

Use of medicinal plants for the treatment of oral diseases in Burkina Faso

Hadissa Tapsoba^{a,b,*}, Jean-Pierre Deschamps^b

^a *Ecole de Santé Publique, Faculté de Médecine, UPRES EA 3444, Vandoeuvre-lès-Nancy, France*

^b *Société Française de Santé Publique, Vandoeuvre-lès-Nancy, France*

Received 20 August 2001; received in revised form 22 June 2005; accepted 18 August 2005

Available online 7 October 2005

Abstract

This paper presents the findings of an investigation into the treatment of oral diseases with medicinal plants in the Kadiogo province, Burkina Faso. Although the region is mainly urban, it appears that traditional healers who live there, and the general population, continue to rely on plant products when dealing with a broad range of oral health concerns. Sixty-two relevant species belonging to 29 families were identified, and each was documented with regard to its local name, part used, indication, mode of administration, and the collection and storage procedure used (when those data were available). A number of ideas for research topics emerged from this work, some of which promise to help selection and prescription of improved traditional remedies for oral diseases at the primary health care level in Burkina Faso.

© 2005 Elsevier Ireland Ltd. All rights reserved.

Keywords: Burkina Faso; Medicinal plants; Oral diseases treatment and prevention; General population; Traditional healers

1. Introduction

Various studies in the vast and still growing literature on traditional medicine have reported (sometimes anecdotally among other findings) the indigenous use of medicinal plants in the treatment of oral diseases. Although oral health-related problems have not been particularly singled out for comment, it is clear that reliance on plant products for their management is common around the world. Publications are found on this topic not only in African countries such as Equatorial Guinea (Akendengue, 1992), Madagascar (Novy, 1997), and South Africa (Lin et al., 1999) but also other parts of the world including for instance Nepal (Manandhar, 1998), Guatemala (Hunter and Arbona, 1995), and Palestine (Ali-Shtayeh et al., 2000).

Nevertheless, the subject is poorly explored in some parts of the developing world, such as Burkina Faso. For example, a 1994 WHO workshop on traditional remedies held in Ouagadougou involved participants from Burkina Faso, Mali and Guinea. The

use of medicinal plants to treat toothache was reported from Mali and Guinea, but no information was available from Burkina Faso (Organisation Mondiale de la Santé, 1994).

Since the legalization of traditional medicine in the 1994 Public Health Code (Loi No 23/94/ADP du 19 Mai 1994 portant Code la Santé Publique, Article 143), much has been done in this field in Burkina Faso. Substantial portions of the new law were devoted to traditional remedies and their inclusion among “medicines and pharmaceutical products” (Article 208). Research into the pharmacopoeia has also been emphasized in order to promote the production and prescription of improved traditional remedies within the modern health system at the primary health care level (Article 324). Research on the improvement of traditional remedies has generally focused on leading causes of mortality such as malaria and AIDS. However, like other developing countries, Burkina Faso faces a considerable burden of non-communicable disease including oral disorders; there is also a dearth of related manpower (Tapsoba and Deschamps, 1997). New approaches of which possibly traditional medicine are therefore necessary.

The purpose of the present paper is to document the use of medicinal plants in the treatment of oral diseases in the Kadiogo province of Burkina Faso. The work is part of a larger investigation aimed at gaining insight into traditional medicine and oral health.

* Corresponding author at: Unité Sciences Sociales, Université du Luxembourg, Campus de Walferdange, BP 2 route de Diekirch, L-7201 Walferdange, Luxembourg.

E-mail addresses: hadissa.tapsoba@iserp.lu, hadissatapsoba@hotmail.com (H. Tapsoba).

2. Method

The use of medicinal plants to treat oral diseases was investigated in two groups of participants in the Kadiogo province.

Because of the geographical location in which the survey was conducted, the behaviors identified were almost exclusively reported by the dominant ethnic group in the area, namely the *Mossi* (although the same group predominates throughout the country).

The first group comprised 80 subjects aged 12–65 who took part in focus group discussions (FGD) in Balkoui, 1 of 17 villages in the province. The FGD approach encourages participants to express their thoughts and perceptions about a given topic without having to reach a consensus in order to gather information not easy to capture in structured interview. The study has been carefully prepared and planned with regard to the number of participants, number of groups and composition of each group (Krueger, 1994; Morgan, 1997; Stewart and Shamdasani, 1990). Additional information about plant use was gathered from key informants including elderly people who had family knowledge of plants without being healers, and people who had been cured of oral problems with medicinal plants.

The second major source of information was a group of 52 members of the Association of Traditional Healers and Herbalists of the province of Kadiogo (ATHKP). They were surveyed using semi-structured interviews within the framework of a larger investigation on traditional medicine in Burkina Faso. The 28 who had already dealt with oral diseases were asked about the names of the plants used.

