Original Research Article

Ethnozoological study on ichthyotherapy among the Suku people (Feshi Territory, Kwango Province), Democratic Republic of the Congo

ABSTRACT

A survey was conducted from August 15, 2019 to February 20, 2020 among 67 traditional healers in order to know the species of fish that are used in the composition of traditional medicines used to treat some diseases in the Kambundi-Nganga Group, Ganaketi Sector, Feshi Territory in Kwango (DR Congo). Seventeen (17) species of fish belonging to 14 genera, 12 families and 8 orders are used by healers to treat 24 diseases. The order of Siluriformes offers eight (8) species of fish for the preparation of medicines used to treat diseases. In this group, the species frequently used are respectively: Parauchenoglanis *punctatus* (31.3%), *Clarias ebriensis* (16.4%), *Gymnallabes typus* (16.4%) and Malapterurus electricus (12%). It is followed by the orders Characiformes (2) and Perciformes (2). The orders Osteoglossiformes, Channiformes, Cyprinodontiformes, Symbranchiformes and Cypriniformes are represented by one species each. The most treated pathologies are: bronchitis, asthma, dysmenorrhea and rheumatism. The most used parts of the fish are bones (32%), head bones (24%), fins (19%), scales (6%) or sometimes the whole fish (15%). It is therefore desirable that in-depth chemical and pharmacological studies be conducted in order to scientifically validate the use of fish in ichthyotherapy and to identify the active principles with therapeutic value for each species.

Key words: Ichthyotherapy, Traditional practitioners, Kambundi-Nganga, Feshi, Kwango, Democratic Republic of the Congo

INTRODUCTION

According to the World Health Organization, more than 80% of the population in Africa rely on Traditional Medicine (TM) to solve their primary health problem [1]; [2]. In the

Democratic Republic of Congo (DRC), with access to health care beyond the reach of the low-income population, many people turn to TM, which is less expensive and also considered more effective than modern therapeutics [3]; [4]; [5]; [6]; [7]. In this case, Tradipraticians draw raw material from the natural environment [8]. Thus, certain species of plants, animals in general and more particularly fish are used [9]; [10].

Due to its faunistic and floristic diversity, the DRC constitutes an important reservoir of biological diversity [11]; [12], which allows it to occupy a privileged place among the countries of the Congo Basin with traditional know-how based on plants and/or animals [9].

The fish fauna of the ichthyological province of Congo is the most diverse in Africa [13]; [14]. There are, to date, about 1250 described fish species [15]. In the market, these fish are readily available fresh or smoked [16]; [17]; [18] and are used for food and feed, where they provide more than 60% of the protein [19]; [20]; [21], in aquaria, and they also provide the raw material in TM for the preparation of some medicinal recipes [22].

Most of the work done on the ichthyofauna of the Congo Basin is limited to systematics [23]; [24], the feeding ecology of a few groups of fishes [25]; [26]; [27] and the modes of adaptation of some of them to occupy different ecological niches [28]. In contrast, studies of fish used in Traditional Pharmacopoeia for medicinal purposes are rare, if not almost non-existent. Yet, fish are sources of unsaturated fatty acids that can prevent consumers from cardiovascular diseases [29].

The present study aims to inventory the fish species used by traditional practitioners in the Traditional Pharmacopoeia of the Kambundi-Nganga group in the Kwango Province of the Democratic Republic of Congo.

More specifically, it is a question of collecting, identifying and drawing up a list of fish species used to treat pathologies, listing the diseases treated, determining the parts of the fish used to treat the diseases and the method of administration. To our knowledge, this is the first time that such a study has been carried out in DR Congo.

MATERIAL AND METHODS

Study setting

This study was conducted in the Kambundi-Nganga groupement (figure 1), located in the Ganaketi sector, Feshi Territory, Kwango Province, DRC. This groupement is located 278 km

south of the town of Kenge, capital of Kwango Province. It is bordered to the north by the Kakombi and Mwela groups; to the south by the Kitaka group; to the east by the Tsay (Inzia) River and to the west by the Bakali River, the Kambundi-Tumbi and Ngima groups.



