An Overview of Herbal Traditional Eye Care Practices and the Development of Eye Health Promotion Strategies in Cameroon

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Authors’ contributions

This work was carried out in collaboration among all authors. Authors WD, NK, JJ and FCN designed the study, wrote the protocol and wrote the first draft of the manuscript. Authors EE, TFE, WT, NVN and AOMT managed the analyses of the study data mining and the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Herbal plants have played an important role in traditional medicine therapy of multiple human illnesses since the existence of man in many parts of the globe. The most common eye diseases include conjunctivitis, cataract, glaucoma, eye allergies, and eye inflammation. The problem of adverse drug effects of modern drugs has led to the increased use nowadays of herbal remedies in the treatment of eye diseases. The World Health Organization (WHO) defines traditional medicine as, the knowledge, skills, and practices based on theories, beliefs, and experiences indigenous to diverse cultures, be it explicable or not that are used in the maintenance of health and the prevention, diagnosis, improvement, and the treatment of physical and mental diseases. In the last decade, the use of traditional medicine has gained popularity and has expanded globally. While traditional medicine is used in developing countries for primary health care, it is also being used in developed countries with advanced health care systems. Traditional medicine accounts for up to 60% of health care delivered in Cameroon, while in other African countries traditional medicine is being relied on as a result of cultural and historical beliefs and up to 80% of the population in Africa use traditional medicine to meet their health care needs. Although, traditional medicine is widely used, issues around policy; safety; efficacy and quality control are still of prime public health concern.

Traditional eye care practices are believed to be indigenous medicines used by community members for the treatment of eye diseases or ocular problems. This is the most applied form of eye treatment in Africa and other parts of Asia and Latin America. Eye care is a public health concern in Cameroon due to late diagnosis of eye pathology and limited access to medication and affordability of prescription eye glasses. This paper attempts to review the herbal medicine practice as an alternative approach to eye treatment using traditional healing, and the development of eye health promotion strategies in the primary health care system in Cameroon.

Keywords: Herbal eye care; practice; health promotion; strategy; Cameroon.

1. INTRODUCTION

Ocular infections have as main cause their exposure to bacterial, fungal, viral and other microbial pathogens. The eye has many natural processes of defence against potential infections or trauma. For example the tears, eyelids and eyelashes contain lysozymes and interferons capable of eye protection against infections [1]. The disruption of the eye defence mechanism may lead to eye inflammation.

1.1 Bacterial Eye Infections

Bacterial ocular infection is caused by different microorganisms such as Streptococcus pneumonia, Haemophilus influenza, Staphylococcus aureus, Escherichia coli etc., The most common causative pathogen for external eye infections includes Staphylococcus aureus and S. epidermidis [2]. The ocular infection Trachoma is caused by C. trachomatis which is the global leading cause of blindness and ocular morbidity. The classic symptoms of bacterial eye infections include; burning, irritation, tearing and in most cases a mucopurulent discharge [3]. Eyelids in some case may be stuck together especially early in the morning at wake up time. Even though bacterial eye infection is generally self-limiting, in case of negligence of treatment can develop into a more severe sight-threatening condition [4].

1.2 Fungal Eye Infections

The types of fungi species that are causal agents to eye infections include Fusarium solani, Fusarium oxysporium, Aspergillus niger, A. flavus, Candida albicans and Penicillum notatum. These infections can be difficult for treatment and patient are at risk of blindness. The eye disease symptoms usually include severe redness, blurring vision and photophobia [5].

1.3 Viral Eye Infections

They are caused by herpes simplex virus1, adenovirus and coxsackie virus. Up to 95% of most eye herpes infections are potentially caused by the herpes simplex virus 1 (HSV-1) [2, 3]. Viral eye infections can be very contagious transmitted easily through contact by objects that are in contact with the infected patients’ eye secretions [4].
There are about 285 million people who are visually impaired in the world, and over 90% of them live in low and middle income countries, with a higher proportion of the disease affecting Africa [1,2]. According to the Global Statistics on Visual Impairment and Blindness in 2014, 80% of vision impairment is preventable [2]. The two preventable leading causes of vision impairment in the world are cataract (43%) and uncorrected refractive error (33%) [3]. The increasing prevalence of eye diseases in Africa, that bears the highest burden of vision impairment and blindness, are of public health concern. Evidence based studies [4-6] revealed that traditional healers in Africa are predominantly based in rural areas and some underprivileged communities. In developing countries, most people visit and consult with traditional healers and only seek treatment at a modern health facility when the traditional medicines they have used for treatment have failed them [3,7].

