

3 **An Overview of Herbal Traditional eye care Practices and the development of eye health**
4 **promotion strategies in Cameroon.**

5
6
7 **ABSTRACT**

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

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

31 **Key words: herbal eye care, practice, health promotion, strategy, Cameroon**

32
33 **1. INTRODUCTION.**

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

38 **1.1. Bacterial eye infections**

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

47 **1.2. Fungal eye infections.**

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

52 **1.3. Viral eye infections**

53 They are caused by herpes simplex virus 1, adenovirus and coxsackie virus. Up to 95% of most eye herpes
54 infections are potentially caused by the herpes simplex virus 1 (HSV-1) [2, 3]. Viral eye infections can be
55 very contagious transmitted easily through contact by objects that are in contact with the infected
56 patients' eye secretions [4].

57 There are about 285 million people who are visually impaired in the world, and over 90% of
58 them live in low and middle income countries, with a higher proportion of the disease affecting
59 Africa [1, 2]. According to the Global Statistics on Visual Impairment and Blindness in 2014,
60 80% of vision impairment is preventable [2]. The two preventable leading causes of vision
61 impairment in the world are cataract (43%) and uncorrected refractive error (33%) [3].
62 The increasing prevalence of eye diseases in Africa, that bears the highest burden of vision
63 impairment and blindness, are of public health concern. Evidence based studies [4-6] revealed
64 that traditional healers in Africa are predominantly based in rural areas and some underprivileged
65 communities. In developing countries, most people visit and consult with traditional healers and
66 only seek treatment at a modern health facility when the traditional medicines they have used for
67 treatment have failed them [3, 7].

68

69 **1.4.Ethno-pharmacotherapeutic importance of herbal plants in the Cameroonian**
70 **pharmacopoeia**

71 Herbal medicine has been an important part of the African culture since the existence of man in
72 this part of the continent and has provided the primary health care needs for over 80%of the
73 population [8]. In Cameroon, the use of herbs for treatment of common diseases is very common
74 due to the rich cocktail and biodiversity of medicinal plants.The integration of traditional
75 medicine in the primary health pipeline is still at its infancy, and not yet effective in Cameroon,
76 due to slow organization of the health sector towards alternative and complementary medicine[9-
77 10]. The government strategies on reform of the health sector plans are in place towards the
78 organization of traditional medicine sector in view of providing the main trends for the
79 development and its integration [11-13]. More studies on TM filled the gap of information of the
80 traditional use of medicinal plants in Cameroon. However, there is still much research work to be
81 done within the framework of the documentation of existing ethnobotanical knowledge [5, 14].In
82 Cameroon more than 289 plants species belonging to 89 families against 220 pathologies have
83 been documented for traditional use and practices [11, 15]. About 68% of the plant inventories
84 documented are commonly used for the treatment of many diseases of economic importance.
85 These herbal plants extracts are prepared as decoction, infusion, maceration, powder, powder
86 mixtures, plaster, calcinations, and in some cases squeeze in water, boiling, cooking with young
87 animals like chicken or sheep, meat or peanut paste, through direct eating, juice, fumigation, and
88 hot bath [16]. The most common diseases or disorders in the community treated include; typhoid,
89 male sexual dysfunction, malaria, gonorrhoea, gastric ulcers, rheumatoid arthritis, fever,
90 dysentery, diarrhea, skin diseases, boils, cough, wounds, syphilis, sterility, sexually transmitted
91 diseases, ovarian cysts, and amoebiasis, with the use of more than two hundred plants with ethno
92 botanic history to treat and control these diseases or disorders [8, 13, 17-19].

93

94 Traditional eye medicine (TEM) is still very common in most parts of Cameroon and other sub
95 Saharan Africa regions where people prefer to visit a traditional eye healer before consulting in a
96 modern hospital or health centre for the treatment of ocular problems despite the toxic effect of
97 TEM [20]. According to a research carried out by *Courtright et al*[43], on the use of TEM on
98 corneal patients in Malawi, 33.8% of patients were found to have used TEM before visiting the

99 hospital [4, 43]. A study conducted by Ukponmwan and Momoh [7, 52] in Benin City, Nigeria,
100 within a hospital-based eye health facility, showed that 1.7% of patients who were consulted in
101 the eye health facility within the study period of 6 months, had developed ocular problems from
102 the use of TEM. Even though people have continued to embrace the use of TEM in most parts of
103 Africa, there still exists no visible evidence to support the efficacy of TEM in the treatment of
104 ocular diseases.