All participants were questioned about collection and storage procedures, preparation of remedies, and duration of treatment. Plant names were initially recorded in two local languages (*Mooré* and *Dioula*) and then, following identification, using scientific nomenclature (Latin binomial and family). Glossaries of indigenous names were used (De La Pradilla, 1986; Kerharo and Bouquet, 1950; Nacoulma, 1996), and botanists at the National Herbarium, National Center for Scientific and Technical Research (*Centre National de Recherche Scientifique et Technologique, CNRST*) were consulted, particularly with regard to plant names recorded in *Dioula*.

Complementary information has been gathered on the use of plants to treat oral diseases elsewhere in the country. On the recommendation of the head of the traditional medicine department in the Ministry of Health, a traditional healer from Ziniaré, Oubritenga province, who is involved in research projects with investigators from the University of Ouagadougou provided a list of medicinal plants.

3. Results

Six medicinal plants specified by their local names could not be identified and are therefore not included here.

Forty medicinal plant species were mentioned by the healers and 34 by focus group discussion participants, with 17 species being common to both. Overall, 62 species belonging to 29 families were documented (Table 1). They were said to be effective in the management of at least one of the following oral health

concerns recorded in *Mooré*: toothache (*Yend-zabré*); gingivitis or bleeding gums (*Yend-ziim*); acute necrotizing gingivitis (*Yend-gniidou*); loose teeth (*Yend-vigsdem*); dental abscesses (*Yend-gnouri*); sores generally in the mouth (*Noo-noada*), also on the tongue and lips. The generic term “sores” also covered ulceration and aphthae.

Some plants were said to have also other indications, and some, like *Wilin-wiiga* (*Guiera senegalensis* JF Gmel.), were used as panaceas. According to the President of the ATHKP, this “universal” medicinal plant well known among the *Mossi* ethnic group was given by God to the humans at the beginning of the World. All parts of *Wilin-wiiga* from the aerial parts to the roots are thought to be effective when used to both prevent and cure several health problems. The President of the Association said that a healer who is unable to diagnosis an illness or specify a remedy can always recommend this plant to the patient and be sure of recovery.

It should be noted that although traditional healers often claimed that dealing with oral diseases did not involve spiritual and magical practices, one of them withheld permission to reproduce his recipes as incantations were necessary at some point during the healing procedure, from collection of raw materials to preparation and administration of remedies.

Plants were mostly available all year round. The harvest sometimes involved elements of ritual, and the best time for collection was generally considered to be in the early morning before sunrise or at sunset. Because of travel difficulties and financial constraints, rather than going to the bush most of the healers bought their raw materials at a large specialist market called *Boins Yaaré* in Ouagadougou. FGDs participants reported that medicinal plants generally cost anything and there was no need to walk long distances as most species could be found in nearby bush.

The principal plant parts used in remedies were fresh or dried roots, stems, leaves, and bark. Bark was often taken from the trunk of the tree, preferably from the side facing the rising sun (East) and the opposite side (West). Plant materials were used in various ways, but decoction was generally the method of choice, with vegetable material often being boiled for drinking, mouth-washing, gargling or inhalation.

Plants were used either alone or in association with other species. For instance: decoction made with roots of *Capparis tomentosa* Lam., *Cassia sieberiana* DC. and *Indigofera tinctoria* L. is used for mouthwash against toothache.

They were also combined with animal or mineral material, most commonly including pieces of bone and stones. Adding some substances was thought to augment the power of a remedy, and the general rule of thumb was to add things like stones or cowry shells in culturally significant numbers (three for a male and four for a female). The amount of raw vegetable material was calculated on a similar basis.

In the past, plant products or remedies were stored in clay pots or leather bags, but bottles, plastic bags, glass flasks, and metal boxes may now be used.

Participants pointed out contraindications associated with certain plants, such as the need to avoid particular food items during the treatment period. As a traditional healer said, some meat,

Table 1
Medicinal plants used to treat oral diseases in the Kadiogo Province, Burkina Faso

