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Journal of Ethnopharmacology xxx (2007) xxx–xxx
Journal of ETHNO-PHARMACOLOGY
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# Ethnotherapeautic management of skin diseases among the Kikuyus of Central Kenya

Grace N. Njoroge [a,*], Rainer W. Bussmann [1]

[a] *Jomo Kenyatta University of Agriculture and Technology, Botany Department, P.O. Box 62000, Nairobi, Kenya*

Received 21 July 2006; received in revised form 15 November 2006; accepted 19 November 2006

**Abstract**

Skin health is increasingly becoming an important aspect of primary health care among many communities particularly because of the increased challenge of HIV-AIDS, skin conditions being among the common opportunistic diseases in immuno-compromised individuals. This study investigated the use of traditional remedies in managing various skin conditions in the Central Province of Kenya. Fifty-seven plant species in 31 families were identified as regularly utilized. Of these plants 27 species had a frequency of three and above. Some of the highly utilized plant species include: *Croton megalocarpus* Hutch., *Senna didymobotrya* (Fresen.) Irwin & Barneby, *Vernonia lasiopus* O. Hoffm., *Croton macrostachyus* Del. and *Aloe secundifolia* Engl.

In the majority of the cases the sap or occasionally the latex was applied directly on the affected areas. In other cases the plant parts were heated and used as poultice. Only in few conditions were the plant parts boiled and the extract used for washing affected areas, probably acting as antiseptic. This study found that 14 skin conditions were commonly managed using herbal preparations. Of these conditions nine (9) had informant consensus of 0.5 and above, with the highest consensus found in management of swellings and skin sores. Soils were also cited as an important non-plant resource for management of skin conditions especially those associated with measles. Since most skin conditions are caused by microorganisms such as bacteria, viruses and fungi, the medicinal plants and other resources reported in this study form a justifiable basis for antimicrobial trials, pharmacological and phytochemical analysis, with promising results.


*Keywords:* Skin diseases; Traditional medicines; Informant consensus; Kenya

## 1. Introduction

The skin serves many functions particularly: protection, thermoregulation, percutaneaous absorption, secretory, and sensory. It has been estimated that skin diseases account for 34% of all occupational diseases (Spiewak, 2000). In some cases skin diseases cause severe stigmatization as in the case of Onchocercal skin disease (OSD) which occurs in rain forest areas of Africa (Vlassoff et al., 2000). The management of skin diseases in developing countries is complicated by the lack of training of most health care workers (HCWs) in taking care of skin and skin disorders because they are a large disease burden in most Sub-Saharan African countries (Mahé et al., 2006).

The management of skin diseases is becoming a priority due to the association of skin opportunistic infections and HIV/AIDS. Estimates show that 92% of HIV-infected individuals have cuteneous and mucosal complications (Geber-Miriam et al., 2006). In Kenya, 4 million people are known to be infected with HIV-AIDS, with about 750 individuals dying daily of AIDS-related diseases.

In developing countries there is an increasing attempt to incorporate traditional medicines, especially herbal preparations in the local health care systems. Several countries of Africa have realized the need to develop improved traditional medicines (ITMs) from local plants that are used traditionally for various ailments (Inngjerdingen et al., 2004). Non-plant resources have also been found to have therapeutic properties. Studies reveal the importance of humans interacting with soils due to the potentially beneficial organisms soils contain (Abrahams, 2005).

Traditional medicinal resources, especially plants, have been found to play a major role in managing dermatological conditions (Inngjerdingen et al., 2004; Ram et al., 2004;

* Corresponding author. Tel.: +254 67 52711; fax: +254 67 52164.
*E-mail addresses:* gnjerinjoroge@hotmail.com, gnjoroge@fsc.jkuat.ac.ke (G.N. Njoroge), rbussmann@natureandculture.org (R.W. Bussmann).
[1] Present address: The University of Texas at Austin, USA. Tel.: +1 808 349 7710; fax: +1 808 356 0452.

0378-8741/$ – see front matter © 2007 Published by Elsevier Ireland Ltd.
doi:10.1016/j.jep.2006.11.025

Geber-Miriam et al., 2006; Saikia et al., 2006). Efficacy trials show that some of the plants used in traditional medicine have antimicrobial, antiviral and anti-inflammatory effects (Hedberg et al., 1983; Okemo, 1996; Fabry et al., 1998; Inngjerdingen et al., 2004; Ram et al., 2004; Houghton et al., 2005; Geber-Miriam et al., 2006). Many traditional skin care remedies still need to be documented and their efficacies validated.