105 Research carried out in Nigeria and other parts of Africa, has shown that harmful traditional eye
106 medicines are detrimental and have adverse effects that can lead to infections which can destroy
107 the eye [21-23]. Patients depend more on the use of TEM as the primary method of treatment and
108 this has resulted in the late presentation of patients in hospitals or health centres for appropriate
109 eye care services. Some patients believe that eye disease is caused by “an evil eye” or that the
110 gods are annoyed with the said individual [24]. TEM is a public health issue which dates since
111 antiquity, especially in developing countries. This is because traditional medication is often
112 contaminated and can promote the spread of pathogenic organisms that can lead to vision
113 impairment in the patient [11, 25-27]. TM continues to play a vital and lasting part in the health
114 care system. The efficacy and potency of TM are attracting world attention [28].

115

116 **2. THE PUBLIC HEALTH SECTOR AND TRADITIONAL MEDICINE ACTIVITY** 117 **IN CAMEROON**

118 Most sub Saharan African countries and the Central African sub regions in particular; have
119 witnessed intensive privatization of State corporations and government services. This includes
120 the privatization of large hospitals where the rational of financial independence have led to the
121 dispensation that offered community care and free medication to patients [2, 29, 30]. Overviews
122 of different national policies linked to public health and medicinal plants application has
123 revealed some pertinent problems. Among these problems are the failures to meet basic health
124 conditions attributed to the following factors in Cameroon such as inadequate decentralization
125 of health sectors/services; enslavement of some rural communities; and the persistence of
126 traditional beliefs with respect to the pathology [31]. The slowdown in decentralization has led to
127 underutilization of available services in health centres and the high cost of services provided by
128 hospitals in relation to the income of the rural population [1, 9]. Another problem is the absence
129 of local pharmaceutical production sector since the '60s when Cameroon had its

130 independence. Cameroon has not had the opportunity to develop a single eye phytomedicine. The
131 country relies more on the purchase of imported pharmaceutical products with an outcome of
132 heavy losses of state revenue, and unfortunately the development policy has not been geared
133 towards available local resources (mainly medicinal plants) [32-35, 36]. Government late move
134 in policy in Cameroon to provide health care services to the population indicates the inability of
135 government to ensure provision of quality services at an affordable price to everyone and
136 particularly to the most vulnerable groups [4, 37]

137
138 In the hinterlands of Cameroon, villagers cover long distances for several days before gaining
139 access to an integrated health centre, dispensary and pharmacy or health clinic for consultation [10].
140 In addition days of work loss, the high cost of drugs should be considered as a constraint to
141 the local population. In recent years, Cameroon joined most of the emerging nations in
142 recognizing that they do not have the resources to provide comprehensive health care like some
143 industrialized countries, and have developed more interest in promoting and integrating the use
144 of traditional medicines [38, 39, 40]. Looking for strategies to solve the problem of limited
145 access to drugs or high cost in part, many health-oriented establishments are now promoting the
146 use of local medicinal plants for disease treatment. The Cameroon public health ministry has put
147 in place services for traditional pharmacopoeia within the ministerial organigram to facilitate the
148 implementation of traditional medicine policies and integration. The ministries of Education,
149 Forestry and Wildlife, Research and Innovation have introduced conservation and bio-diversity
150 programs of medicinal plants into their school curricula and the general sensitization of the
151 population [21, 29]. The some institutions like the Ministries of Environment and Nature
152 Protection the creation of National Parks, and mapping of protected forest areas, in various parts
153 of the country has also demonstrated the political will of the Cameroon government towards the
154 conservation of nature and the sustainable management of bio-diversity [41-43].

155
156
157
158 The shortage of primary health care systems in enclave zones leave the local population with the
159 option of treating themselves with medicinal plants or confronted with road side drugs in the
160 illicit rural markets, or furthermore get access to counterfeit drugs that predispose the

161 population to potential health risks [44]. The population in general in suburban zones starts
162 treating themselves at home (auto-medication) before visits to a traditional healer or a physician.
163 Medicinal plants are mostly used at an early stage of the disease due to cheaper cost and later
164 replace the uncontrolled use of drugs without prescription [13, 14, 45]. Many Cameroonians
165 today, mostly in the villages depend on the use of medicinal plants as source of treatment of
166 illness. Many rural communities in Africa however, still have areas where traditional herbal
167 medicine is the major and only source of health care resources available [9, 46]. There is no
168 gainsaying that the safety, acceptability and efficacy of herbal medicine within the Cameroonian
169 society is well understood by the local population to gain some level of confidence in
170 consumption.