1.4 Ethno-pharmacotherapeutic Importance of Herbal Plants in the Cameroonian Pharmacopoeia

Herbal medicine has been an important part of the African culture since the existence of man in this part of the continent and has provided the primary health care needs for over 80% of the population [8]. In Cameroon, the use of herbs for treatment of common diseases is very common due to the rich cocktail and biodiversity of medicinal plants. The integration of traditional medicine in the primary health pipeline is still at its infancy, and not yet effective in Cameroon, due to slow organization of the health sector towards alternative and complementary medicine [9-10]. The government strategies on reform of the health sector plans are in place towards the organization of traditional medicine sector in view of providing the main trends for the development and its integration [11-13]. More studies on TM filled the gap of information of the traditional use of medicinal plants in Cameroon. However, there is still much research work to be done within the framework of the documentation of existing ethnobotanical knowledge [5,14]. In Cameroon, more than 289 plants species belonging to 89 families against 220 pathologies have been documented for traditional use and practices [11, 15]. About 68% of the plant inventories documented are commonly used for the treatment of many diseases of economic importance. These herbal plants extracts are prepared as decoction, infusion, maceration, powder, powder mixtures, plaster, calcinations, and in some cases squeeze in water, boiling, cooking with young animals like chicken or sheep, meat or peanut paste, through direct eating, juice, fumigation, and hot bath [16]. The most common diseases or disorders in the community treated include; typhoid, male sexual dysfunction, malaria, gonorrhea, gastric ulcers, rheumatoid arthritis, fever, dysentery, diarrhea, skin diseases, boils, cough, wounds, syphilis, sterility, sexually transmitted diseases, ovarian cysts, and amoebiasis, with the use of more than two hundred plants with ethno botanic history to treat and control these diseases or disorders [8,13,17-19].

Traditional eye medicine (TEM) is still very common in most parts of Cameroon and other sub Saharan Africa regions where people prefer to visit a traditional eye healer before consulting in a modern hospital or health centre for the treatment of ocular problems despite the toxic effect of TEM [20]. According to a research carried out by Courtright et al. [21,22,23], on the use of TEM on corneal patients in Malawi, 33.8% of patients were found to have used TEM before visiting the hospital [4,24]. A study conducted by Ukpomwvan and Momoh [7,25] in Benin City, Nigeria, within a hospital-based eye health facility, showed that 1.7% of patients who were consulted in the eye health facility within the study period of 6 months, had developed ocular problems from the use of TEM [26-29]. Even though people have continued to embrace the use of TEM in most parts of Africa, there still exists no visible evidence to support the efficacy of TEM in the treatment of ocular diseases.

Researches carried out in Nigeria and other parts of Africa, have shown that harmful traditional eye medicines are detrimental and have adverse effects that can lead to infections which can destroy the eye [30]. Patients depend more on the use of TEM as the primary method of treatment and this has resulted in the late presentation of patients in hospitals or health centres for appropriate eye care services. Some patients believe that eye disease is caused by “an evil eye” or that the gods are annoyed with the said individual [31]. TEM is a public health issue which dates since antiquity, especially in developing countries. This is because traditional medication is often contaminated and can promote the spread of pathogenic organisms that can lead to vision impairment in the patient [11, 27-29]. TM continues to play a vital and lasting part in the health care system. The efficacy and potency of TM are attracting world attention [30,32].
2. THE PUBLIC HEALTH SECTOR AND TRADITIONAL MEDICINE ACTIVITY IN CAMEROON

Most sub-Saharan African countries and the Central African sub regions in particular, have witnessed intensive privatization of State corporations and government services. This includes the privatization of large hospitals where the rational of financial independence have led to the dispensation that offered community care and free medication to patients [2,31,32]. Overviews of different national policies linked to public health and medicinal plants application has revealed some pertinent problems. Among these problems are the failures to meet basic health conditions attributed to the following factors in Cameroon such as inadequate decentralization of health sectors/services; enslavement of some rural communities; and the persistence of traditional beliefs with respect to the pathology [33]. The slowdown in decentralization has led to underutilization of available services in health centres and the high cost of services provided by hospitals in relation to the income of the rural population [1,9].

Another problem is the absence of local pharmaceutical production sector since the ‘60s when Cameroon had its independence. Cameroon has not had the opportunity to develop a single eye phytomedicine. Tde country rely more on the purchase of imported pharmaceutical products with an outcome of heavy losses of state revenue, and unfortunately the development policy has not been geared towards available local resources (mainly medicinal plants) [34-37,38]. Government late move in policy in Cameroon to provide health care services to the population indicates the inability of government to ensure provision of quality services at an affordable price to everyone and particularly to the most vulnerable groups [4,39].

In the hinterlands of Cameroon, villagers cover long distances for several days before gaining access to an integrated health centre, dispensary and pharmacy or health clinic for consultation [10]. In addition days of work loss, the high cost of drugs should be considered as a constraint to the local population. In recent years, Cameroon joined most of the emerging nations in recognizing that they do not have the resources to provide comprehensive health care like some industrialized countries, and have developed more interest in promoting and integrating the use of traditional medicines [40,41,42]. Looking for strategies to solve the problem of limited access to drugs or high cost in part, many health-oriented establishments are now promoting the use of local medicinal plants for disease treatment. The Cameroon public health ministry has put in place services for traditional pharmacopoeia within the ministerial organigram to facilitate the implementation of traditional medicine policies and integration. The ministries of Education, Forestry and Wildlife, Research and Innovation have introduced conservation and bio-diversity programs of medicinal plants into their school curricula and the general sensitization of the population [21,31]. The some institutions like the Ministries of Environment and Nature Protection the creation of National Parks, and mapping of protected forest areas, in various parts of the country has also demonstrated the political will of the Cameroon government towards the conservation of nature and the sustainable management of bio-diversity [43,44,23].