Plant name (Family, Latin binomial, local <i>Mooré</i> (<i>Dioula</i>) name)	Source of information		Part used	Indications	Utilization
	Traditional healers (<i>N</i> = 52)	Focus groups discussions (<i>N</i> = 80)			
Amaranthaceae, <i>Alternanthera pungens</i> H.B. & Kunth., Sibgpoonré	X		Leaves	Gingivitis	Dried leaves are pounded with millet flour and the powder is applied to affected gums until recovery.
Anacardiaceae, <i>Lannea acida</i> A.Rich., Sabtulga		X	Bark, leaves	Toothache	Bark decoction is used as regular mouthwash until recovery. Dried leaves are powdered and put in the cavity of a decayed tooth.
Anacardiaceae, <i>Lannea microcarpa</i> Eng. K.Krause, Sabga		X	Leaves	Prevention	Regular consumption of a leaf decoction in the form of a beverage is said to protect against oral diseases.
			Bark	Toothache	Against toothache, the bark is boiled with indigenous salt and the decoction is used as a mouthwash whenever the teeth are painful.
Asclepiadaceae, <i>Calotropis procera</i> (Ait) Ait.f., Putrepuugu	X	X	Roots	Toothache	The roots are boiled with white stones and cowry shells and only the decoction is used as a mouthwash to alleviate the pain until recovery.
Balanitaceae, <i>Balanites aegyptiaca</i> (L) Del., Kyeguelga	X	X	Fruit	Toothache, gingivitis	Powder obtained by crushing and storing the pit is applied to the bleeding gums or inserted into the cavity of the painful tooth three times per day until recovery.
			Leaves	Toothache	Leaves are boiled alone or with white stones and the decoction is drunk to alleviate pain.
			Bark	Loose tooth	To strengthen a loose tooth, trunk bark is taken from opposite sides (generally East and West) and mixed with “ <i>Zimm</i> ” (a preparation made from ash that is also used as a food-stuff) and white stones before being brought to the boil. The warm decoction is used for regular mouthwashes and reheated before each application.
Bombacaceae, <i>Adansonia digitata</i> L., Tohèga	X	X	Leaves	Toothache, gingivitis	Dried leaves are stored for 1–2 years in an airtight container (box or plastic bag) and then pounded and strained. A pinch of the resulting powder is applied sparingly to the gum or put into the cavity of the decayed tooth until complete recovery. Some healers recommend adding a dried snail shell before pounding the leaves.
			Flowers, bark	Tooth extraction	Dried or burned flowers may be stored for some time. To extract a “dead” tooth, a pinch of powder made from the flowers and put into the decayed tooth was said enough to remove the tooth within 1 day. A mouthwash made from boiled bark is prescribed when the tooth to extract is painful or for the disintegration of a decayed tooth, despite some sides effects such as the risk of loosing other teeth — even healthy ones. Some participants said the efficacy of the remedy could be improved by collecting trunk bark from two opposite sides (generally East and West), or sticking a needle in the trunk before taking the bark.
Bombacaceae, <i>Ceiba pentandra</i> (L.) Gaertn., Gounga	X		Bark	Sores, gingivitis	Mouthwash with decoction until recovery.

Table 1 (Continued)

Plant name (Family, Latin binomial, local Mooré (Dioula) name)	Source of information		Part used	Indications	Utilization
	Traditional healers (N = 52)	Focus groups discussions (N = 80)			
Burseraceae, <i>Boswellia dalzielii</i> Hutch, Gondregneogo	X	X	Bark, roots	Toothache, gingivitis sores	Dried bark can be stored for about 5 years and is available in the markets all year round. A decoction is made with either bark or roots. Bark is placed in a clay pot, covered with water and brought to the boil in order to prepare a decoction to be used in the form of inhalation and gargles twice a day for 2–10 days. It can be also drunk as tea to treat sore throat and sinusitis. Honey may be added as a sweetener and to improve drug efficacy. The remedy should be stored for no more than 1 week. To treat abscesses, warm soaked compresses of the remedy are applied externally on the swelling. Cold beverages must be avoided during the treatment period.
Burseraceae, <i>Commiphora africana</i> (A. Rich.) Engl., Saag-Noabga		X	Leaves	Tooth extraction	A decoction is made with leaves plus some <i>Zimm</i> and white stones. The decayed tooth is generally lost after one mouthwash, but the treatment may be repeated if necessary.
Capparidaceae, <i>Capparis tomentosa</i> Lam., Lamboitega	X	X	Roots	Toothache	Associated with roots of <i>Cassia sieberiana</i> DC and <i>Indigofera tinctoria</i> L. Decoction for mouthwash.
Caesalpiniaceae, <i>Bauhinia rufescens</i> Lam., Ti-pohèga	X		Leaves	Gingivitis	Decoction for mouthwash
Caesalpiniaceae, <i>Bauhinia thonningii</i> Schum., Baagd yanga		X	Roots	Gingivitis	Particularly indicated for necrotizing gingivitis. A root decoction is used as a mouthwash until recovery. According to one healer, the remedy is more effective when cowry shells are placed on the ground around the plant before the roots are collected.
Caesalpiniaceae, <i>Cassia nigricans</i> Vahl, Zandre Kuka		X	Leaves	Toothache	Available only during the rainy season. Leaves and <i>Zimm</i> are boiled and the warm decoction is used as a mouthwash.
Caesalpiniaceae, <i>Cassia siamea</i> Lam., Cassia		X	Leaves	Toothache	Boiled for inhalation
Caesalpiniaceae, <i>Cassia sieberiana</i> DC., Kumbrisaka	X		Fresh leaves	Sores	Fresh leaves are crushed and mixed with shea butter and the paste is applied to sores overnight after meals for 3 days. This remedy can be stored for several years in an airtight container.
			Roots	Toothache Gingivitis	Dried roots can be stored for long periods. For the treatment of toothache and gingivitis, the roots are boiled for inhalation twice a day (morning and evening) for 3 days. For each inhalation, the necessary amount is taken in the pot. The vapors are inhaled by placing the patient's mouth above the container and covering his head with a blanket.
			Leaves	Prevention	Leaves boiled for regular drinking were said to be highly protective against oral diseases.
Caesalpiniaceae, <i>Cassia singueana</i> Del., Gielpoonsré		X	Leaves	Toothache	Leaves are boiled with white stones to make a mouthwash.
Caesalpiniaceae, <i>Daniellia oliveri</i> (Rolfe) Hutch. & Dalz., Aoga (sana yiri)	X	X	Bark, leaves	Toothache, gingivitis, sores	A leaf decoction is used as a gargle.