Figure 1: Kambundi-Nganga grouping in the Ganaketi Sector, Feshi Territory

This grouping includes 18 villages and was recognized as an administrative entity of the Ganaketi sector in 1957 by the Decree of May 10.1957 on indigenous districts, and Decision No. 152/F.226.3/1959 ratified this recognition. It has a climate of the AW₄ type according to the Köppen classification [30].

The average annual rainfall is about 1600 mm. It reaches 1.700 mm in the central-eastern part of the region and 1500 mm in the southern part. This rainfall is spread from September to December, with abundant rainfall in November and from February to April, with abundant rainfall in April. The hydrography of this group consists of the Makaya, Lembwa, Lumbala, Tseyi, Mubidi and Musambu rivers. The majority of these streams flow into the Mbimbi River, which in turn flows into the Inzia River [30].

Biological materials

The biological material for this study consists of 17 species of freshwater fish used in the PT of the Kambundi-Nganga cluster to treat common pathologies.

Methodology

Surveys

Data were collected from 67 traditional practitioners operating in the Kambundi-Nganga grouping using a survey questionnaire and on the basis of free consent of the respondents. The focus group was also used to collect data from sensitive and demanding individuals. The snowball sampling technique was used [10].

Prior to the actual survey (Appendix 1), a pre-survey was conducted in October 2019 in the same setting to certify and confirm the presence of traditional practitioners. The actual survey was conducted between November 2019 and April 2020. The basic questions of the research were those of knowing the species of fish used in the Traditional Pharmacopoeia in this grouping, the parts of fish used, the pathologies treated as well as the mode of administration.

To be part of this study, the following criteria were taken into account:

- To have the age of reason and not to be less than 18 years old;
- To be a native of the Kambundi-Nganga group or to have lived there for at least 25 years;
- To be a traditional healer or an initiate of natural and traditional healings.

Ichthyological sampling

After interviewing the traditional healers, fish specimens were collected using 2, 3 and 5 cm mesh nets, number 20, 16 and 18 hooks, and creels. The collected fish were kept in jars containing 10% formalin and then preserved in 97% alcohol before being identified in the laboratory. The fish were collected in order to confirm their presence in the waterways of this group, but also to certify the assertions of the traditional healers by asking them to identify the species they referred to by their vernacular names.

Identification of the fish

The identification was made from the determination keys proposed by [14]; [31]; [32]; [33]; [34]; [35] available at the Laboratoire de Limnologie, Hydrobiologie et Aquaculture of the Department of Biology of the Faculty of Science of the University of Kinshasa.

Analysis and statistical processing of data

The data obtained were compiled according to the category of questions on the survey form and the systematic classification rank of the fishes and then encoded on the Excel spreadsheet. The relative abundance by order and family of fish species was calculated and expressed as a percentage. The absolute frequencies (%) of different categories of the questions were also calculated. The results obtained were presented in the form of tables and graphs using Excel 2013 and Origin 6.1 software.

Results

Profile of respondents

Table 1 gives the socio-demographic profile of the respondents.

	Sex		Frequency of	Tradipratician	
Age group (years)	Male	Female	observation	Yes	No
26-30	2	1	3	2	1
31-35	3	1	4	4	-
36-40	1	-	1	1	-
41-45	4	2	6	6	-
46-50	9	3	12	12	-
51-55	10	4	14	13	1
56-60	6	3	9	8	1
61 to more	8	10	18	18	-
Total	43	24	67	64	3
%	64.1	35.8	100	95.5	4.4

Table 1: Profile of traditional practitioners interviewed in the Kambundi-Nganga group

Of the 67 people interviewed, 53 people, or 71.1%, were between 46 years and older and 14 people, or 20.9%, were between 26 and 45 years old. There were 43 men (64.8%) and 24 women (35.8%). Regardless of the age group considered, the male gender dominates over the female gender. This trend is reversed for the age group of 61 years and older, where there are more women than men. Of the respondents, 64 (95.5%) are in fact traditional healers and 3 (4.5%) are not. The latter three are tradipractitioner assistants.