The shortage of primary health care systems in enclave zones leave the local population with the option of treating themselves with medicinal plants or confronted with road side drugs in the illicit rural markets, or furthermore get access to counterfeit drugs that predispose the population to potential health risks [45]. The population in general in suburban zones starts treating themselves at home (auto-medication) before visits to a traditional healer or a physician. Medicinal plants are mostly used at an early stage of the disease due to cheaper cost and later replace the uncontrolled use of drugs without prescription [13,14,46]. Many Cameroonians today, mostly in the villages depend on the use of medicinal plants as source of treatment of illness. Many rural communities in Africa however, still have areas where traditional herbal medicine is the major and only source of health care resources available [9,47]. There is no gainsaying that the safety, acceptability and efficacy of herbal medicine within the Cameroonian society is well understood by the local population to gain some level of confidence in consumption.

2.1 Cameroon Collaboration with WHO to Promote TM

The WHO and the Government of Cameroon signed a Memorandum of understanding (MOU) to put into action a strategic development plan for the promotion, valorization of herbal medicine research in Cameroon. However, despite this convention and mobilization efforts, progress in
this sector is hampered by multiple constraints linked to the development of traditional medicine platform with the framework of: The lack of institutional support for production and dissemination of key species for cultivation; The low cost of herbal traditional medicinal plants by tradipractitioners traders and urban herbalists; Lack of transformation technology for post-harvest and pre-processing; Lack of documentation and scientific research studies for verification of the herbalist’s findings and claims; Poor preservation of medicinal extracts for extended shelf life [32,48-50].

The global Strategic Plan for the integration of herbal medicine in Cameroon by the WHO, subscribe to the recommendation of the organization to promote traditional medicine on a nationwide level. The active participation by Cameroon can be seen by the official recognition of TM in one of three main health sectors in the country. The key actors of the state involved promote the development of the strategy for the integration of traditional medicine in the public health sector in line with the emergence 2035 policy to reduce morbidity and mortality and sustainable health care development [21,51].

2.2 Traditional Medicine Operation in Cameroon

The focus of the implantation strategies for the promotion of traditional medicine research, development and practice in Cameroon is as follows;

1- Formulate a national policy and regulatory framework for the appropriate use of TM
2- Establish a regulatory mechanism to the control safety and quality of products of TM practice;
3- Advocacy, awareness, safe and effective TM therapies among the population and consumers;
4- Cultivate and conserve medicinal plants to ensure their sustainable use.
5- Create a stronger evidence base on the safety, efficacy and quality of the TAM/CAM products and practices;
6- Ensure availability and affordability of TM/CAM including essential herbal medicines;
7- Promote therapeutically the sound use of TM/CAM by providers and consumers;
8- Document traditional pharmacopoeia and all improved traditional medicines and remedies [28-31].

2.3 Importance of Traditional eye Medicine in Cameroon

Traditional eye medicine is gaining popularity due to the close relationship with cultural and traditional belief systems. The continuous use is also possibly associated to limited information on the potential dangers and the lack of information between patients and modern eye health care actors [35,52]. There is less collaboration among modern eye care practitioners and traditional eye healers to address eye health challenges in the local communities. The adoption of a better health education plan could solve the eye health challenge that is of big concern to eye care experts, particularly in the prevention of the various visual impairments and blindness [9]. Approaches put in place within the health promotion may reduce eye complications from the use of TM [3,44]. Studies have shown that health eye health promotion has positive impacts on increasing knowledge and encouraging change of attitudes, behaviours and practices of local communities [6-9,35]. Health promotion and advocacy programmes have empowered the community to understand risks involved in the use of TM. This has influenced the adoption of healthy eye care behaviours and practices and subsequently reducing the disease burden of vision impairment from preventable causes which has contributed towards the prospection of the attainment of the Vision 2020 objectives [21].

Base on the gap of information on traditional eye medicines or practices in Cameroon, the is disparity in the costs of traditional medicines, depending on the culture, type of treatment, nature of treatment, the kind of illnesses for treatment and the attitude, behaviour and socio-economic status of the patient [15,22,45].

Traditional eye medicine care practices may be common due to the accessibility, affordability, and acceptability - as they conform to the cultural beliefs of the people of Cameroon at large and the Boyo people, in particular. The serious health consequences of TEM practices are likely to impact on the majority of the population who are not yet aware of the dangers and harm embedded in traditional eye care practices. In Boyo Division, where Fundong Health District is found, patients find it difficult to access health facilities due to poor road infrastructure which is worst during the rainy season. The number of eye care professionals (human resources for eye health) in the health district is inadequate with 10 eye health staff for a population of 131,649 [48].
The demand for eye health services is relatively high, with 10 eye health personnel (2 ophthalmologists, 1 refractionist, 3 ophthalmic nurses and 4 ophthalmic medical assistants) in the Health District (HD). The eye health personnel are all based at and consult with the Mbingo Baptist Hospital, which is the only faith-based health institution, in the district, that offers eye care services. There are no eye health staff that exist within the government health facilities in the entire Fundong Health District (FHD). Most patients travel for one to two days or even more before accessing the faith-based eye health facility.