Table 1 (Continued)

Plant name (Family, Latin binomial, local Mooré (Dioula) name)	Source of information		Part used	Indications	Utilization
	Traditional healers (N = 52)	Focus groups discussions (N = 80)			
Caesalpiniaceae, <i>Tamarindus indica</i> L., Pousga	X		Leaves	Sores	The bark decoction is prepared in combination with the bark of <i>Pseudocecrela kotschyi</i> (Schweinf.) Harms and <i>Boswellia dalzielii</i> Hutch. A portion of the remedy is taken in the form of drink, at least two glasses per day, while the rest is used for mouth rinsing and inhalation. The mixture can be stored for 7 days. During the treatment period, water is added regularly and the mixture reheated. According to one traditional healer, some meat, including caiman, are forbidden during the treatment period. If possible, it is wise to never eat such meat as it is perceived as being a major cause of oral diseases. Leaves are boiled as a mouthwash to heal lesions. Bark decoction is recommended to relieve tooth pain.
			Bark	Toothache	
Caricaceae, <i>Carica papaya</i> L., Papaye		X	Leaves	Toothache	Boiled for inhalation.
Celastraceae, <i>Maytenus senegalensis</i> (Lam.) Exell., Tokvouгри	X		Bark, roots, leaves	Toothache, gingivitis, sores	Bark and leaves are dried separately, pounded and strained. The fine powder obtained is stored in bottle or other airtight container and used during at least 5 years. In cases of gingivitis or sores, a small amount of the powder is rubbed onto the painful site twice a day (morning and evening) until recovery, generally for about 7–10 days. A decoction of roots and leaves is prepared and stored only for the treatment period, namely 2–3 days. It is used for inhalations and mouthwashes, generally in the morning on waking and after the evening meal to relieve pain. A bark decoction is also used a gargle until recovery from pain. Childhood signs of <i>Naboré</i> (Noma or cancrum oris) or Yend-gniidou (necrotizing gingivitis) are serious, with heavily bleeding gums and very bad breath. In such cases, the dried leaves are pounded and the powder is applied to the affected sites in order to immediately stop the bleeding and cure the sores.
Combretaceae, <i>Anogeissus leiocarpus</i> (DC.) Guill. & Perr., Siiga	X		Resin, leaves	Toothache	A handful of resin is placed in a pot with a tightly closed cover and macerated with three or four cups of water and indigenous salt for 7 days before filtration. Cotton wool soaked with the resulting solution is put in the diseased tooth to relieve pain. One application is generally sufficient. Other products can be added to the pot before maceration. A pinch of dried and powdered leaf is put into the cavity in case of pain.
			Roots, bark	Gingivitis, sores	Roots and bark can be stored for several years when dried and powdered separately. Root powder can be boiled and the liquid used to clean gums or sores. Alternatively, a pinch of powder can be applied to sores or bleeding gums twice a day after eating in the morning and at night for a maximum of 10 days.

Table 1 (Continued)

