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Traditionally Used Anti-hepatitis Plants Species in Dakar District, Senegal

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Authors' contributions

This work was carried out in collaboration among all authors. Author KD designed the study, performed the statistical analysis, wrote the protocol and the first draft of the manuscript. Author WD managed the analyses of the study. Author ADF managed the analyses of the study. Authors SIMD, AIM and PAF performed the statistical analysis. Author ADF managed the literature searches and approved the final corrections. All authors read and approved the final manuscript.

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ABSTRACT

Viral etiologies especially viral hepatitis B remain an area of concern sub-Saharan Africa with a variable prevalence between countries. Ethnobotanical knowledge of medicinal plants used in the treatment of viral hepatitis, in particular, viral hepatitis B, was conducted in the District of Dakar (Senegal). Forty-two participants were surveyed, which included 18 herbalists, 19 Traditional medicine practitioners (TMPs)and 5 resource persons. Fifty-one plant species were documented from forty-seven genera and thirty families. The most frequently mentioned families were; Fabaceae (11 species); Meliaceae, (4 species); Rubiaceae and Combretaceae (3 species each); Annonnacaea, Malvaceae, Rutaceae and Asteraceae (2 species each). All other families were represented by a single species. The decoction was the most common method of préparation (66.66%). Leaves and trunk bark were the plant parts of the plant most used. The most commonly

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used species were: *Tinospora bakis* (85.71%), *Gardiena ternifolia* (73.8%), *Calotropis procera* (71.42%), *Carica papaya* (66.66%), *Citrus aurantifolia* (64.28%) and *Cochlospermum tinctorium* (61.9%). It is concluded that the hepatoprotective properties of these plants are certainly induced by chemical compounds that will have to be identified later through phytochemical research.

Keywords: Dakar; phytotherapy anti hepatitis; protective hepato activity; tradipraticians.

1. INTRODUCTION

Hepatitis is an inflammatory infection of the liver, with orofacial parental and sexual transmission, and involvement of the liver parenchyma [1]. It evolves in morphology and, manifestations including; asymptomatic, severe and fatal forms with general intoxication, jaundice, haemorrhage and other signs of hepatic insufficiency [1,2].

At the global level, WHO estimates that approximately 170 million people, or 3% of the population, are infected with Viral Hepatitis C (HCV) and at risk of cirrhosis and liver cancer [3]. In Africa, 32 million people carry this virus, which represents 5.3% of the population [3].

World Health Organization (WHO) estimates that 2 billion people are infected, including 400 million chronic carriers. Of the 400 Million, 60 million are in Africa [4]. One million people die each year from viral B infection [3].

Hepatitis viruses enter the body either through the digestive system for Hepatitis A (HAV) or blood for Hepatitis C and Hepatitis B (HCV and HBV) or sexually for HBV. The viruses enter the liver cells and multiply, affecting its complex metabolic functions essential for life [5]. However, The long-term natural history of HCV infection is highly variable. The hepatic injury can range from minimal histological changes to extensive fibrosis and cirrhosis with or without hepatocellular carcinoma (HCC). There are approximately 71 million chronically infected individuals worldwide, [6,7].Thus, the liver has an essential role in protein metabolism, it ensures the deamination of amino acids and the product from circulating ammonia [8]. The synthetic liver also needs blood proteins (globins), coagulation factors [9], fibrinogen and prothrombin [8]. The liver can synthesize cholesterol and transport tissues in the form of lipoproteins. Excess cholesterol is converted into bile acids and excreted with bile [10].

Due to the high cost associated with synthetic drugs and their concomitant side effects, local population are using plants to treat common ailments, such as hepatitis in Senegal. Despite the efforts of chemists trying to synthesize new molecules, the products often cause unwanted side effects, making plant medicines an alternative for many people with very low incomes, leading to acceptance of traditional medicine as an alternative form of health care [11].

However, there is very little scientific knowledge about the plants used by herbalists or Tradipracticians. Thus the aim of this study was to identify the various plant species used in the treatment of viral hepatitis in the Dakar District of Senegal.

2. MATERIALS AND METHODS

2.1 Study Area

The survey was conducted in Dakar's District (Fig. 1). The Dakar District has an area of 550 km^2, lies at 14°35'00 '' N Latitude and 17°32'00 '' W Longitude. It has a microclimate marked by the influence of maritime trade winds; hence the existence of freshness and an almost constant humidity and relatively high in the order of 25% and a total annual rainfall of 610 mm/year ANSD, [12]. Below the representative map of the survey area (Fig. 1).

2.2 Vegetation Description, Socio-Economic Conditions and Study Design

The forest heritage of the District consists of a classified domain, a protected area, a hydrographic network with a potential wildlife network.

2.3 Socio-Economic Conditions

Dakar is the most populated region of the country with a very high density, due to the combined effects of natural population growth and migration. It has a young population, mostly male and almost all living in urban areas. This makes it hard to get formal jobs and the informal sector dominates.