Despite the different eye health interventions that are put in place by the government, faith-based organizations (FBOs) and other private healthcare providers especially in rural areas and some cities, still prefer traditional eye treatment (TEM). In rural communities of Boyo Division in the Fundong Health District, community members respect traditional healers whom they believe provide them with first line medical attention (primary eye care) whenever need arises. Limited health promotion strategies exist in most Cameroonian health facilities. Based on the literature consulted for this study, there are no documented studies that assessed the knowledge, attitudes, practices and health seeking behaviours of clients to traditional eye medicine practitioners. Thus, there is a need to bridge this existing gap in research efforts and to contribute to knowledge. The current study is, therefore, necessary to assess traditional eye care practices and design a public health promotion strategy to enhance eye health knowledge, services and facilities in FHD of Boyo Division, in particular and Cameroon at large.

Cameroon has about 90% of the African ecosystems which includes; the Sahelian, Sudan, humid tropical forest, afro mountains, coastal and mountain eco-regions. There is a significant diversity of flora and fauna and ranks the 5th in Africa after the republic of Congo, South Africa, Madagascar and Tanzania [12,24, 32]. This rich biological biodiversity is associated with the diversity of the ethnic groups in which each contributes a unique ethno pharmacopoeia and to Cameroon a national therapeutic patrimony, which is the richest in Africa [15,29].

In Cameroon the onset of economic crisis in the late 1980s created a shift towards the consumption of medicinal plants as an increasing practice in herbal medicine. For the integration of TM into the national healthcare system of Cameroon, the WHO in collaboration with the Cameroon Government had put in place a strategic road map for TM integration [1,4,26]. The gap of information about TM safety and efficacy has made it important for governments to step into the TM practice, research and development within the frame work of integration into the primary, communal and the national health care system in Cameroon [5,16,29].

3. THE CONCEPTS OF TRADITIONAL MEDICINE AND TRADITIONAL EYE CARE MEDICINE

3.1 Traditional Eye Practices

Blindness is one of the most tragic yet often avoidable disabilities in the developing world [49]. Actions by individuals, families and communities, as well as eye care professionals, are vital to achieving the ambitious target of Vision 2020: the right to sight, which aims to prevent 100 million cases of blindness by the year 2020 [6,10].

Traditional healers are many and generally accepted within the African cultural health care providers and in most parts of income poor countries [14,39]. In the last three decades, few traditional healers have been involved in primary eye care activities and studies from some collaborative programmes have shown that healers have become a vital force for community-based prevention of blindness. For a healthy eye we need: malaria and diarrhoea control, clean water supplies, proper rubbish disposal to avoid flies, poverty reduction programs, concerned with family planning and education [4]. Healers use a variety of products (plant, animal, etc.) to make decoctions for face washes, “fume baths” and for direct application to the eye. Scarification (tattooing) is often performed as a preventative and curative procedure [28,36]. There is limited information on specific traditional eye practices or traditional eye medicines and almost no information on the traditional eye care activities of the general population. Products used vary from country to country and healer to healer [12,26].

There is no inventory of traditional eye medicines nor have investigations been carried out to determine the most commonly used products, those that are particularly harmful and those that
might have curative properties. As different parts of the plant (leaves, bark, roots, etc.) are used in different ways, understanding the properties of specific traditional eye medicines will be complex. The complexity is increased because traditional medicine has become dynamic, changing with the cultural, political and economic environments of the setting in which healers live [42,52]. Couching, the dislocation of the lens for the treatment of cataract deserves special mention. It is still performed in many areas of West Africa, although not by most community-based healers. Couchers are generally itinerant and there is minimal follow-up. The demand for their services reflects the lack of availability of modern cataract surgery or lack of faith in the outcome of modern cataract surgery [44].

3.2 Processes of Traditional Medicine and Eye Care Medicine in Cameroon

3.2.1 Teaching traditional healers

The following issues need to be addressed in teaching traditional healers, who should be the trainer? Which healers should be trained? How can we work effectively with healers? What should the curriculum include?

Teaching traditional healers will need to be approached differently from teaching health assistants or village health workers. The intent is not to turn traditional healers into health assistants or village health workers. It is best to conduct orientations and trainings in the local setting. The ophthalmic assistant is usually the most appropriate person to run the trainings as it is he or she who has the best chance of establishing an on-going relationship with the healers [46,51].

3.2.2 Collaboration with African traditional healers for the prevention of blindness

In working with healers, general considerations are as follows:

- Teaching should be recognized as a two-way street; the instructor is also the student. It is important for the instructor to admit that biomedicine also cannot cure all eye diseases.
- Respect must be shown. Many healers believe that they are more knowledgeable about the subject than the instructor.

- Be very careful about offering criticism, especially during orientation or early programme activities. Seek areas on which you can agree with healers and try to reinforce "good" practices (e.g. counselling patients, face-washes) by showing your agreement and offering praise.
- Do not expect to find "success" quickly; developing a programme will take time and results cannot be expected immediately [7, 19-20].

3.2.3 Collaboration between traditional medicine/eye care medicine and orthodox medicine

Traditional healers are an integral and important part of most cultures and will remain so. They are respected members of their communities and live and work in the most rural areas. They are the most commonly consulted and most accessible primary health care providers in all African communities [38,42].