Information on seniority in the profession of Traditional Healer

The tradipractitioners consulted have been in the profession from 0 to more than 25 years. A large number have been in the profession for 26 years or more (16 out of 67, or 23.9%), followed by the 11-15 year age group (15 out of 67, or 22.4%), the 6-10 year age group (13 out of 67, or 19.4%), the 21-25 year age group (12 out of 67, or 17.9%), the 16-20 year age group (8 out of 67, or 11.9%), and finally the 0-5 year age group (3 out of 67, or 4.48%) (figure 2).



Figure 2: Length of time in the traditional medicine profession

Mode of acquisition of therapeutic knowledge

The respondents acquired the knowledge of the tradipractor profession in three different ways: thirty-one (31) out of 67 (46.3%) benefited from a family legacy, 33 (49.3%) were initiated by masters and 3 respondents (4.48%) were initiated by divine inspiration (figure 3).





Other professions practiced by the traditional healers surveyed

Table 2 presents the other professions practiced by the respondents.

		5		
Occupation	Frequency	Male	Female	Percentage (%)
Farmer	31	13	18	46,26
Teacher	16	15	1	23,88
Breeder	5	5	-	7,46
Trader	5	5	-	7,46
Nurse (midwife)	3	-	3	4,47
Customary chief	3	2	1	4,47
Student	2	1	1	2,98
Veterinarian	1	1	-	1,49
Police officer	1	1	-	1,49
Total	67	43	24	99,96

Table 2: Other occupations of respondents

The people surveyed do not only work as traditional healers but also perform other tasks. According to the same results, thirty-one (31) people (46.26%) are farmers, 16 (23.88%) are teachers, 5 (7.46%) are herders, 5 others (7.46%) are traders and the other categories of professions are less representative.

List of fish used in the traditional pharmacopoeia

The list of fish used to treat common diseases in the Kambundi-Nganga group is shown in Table 3.

Orders Family		Genus	Feneries	Vernacular names	
Orders	Family	Genus	Especies	Kisuku	Kikongo
Siluriformes	Amphyliidae	Doumea	Doumea sp	Mukhukuti	Mukulukulu
	Claroteidae	Parauchenoglanis	P. punctatus	Kikaka	Kikaka
	Clariidae	Clarias	C. anglensis	Ngola	Ngolo
			C. ebriensis	Kitsinga	Kakunda
			C.buthupogon	Muzuka	Kakunda
			C. pachynema	Ngani	Kakunda
		Gymnallabes	G. typus	Tsombi	Musombi
	Malapteruridae	Malapterurus	M. electricus	Nganzi	Nina
Perciformes	Anabantidae	Microctenopoma	M. nanum	Kibadi	Kibadi
	Cichlidae	Tilapia	T. sp	Kikedia	Kimbata
Cypriniformes	Cyprinidae	Raiamas	R. sp	Musunza	Mubalo
Osteoglossiformes	Mormyridae	Marcusenius	M. sp	Pimba	Lupimbi
Channiformes	Channidae	Parachanna	P. obscura	Mungusu	Mungusu
Synbranchiformes	Mastacembelidae	Mastacembelus	M. niger	Mudianga	Musanga
Characiformes	Alestidae	Alestes	A. inferus	Tsodi	Kalakala
		Phenacongrammus	P. sp	Tsemakhadi	Munganza
Cyprinodontiformes	Cyprinodontidae	Aphyosemion	A. australe	Muthanda	Ndakala
8	12	14	17		

Table 3: List of fish used in the traditional pharmacopoeia in the Kambundi-Nganga group

A total of 17 species of fish are used in the composition of medicinal recipes of traditional practitioners in the Kambundi-Nganga group to treat pathologies. These fish belong to 14 genera, 12 families and 8 orders.

Relative abundance of fish orders

The relative abundance of the orders of fish used in the composition of the medicinal recipes of traditional healers as visualized in figure 4 shows that the order *Siluriformes* is the most represented (46.5%) followed by *Characiformes* (11.9%) and Perciformes (11.9%). The orders *Osteoglossiformes*, *Channiformes*, *Cyprinodontiformes*, *Symbranchiformes* and *Cypriniformes* are represented at 5.94% each.