171

172 **2.1. Cameroon collaboration with WHO to promote TM.**

173 The WHO and the Government of Cameroon signed a Memorandum of understanding (MOU) to
174 put into action a strategic development plan for the promotion, valorization of herbal medicine
175 research in Cameroon. However, despite this convention and mobilization efforts, progress in
176 this sector is hampered by multiple constraints linked to the development of traditional medicine
177 platform with the framework of: The lack of institutional support for production and
178 dissemination of key species for cultivation; The low cost of herbal traditional medicinal plants
179 by traditional practitioners, traders and urban herbalists; Lack of transformation technology for post-
180 harvest and pre-processing; Lack of documentation and scientific research studies for
181 verification of the herbalist's findings and claims; Poor preservation of medicinal extracts for
182 extended shelf life [30, 47-49].

183

184

185 The global Strategic Plan for the integration of herbal medicine in Cameroon by the WHO,
186 subscribe to the recommendation of the organization to promote traditional medicine on a
187 nationwide level. The active participation by Cameroon can be seen by the official recognition of
188 TM in one of three main health sectors in the country. The key actors of the state involved
189 promote the development of the strategy for the integration of traditional medicine in the public
190 health sector in line with the emergence 2035 policy to reduce morbidity and mortality and
191 sustainable health care development [21, 50].

192

193 **2.2.Traditional Medicine operation in Cameroon**

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

196 1-Formulate a national policy and regulatory framework for the appropriate use of TM

197 2-Establish a regulatory mechanism to the control safety and quality of products of TM practice;

198 3-Advocacy, awareness, safe and effective TMtherapies among the population and consumers;

199 4-Cultivate and conservemedicinal plants to ensure their sustainable use.

200 5-Create a stronger evidence base on the safety, efficacy and quality of the TAM/CAM products
201 and practices;

202 6-Ensure availability and affordability of TM/CAM including essential herbal medicines;

203 7-Promote therapeutically the sound use of TM/CAM by providers and consumers;

204 8-Document traditional pharmacopoeia and all improved traditional medicines and remedies [26-
205 29].

206

207 **2.3.Importance of traditional eye medicine in Cameroon.**

208 Traditional eye medicine is gaining popularitydue to the close relationship with cultural and
209 traditional belief systems. The continuous use is also possibly associated to limited information
210 on the potential dangers and the lack of information between patients and modern eye health care
211 actors [33, 51].There is less collaboration among modern eye care practitioners and traditional
212 eye healers to address eye health challenges in the local communities. The adoption of a better
213 healtheducation plan could solve the eye health challenge that is of big concern to eye care
214 experts, particularly in the prevention of the various visual impairments and blindness [9].
215 Approaches put in place within the healthpromotion may reduce eye complications from the use
216 of TM [3, 42]. Studies have shown that health eye health promotion has positive impacts on
217 increasing knowledge and encouraging change of attitudes, behaviours and practices of local
218 communities [6-9, 33].Health promotion and advocacy programmes have empowered the
219 community to understand risks involved in the use of TM. This has influenced the adoption of
220 healthy eye care behaviours and practices and subsequently reducing the disease burden of vision
221 impairment from preventable causes which hascontributed towards the prospection of the
222 attainment of the Vision 2020 objectives [21].

223 Base on the gap of information on traditional eye medicines or practices in Cameroon, their
224 disparity in the costs of traditional medicines, depending on the culture, type of treatment, nature
225 of treatment, the kind of illnesses for treatment and the attitude, behaviour and socio-economic
226 status of the patient[15, 22, 44]..

227 Traditional eye medicine care practices may be common due to the accessibility, affordability,
228 and acceptability - as they conform to the cultural beliefs of the people of Cameroon at large and
229 the Boyo people, in particular. The serious health consequences of TEM practices are likely to
230 impact on the majority of the population who are not yet aware of the dangers and harm
231 embedded in traditional eye care practices. In Boyo Division, where Fundong Health District is
232 found, patients find it difficult to access health facilities due to poor road infrastructure which is
233 worst during the rainy season. The number of eye care professionals (human resources for eye
234 health) in the health district is inadequate with 10 eye health staff for a population of 131,649
235 [47]. The demand for eye health services is relatively high, with 10 eye health personnel (2
236 ophthalmologists, 1 refractionist, 3 ophthalmic nurses and 4 ophthalmic medical assistants) in the
237 Health District (HD). The eye health personnel are all based at and consult with the Mbingo
238 Baptist Hospital, which is the only faith-based health institution, in the district, that offers eye
239 care services. There are no eye health staff that exist within the government health facilities in
240 the entire Fundong Health District (FHD). Most patients travel for one to two days or even more
241 before accessing the faith-based eye health facility.