Eye care programmes have been effective at the district hospital level in many countries. There has, however, been limited success in expanding activities beyond this level and in overcoming many of the barriers precluding cataract surgery uptake by rural communities. Since the early 1970s, the WHO has repeatedly advocated for the recognition of Traditional Health Practitioners (THPs) as Primary Healthcare (PHC) providers and for the integration of traditional medicine in national health systems [5,42]. Several calls have been made on governments to take responsibility for the health of their people and to formulate national policies, regulations and standards, as part of comprehensive national health programmes to ensure appropriate, safe and effective use of traditional medicine [28,36].

One of the priorities of the African Regional Strategy on Promoting the Role of TM in Health Systems is the promotion of collaboration between practitioners of traditional and conventional medicine. However, despite the health benefits such collaboration could bring to the populations, long period of neglect of traditional medicine practices and products has created low confidence between the two sectors preventing all the efforts put in to promote future useful partnership [47].
3.2.4 Collaboration between research institutions, conventional health practitioners and traditional health practitioners

Global increased interest in traditional medicine needs fruitful collaboration between medical and other healthcare personnel. There are two main reasons why such collaboration is important; First, it is important for health personnel to have an understanding of all the health services so that their patients may be accessible. Secondly, health personnel are viewed by patients as sources of information for all health and health related issues. The understanding of traditional medicine has orientated health care personnel to advise their patients appropriately. Important collaboration between traditional health practitioners and biomedical researchers is also necessary for the validation of claims of traditional health practice (tHps). Such collaborations will facilitate the assessment of the quality, safety and efficacy of the plant raw materials and the finished medicinal products [4,8]. In addition, with the increasing burden of various communicable diseases, particularly HIV/AIDS and malaria on the health systems of Member States, it is imperative that any primary health care (pHc) delivery plans draw on the skills and knowledge of tHps especially because of their close proximity to the community [7,9].

3.3 Consequences of Using Traditional Medicine and Traditional Eye Care Medicine

The use of traditional eye medications (TEM) is still a common practice, as most patients in Africa consult a traditional healer before presentation to a hospital, despite the well-documented toxic effects of TEM [7,43]. Previous studies have reported poverty, poor health seeking behaviour, socio-cultural beliefs, and lack of access to health facilities as common reasons for the persistence of this practice. Practitioners are recognized as traditional medical doctors and although some of their medications are certified as safe by the national drug-regulating agency, they are not meant for ophthalmic use. Traditional healers tend to prefer the use of substances that cause irritation and pain as this is perceived by the healers and patients as more potent [42]. Such substances may be acidic or alkaline resulting in ocular burns. No particular attention is paid to the mode of action (antibiotic or steroid), concentration, and sterility as some of these concoctions (mixture of various substances which may be plant or animal extracts) are made without regard for hygiene including using contaminated water, local gin, saliva, and even urine [46].

Self-medication is a factor that has to be considered as large numbers of patients use plant extracts or concoctions to treat eye complications without any expert advice. The use of TEM is a common practice that could be harmful and lead to blindness. Proper health education of the public and traditional healers can reduce the prevalence of preventable blindness [47,51].

3.4 Eye Herbal Medicines

Herbs are traditionally useful for many eye problems; herbs are believed to increase blood circulation to the eye and remove eyestrain. In Cameroon herbal eye treatment practices have gained a wider visibility within the community. Standard medicinal plants used as eye herbs are Bilberry which helps protect the retina, it also helps improve poor night vision; Jujube - prescribed as an eye tonic to strengthen liver function; Euphrasia officinalis - A special herb for the eye, so called as an Eyebright; Ginkgo biloba - is a well-researched herb that may improve retinal deterioration and Goji Berry which have a long history of use in the treatment of eye problems. Tibetan medicine includes these berries in the treatment of kidney and liver problems. The passion flower helps relax the eye small blood vessels [13,21,46].

3.4.1 Bilberry extracts herbal Remedy’s eye

Bilberry (Vaccinium myrtillus) contains potent antioxidant flavonoids called anthocyanins. Studies indicate that eating bilberry jam can improve night vision but recent trials have not shown that bilberry benefits include a significant improvement in night vision. Other investigations found that anthocyanins from another berry black currant hasten adaptation to the dark and also reduce eye fatigue. Preliminary studies suggested advances for managing cataracts, glaucoma and diabetic retinopathy [22]. In other studies, extracts protect nerve cells in the retina, strengthens blood vessels, improves circulation and block the formation of new blood vessels. The process involved in diseases of the retina such as diabetic retinopathy and macular degeneration has been well elucidated. Leaf and
berry extracts have shown anti diabetic properties, a relevant action given the high risk of eye diseases among diabetics. The bluish-black berries of this plant constitute a tasty jam consumed by the British air force pilots during in the Second World War. The jam improved night vision and gave them a tactical advantage during evening flights.

Scientists studied bilberry and found out that it contained bio-flavonoids called anthocyanosides. These antioxidant molecules prevent free-radical damage and capillary fragility while helping the eyes adapt to darkness [9]. Bilberry helps protect the retina, but it acts preventively rather than curatively. It also helps improve poor night vision if it is due to a deficiency in certain coloring pigments that the eyes require. However, it will not help poor vision due to misshapen eyes, near- and farsightedness, or cataracts.