Relative abundance of fish families

Of the twelve (12) families of fish identified, those of *Clariidae* (14.3%) and *Alestidae* (14.3%) are more abundant than the others which represent 7.14% respectively (figure 5).



Figure 5: Relative abundance of fish families identified and used in the traditional pharmacopoeia

Frequency of use of species

With regard to the results visualized in figure 6, we note that the frequency of use of the fish Parauchenoglanis punctatus (31.3%) is the highest, followed by *Gymnallabes typus* and *Clarias ebriensis* (16.4%), *Malapterurus electricus* (12%); *Clarias angolensis* (10.4%), *Raiamas sp* (9%), *Phenacongrammus sp* (7.4%), *Marcusenius sp*, *Doumea sp* and *Microctenopoma nanum* (6%). The other species have a low frequency of use.



Figure 6: Frequency of use of fish species in traditional pharmacopoeia

Fish parts used to treat pathologies

According to the information in figure 7, several parts of the fish are used by traditional practitioners to prepare recipes that can be used to treat diseases. These are bones (32%), head bones (24%), fins (19%), whole fish (15%), scales (6%), muscles (2%) and finally fat and eggs (1% respectively).





List of diseases treated with fish

The list of diseases treated with the different fish parts is shown in table 4.

	Vernacular names		
Medical expression	Kisuku	Kikongo	
Bronchitis	Tsuaswa	Kifwengi	
Rheumatism	Ngwelumuna	Maladiyamikwa	
Internal hernia	Mukawa	Mbumbi	
Dysmenorrhea	Kilunza	Mengayampasi	
Secondary sterility	Nzembakipakasa	Bukobo	
Irregular contractions	Ndambi	Misongoyandambi	
Dental caries	Kibadi	Mbumbuyameno	
Asthma	Muthulu	Kihema	
Kwashiorkor	Kimbengi	Kibuba	
Accelerated or early contractions	Kafusu	Misongoyandundila	
Epilepsy	Tsaku	Ngambu	
Heavy and long-lasting periods	Kihati	Ngondayanda	
Disseminated erythema	Bikwasa	Makwanzayanene	
Enuresis	Kusuba	Kusuba na nzo	
Weakness and crying in infants	Mulepa	Kulembayanitu	
Ascites	Kisulu	Mbimbidi	
Mental disorders	Bweni	Kilawu	
Umbilical hernia	Mukumba	Mutolo	
Hiccups	Kihikwa	Kishikushiku	
Placental retention	Nangakibu	Kibuyakukangama	
Leprosy	Bwasi	Wazi	
Mycosis	Lota	Loto	
Philtre	Pungu	Kimvangu	
Sterility of small cola	Bukhobubwamungadiadia	Bukoboyangadiadia	

Table 4: List of diseases treated by traditional healers using fish

The results of table 4 above show that the traditional healers of the Kambundi-Nganga group treat 24 diseases with fish. They treat both somatic and psychic pathologies. This is the case of Bweni (mental disorders due to the transgression of traditional customs) and Pungu (philtre).

Specificity of fish in the diseases treated

Table 5 below matches the names of the fish species used with the diseases treated with them.

	Table 5:	Association	of diseases	with	fish	used
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Pathology	Caring fish
Bronchitis	P. punctatus et C. ebriensis
Rheumatism	Malapterurus electricus
Internal hernia	P. punctatus, C. ebriensis, C. pachynema, Phenocongrammus sp et Marcusenius sp
Dysmenorrhea	Gymnallabes typus
Secondary sterility	P. punctatus et C. ebriensis
Irregular contractions	G. typus, A. inferus, Tilapia sp et Raiamas sp
Dental caries	Microctenopoma nanum
Asthma	P. punctatus, C. ebriensis, C. pachynema et C. buthupogon
Kwashiorkor	C. angolensis, C. ebriensis, Phenacongrammus sp et Aphyosemion australe
Accelerated or early contractions	G. typus et Mastacembelus niger
Epilepsy	Raiamas sp et Aphyosemion australe
Heavy and long-lasting periods	P. punctatus et G. typus
Disseminated erythema	Marcusenius sp, P. obscura et A. australe
Enuresis	Doumea sp
Weakness and crying in infants	C. angolensis
Ascites	G. typus et P. punctatus
Mental disorders	Phenacongrammus sp
Umbilical hernia	G. typus
Hiccups	G. typus, Marcusenius sp, P. punctatus et C. ebriensis
Placental retention	G. typus
Leprosy	Phenacongrammus sp, Marcusenius sp, Tilapia sp et A. australe
Mycosis	Phenacongrammus sp, Marcusenius sp, Tilapia sp et A. australe
Philtre	Doumea sp
Sterility of small cola	C. angolensis