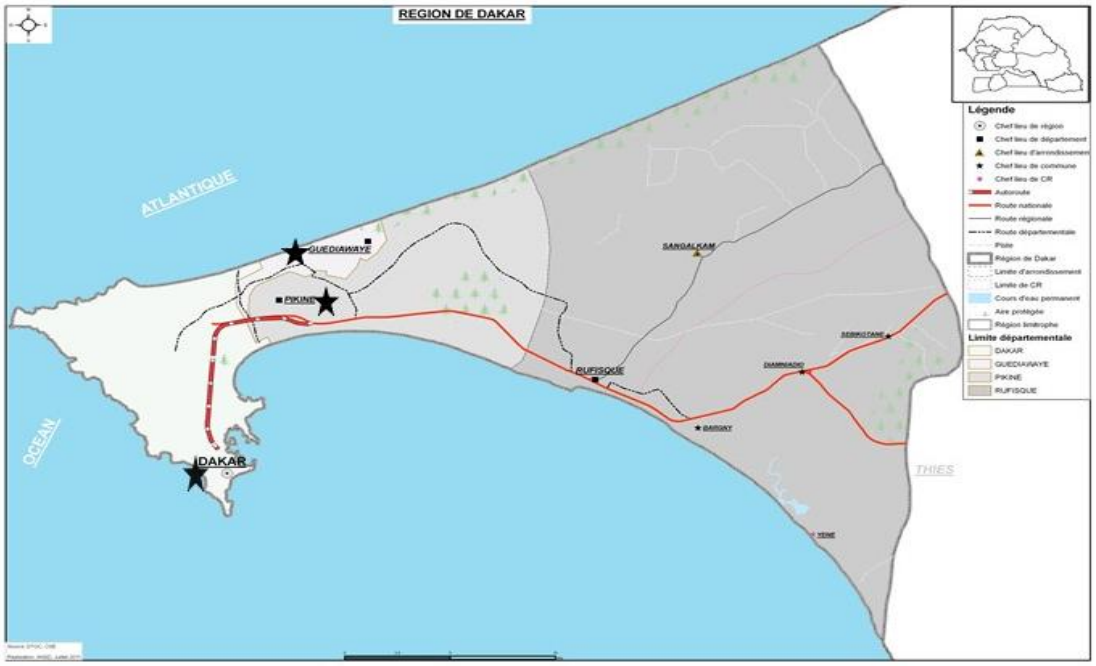

Fig. 1. Map of the survey area (Dakar, Pikine and Guédiawaye) by ANSD, [12]

2.4 Study Design

This study was conducted using a pre-established questionnaire. It covered the period from October 2015 to January 2016.

The majority of tribe ethnic encountered were Wolof, Jola and Serer.

2.5 Collection, Identification and Classification

The unknown species of our interviews had been collected and identified in the laboratory of Botany of Cheikh Anta Diop University by Pr Diatta. The classification was made using the books of Kerharho, [13], Eklu-Natey [14] and the new classification APG III (2014).

2.6 Statistical Analysis

The database software, SPSS version 3 was used for data linkage and processing.

Regular statistics (percentage) were displayed for the frequency of plants quoted. We have used as quantitative analysis such as Use- Value (UV).

3. RESULTS AND DISCUSSION

A total of 51 plant species from 47 genera and 30 families were identified as anti-hepatitis plants. The families, botanical names, local names, common names, used plants, Part used and preparation (application) are given in Table 1 classified according to APG III classification (2014). Some families are more often referred to because they include several species. Thus Fabaceae families with 11 species; Meliaceae, with 4 species; Rubiaceae and Combretaceae with 3 species; Annonnacaea, Malvaceae, Rutaceae and Asteraceae with 2 species and everything else is represented by a single species (Fig. 1). These results are in agreement with those found by Guinnin et al. [15] with 54 species divided into 49 genera and 29 families but the most cited families have in common the Asteraceae. This state of affairs is understandable because the geographical area of studies differs. The reality of the use of plants is thus different according to the countries. The Fabaceae family contains many species of plants known for nutritional and medicinal value. These include the *Acacia nilotica* species that have shown antioxidant and anti-inflammatory activity [16]. The *Cassia siamea* species have shown antioxidant, antalgic, antipyretic and haemolytic activity [17]. Douaré [18] has shown anti-hepatitis activity on *Entada africana* Guill. Perr.

The Meliaceae plant family contains several species that are known to be antimalaria. These include *Azadirachta indica*, *Melia azedarach*, *Carapa procera*, *Khaya senegalensis* and

Trichilia emetica which gave various antimalaria activities. *Trichilia emetica* and *Carapa procera* have shown antimalaria propreties [4]. The *Azadirachta indica* species has indicated antioxidant activity [19] and *Melia azedarach* plant species has shown antiplasmodial activity [20].