Bilberry is useful in treating varicose veins, caused by impaired blood flow in the legs. Another important medicinal property of bilberry involves its ability to act as a blood thinning agent and prevent blood clotting formation. Bilberry extracts can significantly prevent the development of atherosclerosis caused by the build-up of plaque in blood vessels.

3.4.2 Jujube herbal eye remedy

Botanical name Zizyphus jujube, in Chinese medicine is prescribed as a qi tonic to enhance liver function and has proven to be effective on the liver helping patients recover from hepatitis and cirrhosis. The Chinese have also found out that the wild fruit improves skin colour and tone, which are both indications of physical well-being [24].

In modern Chinese medicine, jujube is useful to tone the spleen and stomach, to treat shortness of breath and severe emotional upset caused by nervous conditions. In part of the Central African regions the mixtures from this plant is used as a blood cleanser, an overall tonic, a strengthener, and in disease prevention in most communities [42].

3.4.3 Eyebright herbal eye remedy

Eyebright (Euphrasia officinalis) has long been a folk remedy for the eyes in Nigeria and some parts of West Africa. Most natural food s contains teas, tinctures and homeopathic eye drops made from this herb. A South African study found that eyebright eye drops enhanced the recovery from conjunctivitis and reduce blood sugar in diabetic rats. The same effect is not known for humans although diabetes raises the risk for several eye diseases. Although the benefit for eye treatment has not been well illustrated herbalists in Cameroon and other West African regions successfully use it to treat conjunctivitis.

3.4.4 Ginkgo biloba herbal eye remedy

Known to improve blood flow to the retina as the preliminary research shows improve vision in people with glaucoma [37]. It is also an anti-oxidant and effectively protects nerve cells, including those in the eye. Ginkgo is commonly useful for the treatment of the elderly for disorientation, depression, memory loss, headaches, tinnitus, and vertigo because of its positive effects as a circulatory aid. It helps to increase blood flow to the brain, which makes it a potential treatment for cerebral insufficiency [11].

The flavonoids found in ginkgo may help halt or reduce some retinal problems that have a number of potential causes, including diabetes and macular degeneration. Macular degeneration (often called age-related macular degeneration or ARMD) is a progressive, degenerative eye disease that affects older adults and is the number one cause of blindness in the North America. Studies have shown that ginkgo may help preserve vision in those with ARMD [48-52].

Ginkgo (Ginkgo biloba) is a well-researched herb that may improve retinal deterioration and a host of other ailments such as memory loss, tinnitus, and poor circulation, according to research reports. Traditionally, the grass field community of Cameroon consider the plant to be very effective for the treatment of eye infections [17].

3.4.5 Cinnamon herbal eye remedy

Botanical name Cinnamomum zeylanicum is very important for the treatment of appetite loss, bronchitis, colds, cough, fever, digestive problems and other digestive problems, sore throat, predisposition to infection, diarrhea, and some cancer tumours [44]. Eastern herbal remedies indicate that cinnamon is effective for heart problems, dental pain as well as urinary problems. Cinnamon tea can facilitate digestion, while enabling a peaceful mindset for ritual work or divination.
3.4.6 Lycium berry

Botanical name *Lycium barbarum*, contain 18 amino acids (six times greater than the bee pollen), high content of beta carotene than carrots, more iron than spinach, and 21 trace minerals [15,30]. Goji berries also contain vitamin B1, B2, B6, and vitamin E that are not commonly found fruits and contains up to 13% protein. Tibetan traditional healers include these berries in the treatment of kidney and liver problems and also useful to manage reduction of cholesterol, lower blood pressure, and purification of blood. Goji berries have been used for a very long time for the treatment of eye infections, skin rashes, psoriasis, allergies, insomnia, chronic liver disease, diabetes, and tuberculosis [53].

3.4.7 Passionflower eye herbal remedies

Passionflower has been reported in the Northwest region of Cameroon for eye treatment of blurred vision, and stressed watery eyes. The herb can produce a calming effect, used to treat insomnia and nervousness, and also helps relax the eye small blood vessels [5,13].

3.4.8 Coleus (*Coleus forskohlii*)

Forskolin eye drops have been shown to reduce the production of fluid within the eye thereby reducing pressure and linked to the treatment of glaucoma.

3.4.9 Cannabis (*Cannabis sativa*)

Contains cannabinoinds which in most cases reduce pressure within the eye in patients with glaucoma. Earlier studies were conducted in people who smoke Indian hemp-marijuana and confirmed that the pressure reduction lasted for up to 3 to 4 hours [3,7]. Other studies attempted different methods to deliver cannabinoinds intravenously by oral or inhaled. The side effects are dry, pink eyes, reduced blood pressure, alterations in mental state and behaviour. The identification of receptors for cannabinoinds in the eye has increased more interest and lots of motivation in the development of phytomedicine eye drops [29].

3.4.10 Green tea (*Camellia sinensis*)

Contains great amount of antioxidants which reduces free radicals that are substances that create the so called oxidative damage underlying many chronic diseases including glaucoma, macular degeneration and cataract. More research have shown that treating retinal cells with green tea’s polyphenol can protect them from damage caused by UV light that can increase the risk of macular degeneration. The UV light has the potential to contribute to cataracts [46].