Plant name (Family, Latin binomial, local Mooré (Dioula) name)	Source of information		Part used	Indications	Utilization
	Traditional healers (N = 52)	Focus groups discussions (N = 80)			
Combretaceae, <i>Combretum micranthum</i> G. Don, Randega	X		Twigs	Oral hygiene	Used as toothbrush for mouth and teeth cleaning
Combretaceae, <i>Guiera senegalensis</i> JF Gmel., Wilin-wiiga	X	X	Stems	Abscess, toothache	Stem bark is boiled with black stones to make a mouthwash for use until the abscess matures. Toothache is treated with a mouthwash.
			Leaves	Sores (tongue and lips)	Often used with leaves of <i>Parkia biglobosa</i> (Jacq.) R. Br. Ex G. Don. for a decoction to relieve sores.
Combretaceae, <i>Pteleopsis suberosa</i> Engl. & Diels., Guirgo	X		Bark	Gingivitis	Bark is dried, pounded and brought to the boil to produce a mouthwash for the treatment of bleeding gums.
Ebenaceae, <i>Diospyros mespiliformis</i> Hochst ex A. DC., Ganka	X	X	Leaves	Toothache	Dried leaves are stored in plastic bags before being boiled with white and black stones. The remedy may be stored for no more than the treatment duration, namely 3 days for men and 4 days for women.
			Bark	Toothache, sores	Bark decoction for inhalations and mouthwash twice a day. According to one traditional healer, the mouthwash results in the expulsion of worms responsible for oral diseases, which can then be observed in the liquid.
				Gingivitis	Dried, pounded and strained bark can be stored for several years. To treat gingivitis, it is necessary to rub the gums until they bleed and then apply a pinch of the powder to the painful area after morning and evening meals for 7 days.
Fabaceae, <i>Albizia lebbek</i> (L.) Benth., Acacia		X	Leaves	Toothache	A leaf decoction is used for inhalation.
Fabaceae, <i>Indigofera tinctoria</i> L. Garga	X	X	Roots, leaves	Toothache, gingivitis, sores	Roots are pounded in a mortar with a little water, salt and <i>soumbala</i> (a foodstuff made with <i>Parkia biglobosa</i>) and made into small pieces. When dried, the resulting pellets can be stored for about 6 months. They are placed in the cavity to relieve dental pain. Leaves and roots can be also dried and stored in plastic bags for several months. A decoction can then be made with tobacco (<i>Nicotiana tabacum</i> L.) leaves or powder and used as a gargle twice a day after meals for 7–10 days. Fresh roots are boiled to make a mouthwash for relief of toothache.
Fabaceae, <i>Pterocarpus erinaceus</i> Poir. Noèèka (Gbinnin-yiri)	X	X	Bark	Toothache	Trunk bark from two opposite sides is boiled with cowry shells for inhalation and gargles.
Lamiaceae, <i>Hyptis spicigera</i> Lam., Rung rungu		X	Leaves	Toothache	A small quantity of crushed leaves is put in a spoon with water and set aside for a while. The patient lies on his back for administration. To alleviate tooth pain located on the right side, the remedy is introduced into the left nostril, and vice versa for pain on the left.
Meliaceae, <i>Azadirachta indica</i> A. Juss., Neem	X	X	Twigs	Oral hygiene	Used as chewing-sticks for mouth and teeth cleaning
Meliaceae, <i>Khaya senegalensis</i> (Desr.) A. Juss., Kouka	X	X	Bark	Toothache	Used either fresh or dried. Fresh bark is boiled with salt and used in the form of inhalation followed by a mouth rinse twice a day for 4 and 3 days, respectively for women and men. The remedy should be stored for no longer than the treatment duration.

Table 1 (Continued)

Plant name (Family, Latin binomial, local Mooré (Dioula) name)	Source of information		Part used	Indications	Utilization
	Traditional healers (N = 52)	Focus groups discussions (N = 80)			
				Toothache, gingivitis sores (mouth, tongue)	Dried bark is used in two ways. It can be boiled with lemon or tamarind (<i>Tamarindus indica</i> L.) fruits to produce a decoction that is then stored in bottles in a cool place for about 1 year. This mixture is used to wash bleeding gums or sores twice a day for 7 days. Alternatively, dried bark can be pounded, mixed with salt and red pepper and then strained. A small amount of water is added to make a paste that is formed into small pieces, dried and placed into the cavity of the painful tooth. The remedy is taken whenever the person feels the pain. Bark boiled alone or with <i>Zimm</i> is used to make a gargle to alleviate tooth pain.
Meliaceae, <i>Pseudocedrela kotschy</i> (Schweinf.), Harms Siguédre	X	X	Leaves, roots	Toothache, gingivitis	Leaves are dried and stored. The leaf decoction is used as a gargle and for inhalation. The root decoction is stored in a tightly closed pot for at least 1 month or strained and stored in bottles for several months and then reheated when needed for inhalation. In both cases, the treatment is administered for 3–4 days or until recovery. Hot pepper and bitter food are proscribed during the treatment.
			Twigs	Oral Hygiene	To alleviate toothache, a leaf decoction used in the form of mouth rinse is prepared in combination with <i>Boswellia dalzielii</i> Hutch leaves. A well-known oral hygiene product, the twigs are used as chewing-sticks. Siguédre is also the generic name for chewing-sticks among the Mossi ethnic group.
Meliaceae, <i>Trichilia emetica</i> Vahl, Kinkirs-Taanga	X		Roots	Sores	A root decoction is used as a gargle until recovery.
Mimosaceae, <i>Acacia nilotica</i> var. <i>adansonii</i> (Guill. & Perr.) O. Ktze., Peg-nenga	X		Fruit, bark, leaves	Toothache, gingivitis, sores	The fresh fruit is peeled and crushed together with bark. The resulting mixture may be stored for 4–6 months. The remedy is rubbed sparingly onto the gum or put in the painful tooth every morning before breakfast for 3–4 days or until pain relief is obtained. Some healers recommend avoiding consumption of groundnuts during the treatment period. Dried fruit is added to bark from the mango tree (<i>Mangifera indica</i> L.) and <i>Zimm</i> before pounding and straining. The result can be stored for around 5 years. A pinch of the powder is put in the decayed tooth cavity or rubbed onto gums and sores twice a day for 7–10 days after meals. A decoction of fruits and leaves is used as a mouthwash to treat gingivitis. A bark decoction prepared in a clay pot is used as a mouth rinse for 3 or 4 days for males and females, respectively. A decoction can be also prepared with leaves of <i>Pseudocedrela kotschy</i> (Schweinf.) Harms.
Mimosaceae, <i>Parkia biglobosa</i> (Jacq.) R. Br. Ex G. Don. Roaaga	X		Bark	Toothache	Fumigation made with bark is prescribed to relieve pain. Treatment is repeated until recovery.