242
243 Despite the different eye health interventions that are put in place by the government, faith-based
244 organizations (FBOs) and other private healthcare providers especially in rural areas and some
245 cities, still prefer traditional eye treatment (TEM). In rural communities of Boyo Division in the
246 Fundong Health District, community members respect traditional healers whom they believe
247 provide them with first line medical attention (primary eye care) whenever need arises. Limited
248 health promotion strategies exist in most Cameroonian health facilities. Based on the literature
249 consulted for this study, there are no documented studies that assessed the knowledge, attitudes,
250 practices and health seeking behaviours of clients to traditional eye medicine practitioners. Thus,
251 there is a need to bridge this existing gap in research efforts and to contribute to knowledge. The
252 current study is, therefore, necessary to assess traditional eye care practices and design a public

253 health promotion strategy to enhance eye health knowledge, services and facilities in FHD of
254 Boyo Division, in particular and Cameroon at large.

255
256 Cameroon has about 90 % of the African ecosystems which includes; the Sahelian, Sudan, humid
257 tropical forest, afro mountains, coastal and mountain eco-regions. There is a significant diversity
258 of flora and fauna and ranks the 5th in Africa after the republic of Congo, South Africa,
259 Madagascar and Tanzania [12, 23, 30]. This rich biological biodiversity is associated with the
260 diversity of the ethnic groups in which each contributes a unique ethno pharmacopoeia and to
261 Cameroon a national therapeutic patrimony, which is the richest in Africa [15, 27].

262
263 In Cameroon the onset of economic crisis in the late 1980s created a shift towards the
264 consumption of medicinal plants as an increasing practice in herbal medicine. For the integration
265 of TM into the national healthcare system of Cameroon, the WHO in collaboration with the
266 Cameroon Government had put in place a strategic road map for TM integration[1, 4, 24]. The
267 gap of information about TM safety and efficacy has made it important for governments to step
268 into the TM practice, research and development within the frame work of integration into the
269 primary, communal and the national health care system in Cameroon [5, 16,27].

271 **3. THE CONCEPTS OF TRADITIONAL MEDICINE AND TRADITIONAL EYE** 272 **CARE MEDICINE.**

273 274 **3.1.Traditional eye practices**

275 Blindness is one of the most tragic yet often avoidable disabilities in the developing world [48].
276 Actions by individuals, families and communities, as well as eye care professionals, are vital to
277 achieving the ambitious target of Vision 2020: the right to sight, which aims to prevent 100
278 million cases of blindness by the year 2020 [6, 10].

279 Traditional healers are many and generally accepted within the African cultural health care
280 providers and in most parts of income poor countries [14, 37]. In the last three decades, few
281 traditional healers have been involved in primary eye care activities and studies from some
282 collaborative programmes have shown that healers have become a vital force for community-
283 based prevention of blindness. For a healthy eye we need: malaria and diarrhoea control, clean

284 water supplies, proper rubbish disposal to avoid flies, poverty reduction programs, concerned
285 with family planning and education [4]. Healers use a variety of products (plant, animal, etc.) to
286 make decoctions for face washes, “fume baths” and for direct application to the eye.
287 Scarification (tattooing) is often performed as a preventative and curative procedure [26, 34].
288 There is limited information on specific traditional eye practices or traditional eye medicines and
289 almost no information on the traditional eye care activities of the general population. Products
290 used vary from country to country and healer to healer [12, 24].
291 There is no inventory of traditional eye medicines nor have investigations been carried out to
292 determine the most commonly used products, those that are particularly harmful and those that
293 might have curative properties. As different parts of the plant (leaves, bark, roots, etc.) are used
294 in different ways, understanding the properties of specific traditional eye medicines will be
295 complex. The complexity is increased because traditional medicine has become dynamic,
296 changing with the cultural, political and economic environments of the setting in which healers
297 live [40, 51]. Couching, the dislocation of the lens for the treatment of cataract deserves special
298 mention. It is still performed in many areas of West Africa, although not by most community-
299 based healers. Couchers are generally itinerant and there is minimal follow-up. The demand for
300 their services reflects the lack of availability of modern cataract surgery or lack of faith in the
301 outcome of modern cataract surgery [42].

