Journal of Ethnopharmacology 193 (2016) 45–59

Contents lists available at ScienceDirect

Journal of Ethnopharmacology

journal homepage: www.elsevier.com/locate/jep

Ethnopharmacological communication

A quantitative ethnobotanical survey of phytocosmetics used in the tropical island of Mauritius

M. Fawzi Mahomoodally*, Poorneeka Ramjuttun

Department of Health Sciences, Faculty of Science, University of Mauritius, Réduit, Mauritius

ARTICLE INFO

Article history:
Received 25 April 2016
Received in revised form
12 July 2016
Accepted 12 July 2016
Available online 13 July 2016

Keywords:
Herbs
Cosmetics
Herbal preparations
Phytocosmetic
Mauritius

ABSTRACT

Ethnopharmacological relevance: With a net turnover worth of £181 billion, the cosmetic industry is a leading worldwide business with a very lucrative future. Nonetheless, due to recent concerns regarding toxicity of synthetic cosmetics, herbal products have come into the limelight of cosmetology. The tropical island of Mauritius has a well-anchored diversity of indigenous plant species which are exploited for various purposes but no study has been designed to (i) quantitatively document, (ii) assess the effectiveness, and (iii) study the incidence of adverse effects and perception associated with the use of herbal products for cosmetic applications.

Method: Data was collected from herbal users via face-to-face interviews using semi-structured questionnaire. Quantitative ethnobotanical indices (fidelity level (FL), variety of use (VU) and relative frequency of citation (RFC)) were calculated.

Results: Twenty five herbs belonging to 21 families were recorded in use for 29 different cosmetics applications. Many of the documented species represented well-known plants, although we also recorded a few plants being exploited for new cosmetic applications. Plants with the highest RFC were *Curcuma longa* L. (0.45), *Lawsonia inermis* L. (0.42) and *Aloe vera* (L.) Burm.f. (0.42). A total of 8 plants were reported to score 100% with respect to the FL. Interestingly, *Lawsonia inermis* L. being the highly cited plant species showed a clear dominance as a popular phytocosmetic and which has also been extensively documented for its pharmacological properties. Moreover, it was found that 25% of the respondents experienced adverse effects; with pruritus (11%) being the most reported condition. It was also observed that participants perceived herbs/herbal products to be free from adverse effects.

Conclusion: Most of the plants reported have been described in previous studies for their bioactive components which tend to justify their use as phytocosmetics. Further research should be geared to explore the potential of these plant products for the cosmetic industry.

1. Introduction

The urge of every human being is perhaps beauty which has always been a matter of paramount value (Kole et al., 2005). Prehistorically, along with the development of the chronicle of mankind, the basis of cosmetics shapes into a constant depiction whereby its use was closely related to religion, myths, hunting, war and subsequently medicine (Kumar et al., 2012). For thousands of years, both men and women have utilized various cosmetics bequeathed from many civilizations and different cultures supporting the historical perspective of beauty (Oumeish, 2001). From the times of the Pharaohs, the Romans, the Greeks and the Arabs, through the medieval and Elizabethan periods till today, cosmetics have influenced history of mankind in various philosophical and cultural facets (Oumeish, 2001). Through the centuries, the exquisite beauty of the female gender was revealed through cosmetics in variant patterns as fine arts of many civilizations in the form of portraits, statues and carvings (Oumeish, 2001). Originally, the word *cosmetae* was first employed for the description of Roman slaves whose work was bathing men and women in perfume (Chaudhri et al., 2009).

According to the Federal Food, Drug, and Cosmetic Act (FD&C Act), products meant to be sprayed on, poured, sprinkled, introduced into, applied on or alternatively for application to the human body for purifying, enhancing beauty, promoting body appeal or simply revamping the body look are defined as cosmetics. Skin moisturizers, cleansing shampoos, hair colors, whitening creams, facial cleansers, perfumes and lipsticks as well as any element meant for the use as a constituent of a cosmetic application are among the products inclusive in the above description (U.S. Food and Drug Administration, 2002).

On a global scale, the cosmetic industry is known for its

* Corresponding author.
E-mail address: f.mahomoodally@uom.ac.mu (M.F. Mahomoodally).

http://dx.doi.org/10.1016/j.jep.2016.07.039
0378-8741/

innovation and lucrativeness as a fast-moving business (Kumar et al., 2012). Furthermore, a recent report showed that the worldwide cosmetic market has witnessed an expansion of 3.8% over the last ten years and a net turnover worth of £181 billion (Consultancy.UK, 2015). This industry has also clearly demonstrated its capacity in accomplishing constant development with a global yearly expansion rates ranging from 3% to 5.5% for the past 20 years and stability along with its strength in flexibility to withstand economic crisis (Lopaciuk and Loboda, 2013). Expectation in the future regarding this flourishing market continues to be positive since the proximity to cosmetics of the world population in emerging markets is predicted to rise by 50% (Ernst and Young, 2014). Subsequently, in the coming 10–15 years, the cosmetic industry is strongly believed to double with Japan, China, Brazil, India and the US predicted to occupy the highest positions in this market (Ernst and Young, 2014).