Local surveys in Kenya show that skin diseases take the third place in outpatient morbidity after malaria and respiratory diseases (MOHK, 2005). In Central Kenya however, skin diseases are among the most reported medical cases (Kammen and Dove, 1997). Although some ethnobotanical studies have been accomplished in Kenya, no systematic ethnotherapeutic studies have been undertaken to assess the traditional management of skin diseases in Central Kenya. The current study was undertaken to investigate the local peoples characterisation of skin diseases, and to document the traditional therapies applied for various skin conditions in order to target plants and other resources for validation through phytochemical, antimicrobial and pharmacological studies.

## 2. Materials and methods

### 2.1. Study site and subjects

The Central Province of Kenya covers the area around Mount Kenya, where most of the Kikuyus live. The total population is estimated at 3,724,159 inhabitants in an area of 13,191 $km^2$. Like other parts of Kenya, the use of traditional medicines has been on the increase in this region. In some cases the modern medical facilities are out of reach, with only one government hospital per district.

### 2.2. Data collection

This study focused on people who use traditional resources for self-medication with specific reference to skin diseases. Being a community that live near the Mount Kenya forest, it has been established in other parts of Africa that such communities possess authentic information on their utilisation of natural resources (Terashima, 2001; Kakudidi, 2004a, b). In Kenya just like some other African countries, self health-care using plants is a common practice and is known to yield authentic data (Gedif and Hahn, 2003).

The resource group was randomly selected from the local people in seven districts that make up Central Province: Thika, Murang'a, Kiambu, Maragwa, Nyandarua, Kirinyaga and Nyeri (Fig. 1). In total 60 respondents were interviewed on their traditional management of skin diseases after receiving their prior informed consent. Information on local names of the plants, non-plant therapeutics, ailments treated, mode of administration and preparation was recorded.

To systematically collect data on management of skin ailments in this region, questionnaires, semi-structured interviews, informal interviews and discussions with resource people were applied. These interviews included questions that target the local people's perception of names of the various skin diseases, the names of plants or non plant traditional resources used, parts of plants used, the methods used in preparation as well as methods used in application of the drugs. Interviews were also supplemented by participant observations during trips organised to collect skin ethnotherapeautic specimens.

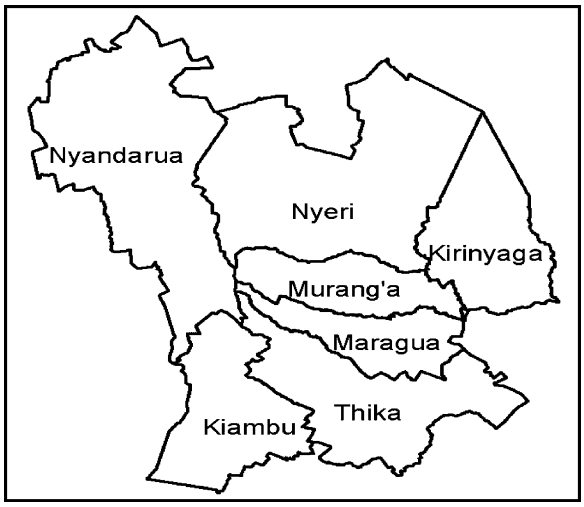


Fig. 1. Districts comprising Central Province of Kenya where field work was carried out.

The informant consensus factor has been viewed as an important indicator for important medicinal plant species for a given ailment. The informant consensus factor for each of the main ailments was calculated to give an indication of agreement in the kind of plant species utilized for each skin disease.

### 2.3. Plant collection and identification

Plants said to be useful in managing various skin diseases during the interviews were visually identified in the field by the respondents. Voucher specimens were collected in duplicate, using standard taxonomic/ethnobotanical procedures, particularly recording important features for identification in the herbarium. Each specimen included vital parts such as leaves, stems, flowers and fruits where available. For small herbaceous plants, whole plants were usually collected. For every specimen collected the vernacular names were also recorded. The specimens were dried in the herbarium and then mounted on sheets.

At the Jomo Kenyatta University herbarium, the collected plant materials were identified using the relevant local taxonomic literature. Identified specimens were then compared with species descriptions to ensure that there was reasonable agreement between the characters observed on the specimen and those provided by the descriptions of the plant it is presumed to be. Assistance in identification was sought from an experienced botanist (Mr Simeon Mathenge) of the University of Nairobi herbarium. The collections at Nairobi University herbarium as well as Jomo Kenyatta University herbarium were used to compare with the identified specimens.