Table 1 (Continued)

Plant name (Family, Latin binomial, local Mooré (Dioula) name)	Source of information		Part used	Indications	Utilization
	Traditional healers (N = 52)	Focus groups discussions (N = 80)			
Mimosaceae, <i>Acacia seyal</i> Del., Gon-miougou	X		Bark, leaves	Toothache	A decoction made with bark or leaves is used as a mouthwash to alleviate tooth pain.
Mimosaceae, <i>Prosopis africana</i> (Guill. & Perr.) Taub., Seinga		X	Bark	Gingivitis	Dried bark is pounded and applied to bleeding gums
Mimosaceae, <i>Acacia macrostachya</i> Reichenb. ex Benth., Guembaogo		X	Leaves	Toothache	Leaves are boiled with white and black stones to make a mouthwash that is used until recovery. The decoction can be also prepared with leaves alone.
Mimosaceae, <i>Acacia senegal</i> (L.) Willd., Gon-pèelga		X	Leaves, thorns	Toothache	Young leaves and thorns are combined with leaves of <i>Diospyros mespiliformis</i> Hochst ex A. DC. (three or four handfuls of each) and boiled with a black stone. The result is used for inhalations followed by gargles, three or four times until the symptoms disappear.
Moraceae, <i>Ficus iteophylla</i> Miq., Kunkwi-pèlega (djètigui-faaga)	X		Leaves	Toothache	The decoction is used as a mouthwash.
Moraceae, <i>Ficus platyphylla</i> Del., Kamsaogo		X	Roots	Tooth extraction	Roots are boiled with white stones and cowry shells for inhalation and mouthwashing. Tooth loss generally occurs after 3 months of treatment
Moraceae, <i>Ficus gnaphalocarpa</i> (Miq.) Steud. ex A. Rich., Kankanga	X		Bark	Sores	The decoction is used as a mouthwash.
Myrtaceae, <i>Eucalyptus camaldulensis</i> Dehnhardt, Eucalyptus		X	Bark, leaves	Toothache	Material is boiled and the vapors are inhaled with the person's head covered.
Olacaceae, <i>Ximenia americana</i> L., Leenga	X	X	Leaves, roots, bark	Toothache Gingivitis, sores	To treat toothache, the roots are boiled with red and white stones for inhalation. Some healers advise against gargling because of the risk of losing other teeth, even healthy ones. Inhalations made by boiling together fresh leaves and roots can be administered twice a day for 7 days. Storage is limited to the treatment period. Dried leaves and roots can be stored for some time. To treat gingivitis and mouth lesions, the dried leaves are boiled with white stones. Twice a day after meals, a gargle is followed by inhalation with the patient's head covered with a white blanket. Treatment is for 3 or 4 days according to sex. The root decoction is used as a mouthwash. Root and bark decoctions are used as a gargle until recovery. Some traditional healers say secret words when taking bark.
Poaceae, <i>Cymbopogon giganteus</i> Chiov., Kuwaré	X		Roots flowers	Toothache, gingivitis, sores (mouth, tongue, lips)	A portion of fresh root decoction is used hot for inhalation, and the remainder is used as a warm mouthwash for at least 7 days. Roots, alone or with flowers, can be dried, stored and used for about 5 years. A decoction made from the fresh material may be stored for no more than 1 week. Dried roots, with or without flowers, are crushed and a pinch of the powder applied on the painful area (tooth, bleeding gums or sore) once or twice a day until symptoms disappear.
Poaceae, <i>Zea mays</i> L., Kamaana	X		Flowers	Toothache	The decoction made with flowers, indigenous salt and white stones is used as a mouthwash.

Table 1 (Continued)