From this table 5, we can note that some pathologies are treated with a single species of fish such as : rheumatism with *Malapterurus electricus*; dysmenorrhea with *Gymnallabes typus*; dental caries with *Microctenopoma nanum*; weakness and crying in infants with *Clarias angolensis*; enuresis with *Doumea sp*; umbilical hernia with *Gymnallabes typus*; placental

retention with *Alestes inferus*; philter with *Doumea sp*; mental disorder with *Phenacongrammus sp* and finally sterility of the small cola with *Clarias angolensis*. In the rest of the cases, for the same disease, an association of two or three species of fish is made. And according to our respondents, the most treated pathologies are: bronchitis, asthma, dysmenorrhea, rheumatism and epilepsy.

Method of administration of traditional fish-based medicines

Traditional practitioners in the Kambundi-Nganga group use four modes of administration (oral, massage, bath and suppository) to treat their patients with medicines made from freshwater fish (figure 8). The most used mode of administration is the oral route with 59 citations or 62.8% (to treat bronchitis, asthma, hiccups, dysmenorrhea, epilepsy, tooth decay, enuresis, placental retention, secondary sterility, irregular contractions during childbirth, philter, heavy and long-lasting menstruation) followed respectively by massage with 23 citations or 24.5% (to treat rheumatism, erythema, sterility of small cola, irregular contractions during childbirth, mental disorders, umbilical hernia, internal hernia and kwashiorkor), bath with 8 citations and 8.51% (to treat weakness and crying of infants) and suppository with 4 citations or 4.26% (to treat internal hernia).



Figure 8: Methods of administration of traditional fish medicines

Testimony of the people on the effectiveness of the treatment with fish

The testimonies of the people surveyed in relation to the effectiveness of the traditional treatment with fish show that 83.6% of the population think that the remedies administered by

the traditional healers bring healing, but 11.9% think that there is no satisfaction and 4.4% of the respondents abstain (figure 9).



Figure 9: Patients' testimonies on the effectiveness of traditional fish remedies

Contra-indications or prohibitions to consumption

Traditional healers recommend that patients who are undergoing treatment or who have received it should not consume the fish used to prepare the remedy for treatment, either for life or for a time. This position is supported by 56 respondents, or 88% of our sample. For some remedies this requirement does not count. This version is collected from 8 respondents, or 11.9%.

Discussion

Fish is one of the most valuable food resources in both developed and developing countries. Not only that fish are the main source of protein with the highest protein content per gram and per calorie of all usual food products [20], but also, they render great services by contributing to the fight against diseases. This is what our research in the Kambundi-Nganga cluster revealed. In total, 17 species of fish are used in the composition of the medicines of the traditional practitioners of the said group to treat pathologies. These fish belong to 14 genera, 12 families and 8 orders. From the point of view of relative abundance, the order *Siluriformes* was the most represented (46.5%) followed by the orders *Perciformes* and *Characiformes*, *Symbranchiformes* and *Cypriniformes* were represented at 5.94% each.

In fact, modern medicine uses fish for its mineral salts such as calcium, phosphorus, iron, copper, fluorine, iodine and selenium (they are very "bioavailable" because they are easily absorbed by the body), its vitamins and omega-3 fatty acids and also because the proteins of ichthyological origin allow the proper functioning of cells and lead to their rapid renewal through successive mitoses, which explains the longevity of human life in fish consumers [38]. Elsewhere, traditional medicine uses the skin of some fish species such as Malapterurus electricus to heal wounds, and in Brazil, the skin of *Tilapia* to treat patients with burns. And other species such as *Clariallabes* and *Distichodus sp* are used to treat malnutrition [39].