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Table 1
Frequency of plant species in management of skin conditions in Central Kenya

| Species | Family | Kikuyu name | Frequency | Use | Method | District |
|---|---|---|---|---|---|---|
| *Agave sisalina* Perrine | Agavaceae | Mũkongo | 4 | Burns | Fibers used as bandage | Kiambu |
| *Aloe secundifolia* Engl. | Aloaceae | Mũgwanũgũ | 24 | Pimples, ringworm, skin rushes, warts and wounds | Sap from leaves | Kiambu, Maragwa, Nyandarua |
| *Aloe secundifolia* Engl. | Aloaceae | Mũgwanũgũ | 8 | Sores, burns, wounds | Leaves and stems beaten-up and applied directly | Maragwa, Thika, Nyeri |
| *Asparagus setaceus* (Kunth) Jessop | Asparagaceae | Rũrura | 7 | Boils | Leaves and stems beaten-up and applied directly | Muranga, Nyandarua Thilka |
| *Aspilia pluriseta* Schweinf. | Asteraceae | Muuti | 7 | Wounds and pimples | Sap applied directly | Muranga Thika |
| *Chenopodium opulifolium* Koch & Ziz. | Chenopodiaceae | Mũiganjo | 5 | Wounds | Bark and sap | Nyandarua, nyeri, Kiambu |
| *Conyza sumatrensis* (Retz.) E.H. Walker | Asteraceae | Mũrũnga anake | 4 | Pimples | Leaves, beaten-up applied on skin | Kiambu |
| *Croton macrostachyus* Del. | Euphorbiaceae | Mũtũndu | 12 | Sores, wounds, warts and ringworm | Sap from leaves and young twigs, applied directly | Muranga, Maragwa |
| *Croton megalocarpus* Hutch. | Euphorbiaceae | Mũkindũri | 9 | Wounds | Sap, topical application | Kiambu Nyandarua |
| *Cucumis aculeatus* Cogn. | Cucurbitaceae | Gakũngũi | 3 | Ringworm | Fruit juice topically applied | Kiambu |
| *Datura stramonium* L. | Solanaceae | Ndatura | 7 | Swellings on skin | Sap used as massage | Kiambu |
| *Dombeya burgesinae* Gerrard | Sterculiaceae | Mũkeũ | 4 | Ringworms | Sap | Kiambu |
| *Eucalyptus globulus* Labill. | Myrtaceae | Mũbaũ | 4 | Pimples and ringworms | Leaves boiled, patient bathed | Muranga Nyandarua |
| *Euphorbia candelabrum* Kotschy | Euphorbiaceae | Mũthũri | 7 | Wounds and warts | Latex topically applied | Kiambu, Muranga Nyandarua |
| *Euphorbia tirucalli* L. | Euphorbiaceae | Nyanjoye | 5 | Warts | Latex topically applied | Kiambu and Murannga |
| *Ficus sycomorus* L. | Moraceae | Mũgumo | 4 | Boils, scabies | Fruit juice topically applied | Nyeri, Nyandarua |
| *Kalanchoe densiflora* Rolfe | Crussulaceae | Mũhũithia | 7 | Swellings on skin | Leaves head and used as massage | Kiambu, Maragwa, Muranga and Nyeri |
| *Melia azardirachta* L. | Meliaceae | Mwarubaine | 4 | Skin rushes | Leaves boiled, patient bathed | Kiambu |
| *Plectranthus comosus* Sims | Lamiaceae | Mũigoya | 6 | Warts | Sap from young leaves, topically applied | Kiambu |
| *Prunus africana* (Hook.f.) Kalkm. | Rosaceae | Mũiri | 3 | Pimples, skin itches | Bark boiled, patient bathed | Kiambu, Nyandarua |
| *Rhoicissus tridentata* (L.f.) Wild & Drum | Vitaceae | Ndũrũtua | 5 | Pimples | Leaves boiled, patient bathed | Kiambu |
| *Ricinus communis* L. | Euphorbiaceae | Mũbarìki | 5 | Skin rushes | Oil from seeds, topical application | Muranga, Thika |
| *Senna didymobotrya* (Fresen.) Irwin & Barneby | Papillionaceae | Mwenũ | 9 | Pimples, scabies, warts, measles | Leaves boiled, patient bathed | Muranga, Nyandarua, Kiambu |
| *Solanum aculeastrum* Dunal | Solanaceae | Mũtũra | 6 | Ringworms, wounds | Fruit juice, sap from bark, topical application | Nyeri, Muranga |
| *Tagetes minuta* L. | Asteraceae | Mũbangi | 3 | Wounds | Sap, topical application | Kiambu, Nyeri |
| *Vernonia lasiopus* O.Hoffm. | Asteraceae | Mũchatha | 10 | Skin rushes, pimples, scabies | Leaves | Muranga, Maragwa, Nyandarua |
| *Zea mays* L. | Poaceae | Mbembe | 4 | Boils | Sap from young grains | Kiambu |