Plant name (Family, Latin binomial, local Mooré (Dioula) name)	Source of information		Part used	Indications	Utilization
	Traditional healers (N = 52)	Focus groups discussions (N = 80)			
Polygalaceae, <i>Securidaca longepedunculata</i> Fres., Pelga	X		Roots	Gingivitis, sores	Dried roots are pounded and stored for around 5 years. To alleviate bleeding gums and sores, the powder is applied to the affected part once a day until recovery.
Rhamnaceae, <i>Zizyphus mucronata</i> Willd., Kimees munung-toogo		X	Roots	Toothache	Roots are boiled with indigenous salt to make an inhalation and mouthwash that is used until recovery.
Rubiaceae, <i>Gardenia ternifolia</i> Schum. & Thonn., Lambre zungu	X	X	Bark, roots	Disintegration of a diseased tooth	For use when there is a cavity. The bark, which must be collected with a stone, is pounded in a mortar with <i>soumbala</i> and indigenous salt that has been dried and crushed. The fine powder is put inside the cavity 2–3 times until the diseased tooth disintegrates.
Rubiaceae, <i>Mitracarpus villosus</i> (Sw.) DC., Yod-pèelga	X		Leaves	Lip sores Toothache	The root decoction is used to treat sores. The decoction is used as a mouthwash.
Sapotaceae, <i>Vitellaria paradoxa</i> CF Gaertn., Taanga	X	X	Bark	Abscess Toothache	Trunk bark is taken from two opposite sides. Bones (preferably from beef) and red pepper (three or four of each according to sex) are placed between two large pieces of bark and covered with <i>Zimm</i> before being brought to the boil. The warm mixture is stored in a clay pot and used for regular mouthwashing until the abscess matures. For toothache, the bark is boiled with white stones and crushed bones and used as a warm gargle. Bark is said to be more effective when removed from a tree that has fallen naturally rather than one that has been intentionally collected (by a person).
Scrophulariaceae, <i>Striga senegalensis</i> Benth., Waango	X		Leaves	Gingivitis, sores	A decoction with roots of <i>Ximenia americana</i> L. and tobacco leaves is used as a mouthwash. <i>Zimm</i> may be added.
Solanaceae, <i>Nicotiana tabacum</i> L., Taba	X	X	Leaves	Toothache, gingivitis	Leaves are stored dried or powered. Used alone, a pinch of tobacco powder placed in the cavity of a painful tooth or on bleeding gums will immediately alleviate the ailment. Mixed with <i>Zimm</i> and shea butter, a small amount is regularly applied to the painful area until recovery. Fresh leaves can be boiled with <i>Zimm</i> to make a mixture that should not be stored for more than 6 months. Cotton wool impregnated with this product is put into the cavity twice a day (morning and evening) for a maximum of 7 days or whenever the person feels the pain.
Sterculiaceae, <i>Sterculia setigera</i> Del. Ponsemporgo	X		Bark	Toothache, gingivitis sores Abscess	Bark is used either fresh or dried. Dried bark can be stored for some time. Boiled bark makes an inhalation or mouthwash for use twice a day for 2–3 days. The hot decoction can be also drunk, when it is said also to be effective against sore throat and sinusitis. In case of abscess, a piece of boiled bark is lightly rubbed on the swelling cheek on a regular basis until the abscess matures.

Table 1 (Continued)

Plant name (Family, Latin binomial, local <i>Mooré</i> (<i>Dioula</i>) name)	Source of information		Part used	Indications	Utilization
	Traditional healers (N = 52)	Focus groups discussions (N = 80)			
			Twigs	Oral hygiene	Twigs are used as chewing-sticks to clean teeth.
Sterculiaceae, <i>Waltheria indica</i> L., Yaar yamdé ^b	X		Roots	Toothache, gingivitis sores	Roots are boiled with roots of <i>Securidaca longepedunculata</i> Fres. to make a decoction that is warmed and used for mouth rinsing and inhalation for 3–7 days in order to relieve pain.
Verbenaceae, <i>Stachytarpheta indica</i> (L.), Vahl Kienga zouia		X	Stems	Pain after tooth mutilation	Stems are boiled to make a gargle to alleviate the pain of cultural tooth mutilations.
Verbenaceae, <i>Vitex doniana</i> Sweet., Andga	X		Roots	Toothache, sores	The decoction is used as a mouthwash.

including caiman, are forbidden during the treatment period, particularly when *Daniellia oliveri* (Rolfe) Hutch. & Dalz. is used against toothache or gingivitis.

Medicinal plants used to treat oral diseases in the Kadiogo province are alphabetically listed by their family name in Table 1.

In addition, the traditional healer of Ziniaré, Oubritenga province, provided the following list of medicinal plants:

- *Pteleopsis suberosa* Engl. & Diels (Girga) is said to effectively strengthen loose teeth.
- For toothache, it is recommended that a root decoction of the following plants be used as a mouthwash or for vapor inhalation: *Acacia pennata* (L.) Willd. (Kaongo); *Acacia ataxacantha* DC (Goanga); *Balanites aegyptiaca* (L.) Del. (Kyequelga); *Mimosa pigra* L. (Koul-Kanka); *Diospyros mespiliformis* Hochst. ex A. DC. (Ganka); *Ximenia americana* L. (Leenga); *Fagara zanthoxyloides* Lam. (Rapéko), *Indigofera tinctoria* L. (Garga); *Acacia macrostachya* Reichenb. ex Benth. (Karidga). Leaf decoctions made with papaya (*Carica papaya* L., Caricaceae) or potatoes (*Ipomoea batatas* (L.) Lam., Convolvulaceae) also help with toothache. When chewed, the leaves of *Psidium guajava* L. (Myrtaceae) and the fruit of *Ziziphus mucronata* Willd. (Rhamnaceae) (Kims mugntoogo) relieve pain.
- Gingivitis can be treated with the seeds of *Acacia nilotica* var. *adansonii* (Guill. & Perr.) O. Ktze. (Peg-nenga), which are burnt, crushed and then applied to the gums. Bark decoctions of *Acacia macrostachya* Reichenb. ex Benth. (Karidga) or *Khaya senegalensis* (Desr) A. Juss. (Kouka) may be used as a mouthwash against bleeding gums.