302

303 **3.2. Processes of traditional medicine and eye care medicine in Cameroon.**

304

305 ***3.2.1. Teaching traditional healers***

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

309 Teaching traditional healers will need to be approached differently from teaching health
310 assistants or village health workers. The intent is not to turn traditional healers into health
311 assistants or village health workers. It is best to conduct orientations and trainings in the local
312 setting. The ophthalmic assistant is usually the most appropriate person to run the trainings as it
313 is he or she who has the best chance of establishing an on-going relationship with the healers [45,
314 50].

315

316 **3.2.2. Collaboration With African Traditional Healers For The Prevention Of Blindness**

317 In working with healers, general considerations are as follows:

- 318 • Teaching should be recognized as a two-way street; the instructor is also the student. It is
319 important for the instructor to admit that biomedicine also cannot cure all eye diseases.
- 320 • Respect must be shown. Many healers believe that they are more knowledgeable about the
321 subject than the instructor.
- 322 • Be very careful about offering criticism, especially during orientation or early programme
323 activities. Seek areas on which you can agree with healers and try to reinforce “good” practices
324 (e.g. counselling patients, face-washes) by showing your agreement and offering praise.
- 325 • Do not expect to find “success” quickly; developing a programme will take time and results
326 cannot be expected immediately [7, 19-20].

327

328 **3.2.3. Collaboration between traditional medicine/eye care medicine and orthodox** 329 **medicine.**

330 Traditional healers are an integral and important part of most cultures and will remain so. They
331 are respected members of their communities and live and work in the most rural areas. They are
332 the most commonly consulted and most accessible primary health care providers in all African
333 communities [36, 40].

334 Eye care programmes have been effective at the district hospital level in many countries. There
335 has, however, been limited success in expanding activities beyond this level and in overcoming
336 many of the barriers precluding cataract surgery uptake by rural communities. Since the early
337 1970s, the WHO has repeatedly advocated for the recognition of Traditional Health Practitioners
338 (THPs) as Primary Healthcare (PHC) providers and for the integration of traditional medicine in
339 national health systems [5, 40]. Several calls have been made on governments to take
340 responsibility for the health of their people and to formulate national policies, regulations
341 and standards, as part of comprehensive national health programmes to ensure appropriate,
342 safe and effective use of traditional medicine [26,34].

343

344 One of the priorities of the African Regional Strategy on Promoting the Role of TM in Health
345 Systems is the promotion of collaboration between practitioners of traditional and conventional

346 medicine. However, despite the health benefits such collaboration could bring to the populations,
347 long period of neglect of traditional medicine practices and products has created low confidence
348 between the two sectors preventing all the efforts put in to promote future useful partnership
349 [46].

350

351 **3.2.4. Collaboration between research institutions, conventional health practitioners and** 352 **traditional health practitioners**

353

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

368

369 **3.3. Consequences of using traditional medicine and traditional eye care medicine.**

370 The use of traditional eye medications (TEM) is still a common practice, as most patients
371 in Africa consult a traditional healer before presentation to a hospital, despite the well-
372 documented toxic effects of TEM [7, 41]. Previous studies have reported poverty, poor health
373 seeking behaviour, socio-cultural beliefs, and lack of access to health facilities as common
374 reasons for the persistence of this practice. Practitioners are recognized as traditional medical
375 doctors and although some of their medications are certified as safe by the national drug-
376 regulating agency, they are not meant for ophthalmic use. Traditional healers tend to prefer

377 the use of substances that cause irritation and pain as this is perceived by the healers and
378 patients as more potent [40]. Such substances may be acidic or alkaline resulting in ocular burns.
379 No particular attention is paid to the mode of action (antibiotic or steroid), concentration, and
380 sterility as some of these concoctions (mixture of various substances which may be plant or
381 animal extracts) are made without regard for hygiene including using contaminated water, local
382 gin, saliva, and even urine [45].

383 Self-medication is a factor that has to be considered as large numbers of patients use plant
384 extracts or concoctions to treat eye complications without any expert advice. The use of TEM is
385 a common practice that could be harmful and lead to blindness. Proper health education of the
386 public and traditional healers can reduce the prevalence of preventable blindness [46, 50].