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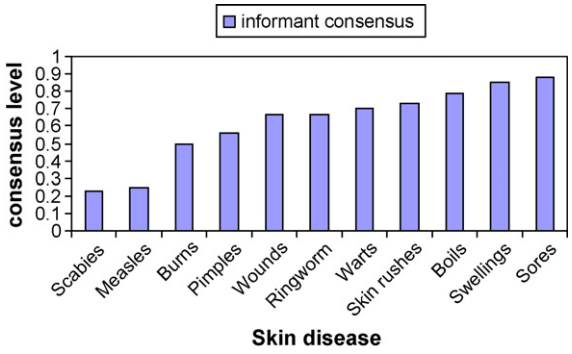


Fig. 2. Informant consensus in traditional management of skin diseases in Central Kenya. Calculation of informant consensus was adopted from Heinrich (2000) as: total number of times each skin disease was cited among the respondents ($n$) minus total number of species used in managing this diseases then divided by ($n - 1$). Maximum value = 1.0.

## 3. Results and discussion

The respondents in this study identified fourteen (14) different skin diseases which were managed through various traditional therapies, nine (9) of which had informant consensus of 0.5 and above (Fig. 2). This study found a total of 57 plant species in 31 families as regularly utilized in management of various skin conditions. Of these plants, 27 species had a frequency of three and above (Table 1). Some of the highly utilized plant species included: *Croton megalocarpus* Hutch., *Senna didymobotrya* (Fresen.) Irwin & Barneby, *Vernonia lasiopus* O.Hoffm., *Croton macrostachyus* Del. and *Aloe secundifolia* Engl. (Table 1).

In the majority of the cases the sap or occasionally the latex was applied directly on the affected areas. In other cases the plant parts were heated and used as poultice. Only in very few conditions were the plant parts boiled and the extract used for washing affected areas usually serving as antiseptics.

Skin diseases can be caused by a variety of microorganisms. Exemplary disorders caused by bacteria include: impetigo, ecthyma, pyoderma, anthrax, tuberculosis of the skin, folliculitis, furunculosis (boils), carbuncles and eczema dermatitis among others. The most common bacterial skin disease cited in this study was boils with informant consensus of 0.79. Some skin diseases caused by fungal infections include ringworms and candidiasis. In this study local people in Central Kenya used diverse plant preparations, especially for the management of ring worm, with informant consensus of 0.67. Viruses also affect the skin, causing ailments like measles, Herpes simplex, Herpes zoster, smallpox and warts. The commonest skin viral disease in this study was warts, whose informant consensus was quite high (0.7). Other skin conditions managed by traditional means in this area included different kinds of wounds with informant consensus of 0.67.

The commonest methods of preparing skin ethnotherapeautics in this region was direct topical applications of either sap, latex or macerated parts of the medicinal plants. In regard to all the skin conditions, the preparations were applied many times in a day until healing was evident.

Most of the plants in this study were reported for the first time in the management of skin diseases in this region. Some of the plant species used by other communities in Kenya for management of skin diseases have been investigated for their antimicrobial activity. In the case of *Erythrina abyssininca* DC for example, extracts from leaves were found to be active against *Salmonella aureus*, *Entero-cocci, Pseudomonas aeruginosa* and *Enterobacteriaceae* (Fabry et al., 1998). The diethylether extract of this plant contains flavonoids (antiviral activity) and triterpenoids (anti-inflammatory activity). Previous studies have also shown some plant extracts used in management of skin diseases in traditional communities possess antioxidant, haemostatic, analgesic properties as well as immune stimulating activities (Inngjerdingen et al., 2004; Houghton et al., 2005). Further work on the plants reported in this study should include such analysis.