4. Discussion

The findings of this study indicate that in Kadiogo province both the general population and traditional healers continue to rely on remedies made with vegetable materials (often augmented with mineral or soil components) for the management of oral diseases. Sixty-two medicinal plants species belonging to 29 families were identified as being in current use.

Six of the plants cited belonged to the list of endangered species established by the Association of Traditional Healers and Herbalists of the province of Kadiogo, i.e. Leenga (*Ximenia americana* L.), Kuwaré (*Cymbopogon giganteus* Chiov.), Gondregneogo (*Boswellia dalzielii* Hutch), Lamboitega (*Capparis tomentosa* Lam.), Kinkirs-Taanga (*Trichilia emetica* Vahl), and Pelga (*Securidaca longepedunculata* Fres.).

Given the great number of ethnic groups in Burkina Faso, it would be interesting to explore potential ethnic diversity in coping with oral diseases, among both general populations and traditional healers.

In the meantime, complementary information has been gathered on the use of plants to treat oral diseases in the Oubritenga province. It was of interest to discover additional indications for some of the plants identified in the Kadiogo survey, and to hear of other species used to treat oral diseases. These findings underline the need to extend investigations such as this nationwide and to other developing countries.

The present study highlighted a number of potential research topics for the future, particularly regarding the selection and prescription of improved traditional remedies for oral diseases at the primary health care level. This would be in accord with the ongoing National Policy on Traditional Medicine in Burkina Faso.

Acknowledgments

This paper is a tribute to my father, Tapsoba Sibiri Johnson (In Memoriam).

The authors wish to thank the “Association des Tradipraticiens et Herboristes de la Province du Kadiogo” as well as the Community of Balkoui for sharing their knowledge. Thanks are also due to the staff of the National Herbarium (Centre National de Recherche Scientifique et Technologique, CNRST) for their assistance.

References

- Akendengue, B., 1992. Medicinal plants used by the Fang traditional healers in Equatorial Guinea. *Journal of Ethnopharmacology* 37, 165–173.

- Ali-Shtayeh, M.S., Yaniv, Z., Mahajna, J., 2000. Ethnobotanical survey in the Palestinian area: a classification of the healing potential of medicinal plants. *Journal of Ethnopharmacology* 73, 221–232.
- De La Pradilla, C.F., 1986. *Plantes Médicinales Vendues sur les Marchés de Ouagadougou*, 3rd ed. Librairie Jeunesse d'Afrique, Ouagadougou.
- Hunter, J.M., Arbona, S.I., 1995. The tooth as a marker of developing world quality of life: a field study in Guatemala. *Social Science and Medicine* 41, 1217–1240.
- Kerharo, J., Bouquet, A., 1950. *Plantes Médicinales et Toxiques de la Côte d'Ivoire-Haute-Volta*. Vigot Frères, Paris.
- Krueger, R.A., 1994. *Focus Groups: A Practical Guide for Applied Research*. Sage Publications, London.
- Lin, J., Opoku, A.R., Geheeb-Keller, M., Hutchings, A.D., Terblanche, S.E., Jager, A.K., van Staden, J., 1999. Preliminary screening of some traditional zulu medicinal plants for anti-inflammatory and anti-microbial activities. *Journal of Ethnopharmacology* 68, 267–274.
- Manandhar, N.P., 1998. Native phytotherapy among the Raute tribes of Dadeldhura district, Nepal. *Journal of Ethnopharmacology* 60, 199–206.
- Morgan, D.L., 1997. *Focus Groups as Qualitative Research*, 2nd ed. Sage Publications, Newbury Park, CA.
- Nacoulma, O.G., 1996. *Plantes Médicinales et Pratiques Médicales Traditionnelles au Burkina Faso. Cas du plateau central, Tome II & I*. Doctorat d'Université, Université de Ouagadougou.
- Novy, J.W., 1997. Medicinal plants of the eastern region of Madagascar. *Journal of Ethnopharmacology* 55, 119–126.
- Organisation Mondiale de la Santé, 1994. *Rapport du Premier Atelier Inter Pays sur les Médicaments Traditionnels (Burkina Faso-Guinée-Mali)*. OMS, Ouagadougou.
- Stewart, D.W., Shamdasani, P.N., 1990. *Focus groups. Theory and Practice*. Sage Publications, Newbury Park, CA.
- Tapsoba, H., Deschamps, J.P., 1997. La santé bucco-dentaire dans le système national de santé au Burkina Faso [Oral health within the national health system of Burkina Faso]. *Cahier Santé* 7, 317–321.