387

388 **3.4. Eye Herbal medicines.**

389 Herbs are traditionally useful for many eye problems; herbs are believed to increase blood
390 circulation to the eye and remove eyestrain. In Cameroon herbal eye treatment practices have
391 gained a wider visibility within the community. Standard medicinal plants used as eye herbs are
392 Bilberry which helps protect the retina, it also helps improve poor night vision; Jujube -
393 prescribed as an eye tonic to strengthen liver function; *Euphrasia officianales* - A special herb
394 for the eye, so called as an Eyebright; *Ginkgo biloba* - is a well-researched herb that may improve
395 retinal deterioration and Goji Berry which have a long history of use in the treatment of eye
396 problems. Tibetan medicine includes these berries in the treatment of kidney and liver
397 problems. The passion flower helps relax the eye small blood vessels [13, 21, 45].

398 **3.4.1. Bilberry extracts herbal remedy's eye**

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

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

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

421 **3.4.2. Jujube herbal eye remedy.**

422 Botanical name *Zizyphus jujube*, in Chinese medicine is prescribed as a qi tonic to enhance liver
423 function and has proven to be effective on the liver helping patients recover from hepatitis and
424 cirrhosis. The Chinese have also found out that the wild fruit improves skin colour and tone,
425 which are both indications of physical well-being [23].

426 In modern Chinese medicine, jujube is useful to tone the spleen and stomach, to treat shortness
427 of breath and severe emotional upset caused by nervous conditions. In part of the Central African
428 regions the mixtures from this plant is used as a blood cleanser, an overall tonic, a strengthener,
429 and in disease prevention in most communities [40].

430 **3.4.3. Eyebright herbal eye remedy.**

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

438

439 **3.4.4. Ginkgo biloba herbal eye remedy.**

440 Known to improve blood flow to the retina as the preliminary research shows improve vision in people
441 with glaucoma [35]. It is also an anti-oxidant and effectively protects nerve cells, including those in the
442 eye. Ginkgo is commonly useful for the treatment of the elderly for disorientation, depression,

443 memory loss, headaches, tinnitus, and vertigo because of its positive effects as a circulatory aid.
444 It helps to increase blood flow to the brain, which makes it a potential treatment for cerebral
445 insufficiency [11].

446 The flavonoids found in ginkgo may help halt or reduce some retinal problems that has a number
447 of potential causes, including diabetes and macular degeneration. Macular degeneration (often
448 called age-related macular degeneration or ARMD) is a progressive, degenerative eye disease
449 that affects older adults and is the number one cause of blindness in North America. Studies
450 have shown that ginkgo may help preserve vision in those with ARMD [47-51].

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

455 **3.4.5. Cinnamon herbal eye remedy.**

456 Botanical name *Cinnamomum zeylanicum* is very important for the treatment of appetite loss,
457 bronchitis, colds, cough, fever, digestive problems and other digestive problems, sore throat,
458 predisposition to infection, diarrhea, and some cancer tumours [42]. Eastern herbal remedies
459 indicate that cinnamon is effective for heart problems, dental pain as well as urinary problems.
460 Cinnamon tea can facilitate digestion, while enabling a peaceful mindset for ritual work or
461 divination.

462 **3.4.6. Lycium berry**

463 Botanical name *Lycium barbarum*, contain 18 amino acids (six times greater than the bee
464 pollen), high content of beta carotene than carrots, more iron than spinach, and 21 trace minerals
465 [15, 28]. Goji berries also contain vitamin B1, B2, B6, and vitamin E that are not commonly
466 found fruits and contains up to 13% protein. Tibetan traditional healers include these berries in
467 the treatment of kidney and liver problems and also useful to manage reduction of cholesterol,
468 lower blood pressure, and purification of blood. Goji berries have been used for a very long time
469 for the treatment of eye infections, skin rashes, psoriasis, allergies, insomnia, chronic liver
470 disease, diabetes, and tuberculosis [53].

471 **3.4.7. Passionflower eye herbal remedies.**

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

475

476

477 **3.4.8. Coleus (*Coleus forskohlii*)**

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

480 **3.4.9. Cannabis (*Cannabis sativa*)**

481 Contains cannabinoids which in most cases reduce pressure within the eye in patients with
482 glaucoma. Earlier studies were conducted in people who smoke Indian hemp-marijuana and confirmed
483 that the pressure reduction lasted for up to 3 to 4 hours [3, 7]. Other studies attempted different methods
484 to deliver cannabinoids intravenously by oral or inhaled. The side effects are dry, pink eyes, reduced
485 blood pressure, alterations in mental state and behaviour. The identification of receptors for cannabinoids
486 in the eye has increased more interest and lots of motivation in the development of phytomedicine eye
487 drops [27].