Screening for active substances from the plants documented in this study and testing their activity against skin disease causing organisms forms an interesting subject for future studies. In this study soils from mole mounds were found to be used consistently for management of measles. Samples of these soils may have antiviral activities and need further investigations.

## Acknowledgments

This study would not have been completed without the cooperation of many respondents in Central Kenya whose help is here acknowledged. Part of the financial support came from BIOTA East Africa. Special thanks to Mr. Simon Mathenge of Nairobi University who helped with plant specimen identifications.

## References

Abrahams, P.W., 2005. Soils: their implications to human health. The Science of the Total Environment 291, 1–32.
Fabry, W., Paul, O.K., Ansorg, R., 1998. Antibacterial activity of East African medicinal plants. Journal of Ethnopharmacology 60, 79–84.
Geber-Miriam, T.G., Neubert, R., Schimdt, P.C., Wutzler, P., Schmidtke, M., 2006. Antiviral activities of some Ethiopian medicinal plants used for the treatment of dermatological disorders. Journal of Ethnopharmacology 104, 182–187.
Gedif, T., Hahn, H., 2003. The use of medicinal plants in self-care in rural Central Ethiopia. Journal of Ethnopharmacology 87, 155–161.
Hedberg, I., Hedberg, O., Madati, P., Mshigeni, K.E., Mshiu, E.N., Samuelsson, G., 1983. Inventory of plants used in traditional medicine in Tanzania. II. Plants of the family Dilleniaceae to Opilliaceae. Journal of Enthopharmacology 9, 105–128.
Heinrich, M., 2000. Ethnobotany and its role in drug development. Phytotherapy Research 14, 479–488.
Houghton, P.J., Hylands, P.J., Mensah, A.Y., Hensel, A., Deters, A.M., 2005. In vitro tests and ethnopharmacological investigations: wound healing as an example. Journal of Ethnopharmacology 100, 100–107.
Inngjerdingen, K., Nergard, C.S., Diallo, D., Mounkoro, P.P., Paulsen, B.S., 2004. An ethnopharmacological survey of plants used for wound healing in Dogonland, Mali, West Africa. Journal of Ethnopharmacology 92, 233–244.
Kakudidi, E.K., 2004a. Folk plant classification by communities around Kibale national Park, Western Uganda. African Journal of Ecology 42 (suppliment 1), 57–63.
Kakudidi, E.K., 2004b. Cultural and social uses of plants from and around Kibale national Park, Western Uganda. African Journal of Ecology 42, 114–118.
Kammen, D.M., Dove, M.R., 1997. The virtues of mundane science. Environment 39, 6.

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Mahe', A., Faye, O., N'Diaye, H.T., Ly, F., Konare, H., Keita, S., Traore, A.K., Hay, R., 2006. Definition of an algorithm for the management of common skin diseases at primary health care level in sub-Saharan Africa. Transactions of the Royal Society of Tropical Medicine and Hygiene 99, 39–47.

Ministry of Health, 2005. Kenya, Report-MOHK.

Okemo, P.O., 1996. Antimicrobial efficacy of selected medicinal plants used by Kenyan Herbal doctors. Ph.D. Thesis. Kenyatta University of Nairobi, pp. 173–190.

Ram, A.J., Bhakshu, L.Md., Raju, R.R.V., 2004. In vitro antimicrobial activity of certain medicinal plants from Eastern Ghats, India, used for skin diseases. Journal of Ethnopharmacology 90, 353–357.

Saikia, A.P., Ryakala, V.K., Sharma, P., Goswami, P., Bora, U., 2006. Ethnobotany of medicinal plants used by Assamese people for various skin ailments and cosmetics. Journal of Ethnopharmacology 106, 149–157.

Spiewak, R., 2000. Occupational skin diseases among farmers. In: Zagorski, J. (Ed.), Occupational and Para-Occupational Diseases in Agriculture. Institute of Agricultural Medicine, Lublin, pp. 42–152.

Terashima, H., 2001. The relationships among plants, animals, and man in the african tropical rain forest. Africa Study Monographs Supplement 27, 43–60.

Vlassoff, C., Weiss, M., Ovuga, E.B.L., Eneanya, C., Nwel, P.T., Babalola, S.S., Awedoba, A.K., Theophilius, B., Cole, P., Pegah, S., 2000. Gender and the stigma of onchocereal skin disease in Africa. Social Science & Medicine 50, 1353–1368.

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