In the present study, traditional healers in the Kambundi-Nganga group in the DRC treat 24 diseases with the 17 species of fish identified. They treat somatic as well as psychological pathologies such as rheumatism with *Malapterurus electricus*; dysmenorrhea with *Gymnallabes typus*, dental caries with *Microctenopoma nanum*, placental retention with *Alestes inferus*; philtre with Doumea sp; mental disorders with *Phenacongrammus sp*; bronchitis and asthma with *Parauchenoglanis punctatus*, etc. It has been established that to treat a pathology, traditional practitioners of the Kambundi-Nganga group use one or more species of fish. The frequency of use of all species in traditional medicine in this group differs. The species of fish most frequently used are *Parauchenoglanis punctatus* (31.3%), *Clarias ebriensis* (16.4%), *Gymnallabes typus* (16.4%) and *Malapterurus electricus* (12%).

With regard to the mode of acquisition of therapeutic practice, the majority of traditional practitioners in the Kambundi-Nganga group (49.3%) were initiated by masters, followed by those who benefited from a family legacy (46.3%), and the minority of respondents (4.48%) received their initiation through divine inspiration. These results confirm the observations made by [9] in a study devoted to an ethnobotanical and ecological study of plants used in traditional medicine in the Lukunga District of Kinshasa in the D.R. Congo. According to the results obtained by the latter, 20% of the respondents inherited the knowledge of medicinal plants from their ancestors (revelation), 19% of the respondents inherited this knowledge from their families, 18% of the respondents from books, 15% of the respondents from herbalists, 14% of the respondents from friends, 13% of the respondents have for therapeutic references themselves, and finally 1% of the respondents from vendors.

According to [40], the therapeutic practice of Traditional Pharmacopoeia is often characterized by analogy. And in the case of this study, the analogy is based on name and ethological approximation. This research revealed that traditional practitioners of the Kambundi-Nganga group also use nominal analogy to treat certain pathologies. This is the case of dental caries treated with the fish Microctenopoma nanum. In fact, dental caries in Kisuku is called Kibadi; and in the rivers of the grouping under study, a species of fish bearing the same name of Kibadi has been identified. Thus, in order to treat this pathology, traditional practitioners have made a correspondence between the disease and the fish bearing the same name. The second analogy raised by this investigation is the ethological connection. For this case, some examples are also retained: (1) Rapprochement between rheumatism and the fish *Malapterurus electricus*. The rheumatism is an acute or chronic disease characterized by pains in the muscles or in the articulations. And it condemns the individual to no longer make free use of the target organs, thus reducing the patient's movements [41]. In the Kisuku language, this disease is called Ngwelumuna, which means disarticulation, because it disarticulates the motor system of the individual suffering from this disease, and the fish Malapterurus electricus (Nganzi in Kisuku) is said to be electric because it produces a discharge on any body that disturbs it [33]; [35]. For humans, this discharge creates a destabilizing effect on the joints like an electric current. In view of this ethological analogy, the traditional practitioners of the Kambundi-Nganga group felt that *Malapterurus electricus* would serve as a favorable remedy for rheumatism. (2) The connection between asthma and Parauchenoglanis punctatus (Kikhaka in Kisuku). Asthma is a disease of the bronchial tubes that manifests itself by intermittent breathing discomfort and suffocation. Hence the patient's breathing rhythm in case of an attack becomes very accelerated sometimes with opening of the mouth [42]. Parauchenoglanis punctatus on the other hand shows a similar behavior whenever it is placed outside its ecological niche. Thus, intense breathing is observed in this fish with opening of the opercules covering its gills [43]. These two fundamental aspects: rapid breathing and opening of the gills have made *Parauchenoglanis punctatus* an ideal candidate for alleviating asthma and bronchitis according to the traditional practitioners of the Kambundi-Nganga group. (3) Epilepsy and Raiamas sp (Musunza in Kisuku). Epilepsy is a nervous disease (related to brain electricity) characterized by generalized seizures with or without loss of consciousness, resulting from the sudden discharge of a cerebral nerve center [44]. For its part, *Raiamas sp* is an indiscreet fish according to traditional practitioners, because it lets itself be seen if it is present in a stream by its jumps or surges on the surface of the water. However, it is a fact that an epileptic in a seizure usually jumps or leaps. This restless behavior has earned the species *Raiamas sp* a remedy for the care of epileptics.