488 **3.4.10 Green tea (*Camellia sinensis*)**

489 Contains great amount of antioxidants which reduces free radicals that are substances that create the so
490 called oxidative damage underlying many chronic diseases including glaucoma, macular degeneration and
491 cataract. More research have shown that treating retinal cells with green tea's polyphenol can protect
492 them from damage caused by UV light that can increase the risk of macular degeneration. The UV light
493 has the potential to contribute to cataracts [45].

494 **3.4.11. Hydrastis canadensis (Golden seal, eye balm)**

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

498 **3.4.12. Grape seed extracts**

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

504 **3.5. OTHER EYE HERBS**

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

508

509

510 **3.6.EYE HEALTH PROMOTION IN CAMEROON**

511 Blindness stands as one of the public health concern that can be avoided in Cameroon. Actions
512 by individuals, families and communities, as well as eye care professionals, are important to
513 achieving the target of vision 2020. These include the right to sight, which aims at preventing
514 about 100 million cases of blindness by the year 2020 [13]. The prevention of blindness involves
515 defining the role of human behaviour in eye health. In most circumstances this might involve
516 promoting the adoption of eye health, promoting behaviours and in other cases the
517 discouragement of behaviours that damage eye health. The role of human behaviour and the
518 scope for prevention depends on the specific disease: for conditions such as trachoma, eye
519 injuries, vitamin A deficiency, and sexually transmitted diseases there is considerable scope for
520 primary prevention [12, 50]. Secondary prevention involving recognition of symptoms and early
521 disposition for treatment is suitable for other conditions such as cataract, trichiasis, eye
522 infections, and leprosy. In cases where the intervention is mass treatment for example in the case
523 of the control of onchocerciasis, willingness by the local population to participate in advocacy
524 services is key in determining the success of the programme.

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

533 **3.6.1 Understanding influences on behaviour**

534 Qualitative research methods can provide useful information on the use and non use of eye
535 health services. Barriers to the uptake of cataract services from patients' point of view can

536 include one or more of the following: acceptance of impaired vision as an inevitable
537 consequence of old age, fear of the operation, contact with individuals who have had bad
538 experiences, lack of encouragement from the family, lack of knowledge concerning where
539 surgery is provided, distance from the service, lack of a person to accompany the patient to
540 hospital, poor state of hospitals, long waiting consultation time and lists, and high cost. Studies
541 done in Cameroon and other African countries demonstrate that high cost is the most important
542 barrier [51].

543 Barriers vary from location to location, and a study from Cameroon suggests that barriers can
544 also change over time. Barriers for cataract can also apply to trichiasis surgery and, in northern
545 Nigeria, low perceived risk and lack of appreciation of the benefits of surgery emerged as
546 important barriers [23, 28]. The impact on uptake of developing affordable community based
547 services has been shown in the Gambia. Lack of confidence in the service being provided was
548 identified as an important factor in a study of glaucoma in Togo, and the West African zones.
549 Survey conducted on many people in a multi centred trials living in urban city of Lomé, about
550 two thirds of population aware of glaucoma (25%) were not confident of the competence of
551 doctors to treat the disease. Stigma attached to some diseases such as Hansen disease can be a
552 limiting factor to attending treatment with the result that ocular complications may be identified
553 at a late stage.

554

555 **3.6.2. Case study1-clinical trials in herbal eye treatment.**

556 A comparative randomised double masked multicentric clinical trial was
557 conducted to evaluate the efficacy and safety of an herbal eye drop
558 preparation, itone eye drops with artificial tear and placebo in 120 patients with
559 computer vision syndrome. Patients using computer for at least 2 hours continuously
560 per day having symptoms of irritation, foreign body sensation, watering, redness,
561 headache, eye ache and signs of conjunctival congestion, mucous/debris, corneal
562 filaments, corneal staining or lacrimal lake were included in this study [57]. Every patient
563 was instructed to put two drops of either herbal drugs or placebo or artificial tear in the
564 eyes regularly four times for 6 weeks. Objective and subjective findings were recorded
565 at bi-weekly intervals up to six weeks. The side effects, if any, were also noted. Results
566 in computer vision syndrome showed that the herbal eye drop preparation was

567 significantly better than artificial tear with no side-effects observed by any of the drugs.
568 Both subjective and objective improvements were observed in itone treated cases and
569 therefore itone was considered as a useful drug in computer vision syndrome [57].