Interestingly, there is a great tendency of consumers to return to the use of herbs/herbal products for various uses with the aim of implementing a more natural mode of life based on the perception that it is safer (Kapoor, 2005). Since primeval time, numerous civilizations of the past have been subjected to the major use of herbs as cosmetic applications. Moreover even today, the demand and the utilization of herbal cosmetics also termed phytocosmetics have increased significantly in the personal care system (Kapoor, 2005). This drive is mainly due to the extreme use of synthesized chemicals, unnatural and artificial products, chemical colorants and their imitated commodities in the production of non-herbal cosmetics for the past 150 years. Consequently their manufacture and applications cause numerous adverse effects leading to a panoply of diseases to the human body (Kapoor, 2005). Recently, a very famous multinational cosmetic group made headlines for being sued by a deceased female talc powder user's family who claimed that her ovarian cancer was directly linked with the application of this powder for more than 10 years (Sheffield, 2016).

The belief that phytocosmetics are naturally safe has resulted to a growing consumer demand for cosmetics containing natural and/or organic ingredients (Kole et al., 2005; Antignac et al., 2011). Subsequently, this clearly explains the rapid paradigm shift towards the manufacture and use of phytocosmetics rather than synthetic-derived products among consumers and even the main leaders of cosmetic markets (Kapoor, 2005). The quest for phytocosmetics is continuously increasing globally with the popularity of the use of natural constituents rising drastically at present (Lall and Kishore, 2014).

Hence, recognition and proper documentation of herbs used in many cultures which consists of an integral part of cosmetic applications is of paramount implication in the proper usage with respect to their active components. The study aims at documenting and evaluating the different types of herbs in common use in Mauritius as cosmetic applications which will eventually open new avenues for research and industrial development.

2. Materials and methods

2.1. Study area

Mauritius, a small oblong mass of coral reefs emerged from a primitive volcanic eruption in the Indian Ocean, nearly 2000 km east of the African continent (Mauritius-info, 2016). The island enjoys a tropical climate of moderate temperature, from May to October (winter season) during which the temperature varies from 17 °C to 23 °C and from November to April (summer season) whereby the temperature ranges from 23 °C to 33 °C (Mauritius-info, 2016). The island is 2040 sq.km and is surrounded by abundant verdure in the central highlands (Mauritius-info, 2016). Back in the 9th century, Mauritius was first discovered by the Arabs followed by Dutch colonization then to French possession who eventually lost the island to the British in 1810 (Mauritius-info, 2016). Finally the island got its independence in 1968. A wealthy legacy of variety of animals and indigenous plants exists on the island. The Mauritian population is comprised of people from European, Indian, African and Chinese origins mainly. According to The World Bank, from an economical perspective, Mauritius keeps growing in a positive way despite worldwide financial crisis (The World Bank, 2015).

2.2. Questionnaire design

The study questionnaire was comprehensively developed to investigate into the cosmetic uses of herbs as cosmetic applications. Questions were based on previous studies (Sreekeesoon and Mahomoodally, 2014; Ali and Yadav, 2015). An information sheet was given at the start of the questionnaire to explain and establish the aims and objectives of the survey, including definitions and examples of cosmetics. The questionnaire consisted of 22 structured open-ended and close-ended questions divided into sections. Section A included demographics such as age, gender, ethnicity, educational level, area of residence, monthly household income and occupation. Participants were asked information about their current state of health and the use of any herb as cosmetics in section B.

Respondents were requested to elaborate on the herbs used, cosmetic applications, parts used, length of use, procurement, method of preparation, mode of application, frequency of use, and any adverse effects experienced. Specifications on polyherbal (mixture of various herbs) preparations were also noted. Reasons for motivation, sources of information, cost, purity as well as possible replacement of usage of herbs as cosmetic applications were also requested from participants. Informants were asked to rate the effect of herbal products as cosmetics on a Likert scale of 0–10, where 0 was equivalent to no effect while 10 was equal to best effect ever. Similarly, the effectiveness of non-herbal cosmetics against herbal cosmetics too was estimated by the participants on a Likert scale of 1–5 whereby 1 represented not effective at all and 5 represented very effective. Questions regarding types of adverse effects experienced if any were sought. Likert scales were used to study the severity of damage due to adverse effects (severe, moderate, mild) and the length about the discontinuation in the practice of use of the herb in case of adverse effects encountered with options like 1 week, 1 month, 6 months, 1 year, >1 year, and never used. Lastly, participants were asked if they feel there is a rise or not in the use of herbs as cosmetics.

2.3. Data collection and field study

Approval for the project was granted by the Department of Health Sciences, Faculty of Science of the University of Mauritius. A total of 100 key informants were interviewed during the academic year 2015–2016. The choice of key informants was based upon purposive sampling which comprised of selecting key respondents in accordance with criteria which are already established (for example, herbal users) to obtain accurate information while answering the key questions (Samoisy and Mahomoodally, 2015).

Some of the interviews were performed during busy hours of common areas such as the traditional 'bazaars'. Personal visits were also undertaken to homes and indigenous health centers. Proper data was partly collected using the participatory rural appraisal method, as the key informants also became investigators themselves, participating in interviews, informal meetings, open and group discussions, and overt observations with the