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Review

Are plants used for skin care in South Africa fully explored?

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ABSTRACT

Ethnopharmacological relevance: South Africa is an important focal point of botanical diversity, and although many plant species have been used since ancient times in ethnomedicine, only a few species have hitherto been fully investigated scientifically. A large proportion of the South African population use traditional medicines for their physical and psychological health needs. Many medicinal plants have recently gained popularity as ingredient in cosmetic formulations based on their ethnomedicinal values and many cosmetic products sold in stores are of natural origin. The present review discusses the ethnopharmacological values, pharmacological and toxicological evidence of 117 plant species grown in South Africa, which are used traditionally for skin care purposes. Special focus was on their traditional use for many skin disorders in order to identify their therapeutic potential, the state of ethnopharmacological knowledge and special emphasis has been on areas which require further research.
Materials and methods: The information regarding all 117 plant species mentioned was extracted from Sci-Finder, Science direct, Medline and Google Scholar. All the available relevant data for medicinal plants was collated from literature review articles from the 19th century to early 2013.
Results: The extracts from different parts of plants exhibited significant pharmacological properties, proving significant skin care potentials. Special emphasis was on those plant species which still need further exploration and these have been documented separately.
Conclusions: Despite the immense use of plants in ethnomedicine for skin care, limited research has been done on the activity of the crude extracts and very little on the active constituents. Consequently, almost 35 out of the 117 species are totally unexplored in the area of skin care. This investigation would be of interest to a broad readership including those researchers working in this field. The plant species namely: *Greyia flanaganii*, *Sideroxylon inerme*, *Sclerocarya birrea*, *Calodendrum capense*, *Hyaenanche globosa*, *Harpephyllum caffrum*, *Ximenia americana*, *Leucosidea sericea Artemisia afra*, and *six Aloe species* have been scientifically validated by our research group for skin hyperpigmentation problems.

Contents

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1. Introduction

Skin is the largest organ in the body which protects the internal environment from the external one and adds to our beauty too. Beauty is a quality that gives pleasure to the senses, which is desired by many humans. In general terms skin diseases account for approximately 34% of all the diseases encountered worldwide (Abbasi et al., 2010). They affect people of all ages and constitute a major concern for medical consultation. Skin diseases currently exist as a major health burden in both developed and undeveloped countries. According to the World Health Organization (WHO), burns have also been a serious public health problem due to the global increase in burn mortality rates. In South Africa, over 19,500 fire-related deaths are reported annually and they rank among the 15 leading causes of death among youngsters (5–29 years). However, mortality rate for skin diseases is relatively low, often persistent and are difficult to treat (WHO, 2012). There are many different ways to protect our skin. The usage of natural ingredients for skin care is very popular today. Medicinal plants have been found to play a major role in the treatment of various skin disorders and these species have been used in many countries around the world where they contribute significantly towards the health care for skin (De Wet et al., 2013). Moreover, the extensive use of medicinal plants to treat dermatological conditions in traditional system of whole southern Africa has been recently reported (Mabona et al., 2013).

The search for natural remedies for skin care is on-going worldwide. A review by Vermaak et al. (2011) focused on the importance of seeds oil from six species used in the preparation of cosmetics, also mentioned the traditional and other medicinal usage of seed oils. An article by Mabona et al. (2013) focussed on the dermatological applications of about 47 Southern African medicinal plants. The authors had mainly mentioned the antimicrobial effects of plants against skin pathogens. Chen et al. (2012) summarised very systematically the medicinal and cosmetic relevance of the *Aloe ferox*, a fully explored plant of South Africa which is also used in cosmetic herbal formulations. A document from Brendler and Phillips (2011) unpublished work, provided a list of African cosmetic species and their usage. Reports by other researchers such as Preetha and Karthika (2009), Jain et al. (2010), Shivanand et al. (2010), Gupta et al. (2011) and Mukul et al. (2011), focussed on the significance of Indian herbs and spices used in maintaining and enhancing human beauty as well as popularity of these herbs in cosmetics. Chaudhari et al. (2011) reviewed common types of plants used for skin care and concluded that the oxidative stress is one of the major mechanisms for skin aging and dermatological conditions.

These publications do not cover relevant significant scientific information regarding South African plants used for skin care. The need for review of the plants species grown in South Africa should focus on gaps in our understanding of traditional uses and *in-vitro* studies such as, pharmacological studies, toxicity profiling, pre-clinical and clinical trials. Previous review reported by Van Wyk and Gericke (2000) and Chen et al. (2012) were directed at phytochemical aspects and few pharmacological activities of the species. Hence, an attempt was made to update the complete information on traditional uses, phytochemical aspects, toxicity and pharmacological activities of the species, which can aid for future research to be taken on the respective species by synthetic chemists, phytochemists, pharmacologists, clinicians, scientists and toxicologists *etc.* The review highlighted the traditional formulations made from the species for skin care (Table 1), in addition to this, different biological activities and toxicological studies have been reported on various extracts of different plant parts (Table 2).

There is growing interest in the health benefits of plants grown in South Africa with regard to skin care. In line with this, there is an increasing numbers of published articles claiming that plant or plant derived actives may function as candidate for skin care. However, it is unclear which plant extract/active can work effectively. Therefore, to test this all available literature were reviewed with an intention of capturing what biological and/or phytochemical studies have been performed on those extracts. The present review focused on the ethnopharmacological aspects of 117 plant species used traditionally in South Africa for skin care belonging to 57 families and 101 genera, which are applied topically or taken orally in the traditional healing system of the South African population. Disorders treated, include abscesses, acne, burns, boils, incisions, ringworm, rashes, shingles, sores, wounds and warts. But such knowledge of medicinal plants is limited to specific localities in rural area. In other words, only a few people from local areas have information on the use of these medicinal plants. These species are still not fully investigated scientifically and a few are completely unexplored.

The main aims of the present review are as follows:

- Which species are used traditionally for skin care by people of South Africa?
- Which species have been explored scientifically? Either for the identification of bioactive compounds or for pharmacological applications
- What types of activities are associated with the species which have already been studied scientifically?
- How many species are still unexplored scientifically for skin care?