570

571 **.3.6.3. Case study 2: Comparative double-blind randomized placebo-controlled** 572 **clinical trial of a herbal eye drop formulation (QatoorRamad) of Unani medicine in** 573 **conjunctivitis.**

574 QatoorRamad (QR) is a good ophthalmic formulation of Unani medicine. It is known for its beneficial
575 effects in the treatment of the inflammatory conditions of the eyes [57]. The effect of QR eye drops
576 was studied by a double-blind, randomized, prospective, placebo-controlled clinical trial, conducted
577 in 70 patients between the ages of 20 to 60 years. Those suffering from different types of
578 conjunctivitis such as mucopurulent, phlyctenular and allergic conjunctivitis were recorded. Local
579 application of two drops 3 to 4 times per day of the QR was applied to the affected eyes for up to 14
580 days. Patients were examined at the time of diagnosis and after 2, 7 and 14 days of exposure.
581 Clinical efficacy was measured as the cumulative sum score of several signs and symptoms of
582 different types of conjunctivitis. The side effects, if any, were also recorded during the study. In
583 mucopurulent conjunctivitis QR showed excellent results while. In the few cases of phlyctenular and
584 allergic conjunctivitis it controlled the deterioration and seemed to help in the improvement. There
585 were no side effects observed during the course of the study and the eye drop was well tolerated by
586 the patients. QatoorRamad was considered to be a useful drug in all conditions studied and
587 acceptable as a potential ophthalmic formulation [57].

588

589

590 **3.7. The role of health promotion in the fight against avoidable blindness in Cameroon**

591 Eye health promotion has the potential to improve the lives of the population when a variety of
592 strategies are well coordinated. According to the World Health Organization, eye health
593 promotion is defined as “the process of enabling people to increase control over and improve
594 their eye health” [22, 29, 42]. The concept of eye health promotion, expanded in 1986 during the
595 Ottawa Charter, and like other health issues focuses on five areas which were later merged into
596 three strategic core components namely; health education, health reorientation and health
597 advocacy [25, 40]. Eye health promotion can potentially provide a safe platform in the
598 community; the right to information; empowerment; and offers opportunities for healthy eye
599 lifestyle options. The effective community strategies are prioritized in decision making, planning

600 and implementation to achieve improved eye health results. The Ottawa conference advocated
601 for “Health for all” has been the basis for eye health promotion now widely used today[42]. Eye
602 health education is relevant in achieving eye health promotion. Promoting eye health requires
603 joint efforts from all sectors and a health promotion strategy is required for the reduction of the
604 prevalence of avoidable eye diseases, resulting from traditional eye practices.

605
606 In Cameroon the ministry of health in collaboration with WHO and other eye health advocacy
607 groups are working synergistically to bring public awareness on eye health. Various promotional
608 materials, eye health alerts are promoted on media and public places, yet little impact has been
609 created so far. Work on promotional materials by researchers and support by *Spec Savers*, eye
610 safety promoters and other NGOs for eye management and policies are still at their infancy.
611 There is therefore the need for the development of more aggressive promotional materials to
612 sensitize the population of the dangers of neglect of the care of the eye. There is the need to
613 sensitize on the use of foreign products such as herbal medicine to the eye. Such advice needs
614 supporting information from census and accredited tradipractitioners specialized in traditional
615 herbal treatment of the eye [2, 19, 27].

616 It has become clear from current studies that there is an increasing motivational interest
617 in the exploitation of the Cameroon rich traditional pharmacopoeia in the treatment and
618 management of ocular diseases. Herbal therapy now plays a significant role in healthcare
619 system in Cameroon and most sub Saharan African countries[3, 54]. There are still more
620 major constraints that requires integration of traditional or complimentary medicine to
621 have its role and be considered through a proof of concept as the effective treatment of
622 eye diseases. The use of plant products that has not been validated with a high throughput
623 methods and scientific criteria to compete with existing conventional therapies [55, 56].
624 In addition, other issues that need to be addressed are that of access and benefit sharing
625 following the Nagoya agreement. Local laws in Cameroon governing TM need to be
626 allign or TRIP compliant if trade of Cameroon herbal products has to increase and
627 competitive. Also issues of sustainable use and development of plant products need to be
628 addressed and properly managed by the ministry of Public health..

629

630 **Conclusion.**

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

654

655

656 **ETHICAL CONSIDERATIONS**

657 Ethical approval was taken from the institutional review board of the University of Kwazulu
658 Natal and the Baptist Medical Board of Cameroon (MBS), of the University of Yaoundé I.

659

660 **COMPETING INTERESTS**

661 Authors have declared that no competing interests exist.

662

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UNDER PEER REVIEW