transepidermal water loss, average moisture retention properties and noteworthy occlusive effects, its inclusion in cosmetic products based on its traditional use may be justified depending on the application.

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**KEYWORDS:** Cosmetic; Efficacy; GC×GC–MS; Marula; Safety; Sclerocarya birrea

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