In traditional and modern pharmacopoeia, remedies based on plants or animals are prepared in various ways: decoction, infusion, cooking, fermentation ... [45]. Their modes of administration are also very varied: ingestion, scarification (for fractures and wounds, the healer being able to make an incision to deposit his preparation), undulation, poultice, friction, bath, spraying (the healer masticates and spits on the lesions), inhalation, insufflation (reserved for psychiatric pathologies), instillation (for ENT and eye pathologies) [9]; [46]. The same finding was noted in this study. The different remedies (except for umbilical hernia care) require the combination of many other plant products. Their preparation is done by calcination, decoction and cooking. These medicines are administered by ingestion, by massage, by wearing to the body, by bathing, by body contact, by scarification, by anal route (suppository) and by fumigation. These are in some cases identified and in others not, following the free will of the traditional practitioners.

The question of healing in traditional Suku medicine is dependent on the proxemics, which is the set of circumstances, events, times, places, words, positions, etc., that surround the treatment. And it is of strict observance [47]. This study in the Kambundi-Nganga group confirmed this reality.

CONCLUSION AND SUGGESTIONS

The objective of this study was to identify the different species of fish used in the traditional treatment of pathologies (ichthyotherapy) in the Kambundi-Nganga group in the Kwango province of DR Congo.

The results obtained showed that the traditional practitioners of this group know the fish that are used in the preparation of traditional medicines and use them in whole or in part to treat pathologies. Seventeen species of fish belonging to 14 genera, 12 families and 8 orders are used for this purpose. The order of *Siluriformes* offers an important ichthyotherapeutic diversity with 8 species, 5 genera and 4 families. The species frequently mentioned are *Parauchenoglanis punctatus* (31.3%), *Clarias ebriensis* (16.4%) and *Gymnallabes typus* (16.4%) and *Malapterurus electricus* (12%). A total of 24 diseases are treated with the identified fish, of which the pathologies frequently treated with fish are bronchitis, asthma, dysmenorrhea, epilepsy and rheumatism. In the preparation of recipes, caregivers most often use the hard parts of fish such as bones (23%), head bones (24%), fins (19%) and scales (6%) and sometimes the whole fish (15%). Prepared by calcination, decoction and cooking, the

remedies are administered by ingestion, massage, wearing to the body, bathing, body contact, scarification, anal route (suppository) and fumigation.

It is therefore desirable that extensive chemical and pharmacological studies be conducted to scientifically validate the use of these fish in ichthyotherapy and to identify the active principles or compounds of therapeutic value for each species. This would provide a new source of raw material compounds to the modern pharmaceutical industry.

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Appendix 1: Survey Sheet

I. Identity

1. Age:
2. Profession :
3. Are you a Tradipratician? YesNo
4. How and/or from whom did you learn the trade of Tradipratician?
II. Use of fish in the traditional pharmacopoeia
1. Are you familiar with fish? Yesno
2. What do you think their use is?
3. Can you make a medicine with fish? YesNo
4. If Yes, are these fish used as a raw material or as an ingredient?
5. What fish do you use to prepare your remedies?
6. What parts of the fish do you use in the preparation of your remedies? Scale,
Fins, Head bones, Bones, Muscles, Fats, Whole fish,
Viscera
7. What diseases do you treat with fish products?
8. How do you administer these products?
9. Do your remedies give a good result (cure)? YesNo
10. How do you prepare the products for each type of disease listed above?

11. What is the dose needed for each treatment?.....

12. What are the contraindications for your products?