3.4.11 *Hydrastis canadensis* (Golden seal, eye balm)

Active biomolecule in this plant is berberine, which acts against bacteria and fungi infection including *Clamidia trachomatis*. Trachoma causes a roughening of the conjunctiva, cornea and eyelids. Golden seal can be used as an eye washes for stage 1 treatment of trachoma [9].

3.4.12 Grape seed extracts

Contains helpful components like flavonoids, linoleic acid, Vit E, and oligomeric proanthrocyanidins. The compounds help with cataract, diabetic retinopathy, macular degeneration and eye strain. The extract is commonly used by trade-practitioners in Cameroon. However, the poor hygienic handling of the extract and poor preparation of extract using contaminated product can render the eye at risk of other secondary infection.

3.5 Other Eye Herbs

Many herbs, fruits, and vegetables have antioxidant properties. Garlic; preliminary studies suggests that it may help prevent cataracts. Others like turmeric contain the potent anti oxidant curcumin which has been shown to protect against cataracts.

3.6 Eye Health Promotion in Cameroon

Blindness stands as one of the public health concern that can be avoided in Cameroon. Actions by individuals, families and communities, as well as eye care professionals, are important to achieving the target of vision 2020. These include the right to sight, which aims at preventing about 100 million cases of blindness by the year 2020 [13]. The prevention of blindness involves defining the role of human behaviour in eye health. In most circumstances this might involve promoting the adoption of eye health, promoting behaviours and in other cases the discouragement of behaviours that damage eye health. The role of human behaviour and the
scope for prevention depends on the specific disease: for conditions such as trachoma, eye injuries, vitamin A deficiency, and sexually transmitted diseases there is considerable scope for primary prevention [12,51]. Secondary prevention involving recognition of symptoms and early disposition for treatment is suitable for other conditions such as cataract, trichiasis, eye infections, and leprosy. In cases where the intervention is mass treatment for example in the case of the control of onchocerciasis, willingness by the local population to participate in advocacy services is key in determining the success of the programme.

The programme of eye health promotion was first put in place in 1986 in the Ottawa Charter which defined five areas of activity that can be grouped into three areas of action: health education, reorientation, and advocacy. Health education to promote the adoption of eye health promoting behaviours and increase uptake of eye care services provides the backbone of health promotion. Changing long standing behaviours that might be deeply rooted in culture is never easy. However, well planned educational programmes can be effective provided two critical requirements are fulfilled: the underlying influences on behaviour are addressed, and appropriate methods, target groups, and settings are selected.

3.6.1 Understanding influences on behavior

Qualitative research methods can provide useful information on the use and non-use of eye health services. Barriers to the uptake of cataract services from patients’ point of view can include one or more of the following: acceptance of impaired vision as an inevitable consequence of old age, fear of the operation, contact with individuals who have had bad experiences, lack of encouragement from the family, lack of knowledge concerning where surgery is provided, distance from the service, lack of a person to accompany the patient to hospital, poor state of hospitals, long waiting consultation time and lists, and high cost. Studies done in Cameroon and other African countries demonstrate that high cost is the most important barrier [52].

Barriers vary from location to location, and a study from Cameroon suggests that barriers can also change over time. Barriers for cataract can also apply to trichiasis surgery and, in northern Nigeria, low perceived risk and lack of appreciation of the benefits of surgery emerged as important barriers [24,30]. The impact on uptake of developing affordable community based services has been shown in the Gambia. Lack of confidence in the service being provided was identified as an important factor in a study of glaucoma in Togo, and the West African zones. Survey conducted on many people in a multi centred trials living in urban city of Lomé, about two thirds of population aware of glaucoma (25%) were not confident of the competence of doctors to treat the disease. Stigma attached to some diseases such as Hansen disease can be a limiting factor to attending treatment with the result that ocular complications may be identified at a late stage.

3.6.2 Case study 1- clinical trials in herbal eye treatment

A comparative randomised double masked multicentric clinical trial was conducted to evaluate the efficacy and safety of an herbal eye drop preparation, itone eye drops with artificial tear and placebo in 120 patients with computer vision syndrome. Patients using computer for at least 2 hours continuously per day having symptoms of irritation, foreign body sensation, watering, redness, headache, eye ache and signs of conjunctival congestion, mucous/debris, corneal filaments, corneal staining or lacrimal lake were included in this study [54]. Every patient was instructed to put two drops of either herbal drugs or placebo or artificial tear in the eyes regularly four times for 6 weeks. Objective and subjective findings were recorded at bi-weekly intervals up to six weeks. The side effects, if any, were also noted. Results in computer vision syndrome showed that the herbal eye drop preparation was significantly better than artificial tear with no side effects observed by any of the drugs. Both subjective and objective improvements were observed in itone treated cases and therefore itone was considered as a useful drug in computer vision syndrome [54].

3.6.3 Case study 2: Comparative double-blind randomized placebo-controlled clinical trial of a herbal eye drop formulation (Qatoor Ramad) of Unani medicine in conjunctivitis

Qatoor Ramad (QR) is a good ophthalmic formulation of Unani medicine. It is known for its beneficial effects in the treatment of the inflammatory conditions of the eyes [54]. The
effect of QR eye drops was studied by a double-blind, randomized, prospective, placebo-controlled clinical trial, conducted in 70 patients between the ages of 20 to 60 years. Those suffering from different types of conjunctivitis such as mucopurulent, phlyctenular and allergic conjunctivitis were recorded. Local application of two drops 3 to 4 times per day of the QR was applied to the affected eyes for up to 14 days. Patients were examined at the time of diagnosis and after 2, 7 and 14 days of exposure. Clinical efficacy was measured as the cumulative sum score of several signs and symptoms of different types of conjunctivitis. The side effects, if any, were also recorded during the study. In mucopurulent conjunctivitis QR showed excellent results while. In the few cases of phlyctenular and allergic conjunctivitis it controlled the deterioration and seemed to help in the improvement. There were no side effects observed during the course of the study and the eye drop was well tolerated by the patients. Qatoor Ramad was considered to be a useful drug in all conditions studied and acceptable as a potential ophthalmic formulation [54].

3.7 The Role of Health Promotion in the Fight against Avoidable Blindness in Cameroon

Eye health promotion has the potential to improve the lives of the population when a variety or strategies are well coordinated. According to the World Health Organization, eye health promotion is defined as “the process of enabling people to increase control over and improve their eye health” [22, 31, 44]. The concept of eye health promotion, expanded in 1986 during the Ottawa Charter, and like other health issues focuses on five areas which were later merged into three strategic core components namely; health education, health reorientation and health advocacy [27, 42]. Eye health promotion can potentially provide a safe platform in the community; the right to information; empowerment; and offers opportunities for healthy eye lifestyle options. The effective community strategies are prioritized in decision making, planning and implementation to achieve improved eye health results. The Ottawa conference advocated for “Health for all” has been the basis for eye health promotion now widely used today [44]. Eye health education is relevant in achieving eye health promotion. Promoting eye health requires joint efforts from all sectors and a health promotion strategy is required for the reduction of the prevalence of avoidable eye diseases, resulting from traditional eye practices.

In Cameroon the ministry of health in collaboration with WHO and other eye health advocacy groups are working synergistically to bring public awareness on eye health. Various promotional materials, eye health alerts are promoted on media and public places, yet little impact has been created so far. Work on promotional materials by researchers and support by Spec Savers, eye safety promoters and other NGOs for eye management and policies are still at their infancy. There is therefore the need for the development of more aggressive promotional materials to sensitize the population of the dangers of neglect of the care of the eye. There is the need to sensitize on the use of foreign products such as herbal medicine to the eye. Such advice needs supporting information from census and accredited traditional practitioners specialized in traditional herbal treatment of the eye [2, 19, 29].

It has become clear from current studies that there is an increasing motivational interest in the exploitation of the Cameroon rich traditional pharmacopoeia in the treatment and management of ocular diseases. Herbal therapy now plays a significant role in healthcare system in Cameroon and most sub Saharan African countries [3, 55]. There are still more major constraints that require integration of traditional or complimentary medicine to have its role and be considered through a proof of concept as the effective treatment of eye diseases. The use of plant products that has not been validated with a high throughput methods and scientific criteria to compete with existing conventional therapies [56, 57]. In addition, other issues that need to be addressed are that of access and benefit sharing following the Nagoya agreement. Local laws in Cameroon governing TM need to be align or TRIP compliant if trade of Cameroon herbal products has to increase and competitive. Also issues of sustainable use and development of plant products need to be addressed and properly managed by the ministry of Public health.

4. CONCLUSION

It is noteworthy that most of the eye conditions come on so slowly that people may not be aware of noticeable symptoms until the disease has become severe. Early treatment intervention can prevent significant visual loss. Many influences
on behaviour including culture, economics, power, and tradition operate at the community level. A community based programme is one which works within a geographically defined location, and takes into consideration the influences that operate at the local community level, and seeks to involve community actors in the decision making process and implementation. Working with communities can be demanding: as field workers need to be sensitive to the communities' needs and dynamics, and have a basic process of communication, to build consensus, resolve conflicts, and develop capacity building for a safe primary health traditional herbal eye practice. Traditional eye care practices are believed to be indigenous medicines used by community members for the treatment of eye diseases or ocular problems in Cameroon and beyond still to be elucidated. There is the most applied form of eye treatment in Cameroon and other parts of sub Saharan Africa. Eye care is a public health concern in Cameroon due to late diagnosis of eye pathology and limited access to medication and affordability of prescribed eye glasses. Within the framework of vulgarizing the Cameroonian pharmacopoeia, herbal eye treatment needs promotion, advocacy and integration into the primary healthcare system. There is a need for a more collaborative research platform on herbal eye treatment between the medical team and the tradi-practitioners. The government of Cameroon is encouraged to promote research on improved traditional medicine for eye treatment. The future research plan of our project will be to conduct studies at the national level on the knowledge attitude and practice in herbal eye treatment and the collaboration prospects between eye herbal traditional doctors and modern doctors in the promotion of eye treatment within the primary health care system.

CONSENT
It is not applicable.

ETHICAL APPROVAL
Ethical approval was taken from the institutional review board of the University of Kwazulu Natal and the Baptist Medical Board of Cameroon MBS, of the University of Yaoundé I.

COMPETING INTERESTS
Authors have declared that no competing interests exist.

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