Rubiaceae family contain plant species that have been a source of medicine and some have shown potential at experimental stages. In a systematic review, Karou et al. [21] revealed that 60 species are used for 70 medicinal indications while many species have exhibited antimalarial, antimicrobial, antihypertension, antidiabetic, antioxidant and anti-inflammatory activities.

Extracts of total alkaloids from the 3 organs of the plant, proved anticancer activity. These extracts inhibit the proliferation of MCF-7 breast cancer cells. In addition to antitumor activity, the alkaloid extracts of N. latifolia Sm. act against pain. They inhibit pain after injection of acetic acid at 0.6% in mice [22]. The foregoing literature findings suggest that plants from the three families contain ingredients that are useful for deceases. Fig. 2 shows the family classification of species.

The most frequently mentioned plants are *Tinospora bakis* 36/42 soit (85,71%), *Gardiena ternifolia* 31/42 soit (73,8%), *Calotropis procera* 30/42 soit (71,42%), *Securidaca longepedunculata* 14/42 soit (33,33%), *Citrus paradisi* 13/42 soit (31%). These results are not similar to those of [15] found 4 plants for the treatment of viral hepatitis. This difference may be due to the number of people surveyed, the dissimilar vegetation characteristic of one District to another. The leaves and barks are the organs mainly used for the medicinal preparations. These results are according to [23] who demonstrate that leaves are mainly used during treatments traditional and not according to those of [24] who is a similar study in India has found that the part of the most used plant is the leafy stem. This is understandable because the pathology involved and the area geographical study is different. The decoction (66.66%) is the most used mode. This is much higher than those found by [25] and [15].

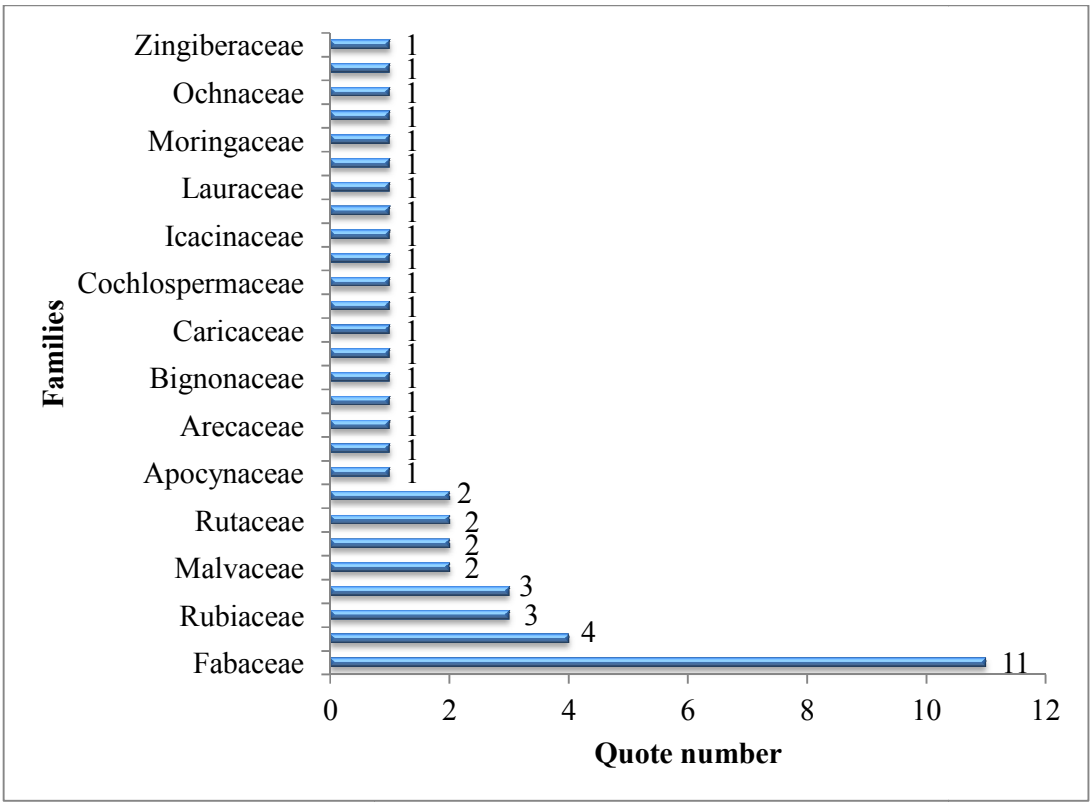

Fig. 2. Families classification plants

Table 1. Plants species used against viral hepatitis

Families/botanical name of plants	Common names	Locals names	Used part	Preparation
1. *Acacia nilotica* (L.) Willd. Ex Del. (Fabaceae)	Red gum	Neb neb (Wo)	Fruits	Infusion
2. *Acanthospermum hispidum* DC. (Asteraceae)	Starry capitula	Ebédé (D)	Flowers	Decoction
3. *Adansonia digitata* L. (Malvaceae)	African baobab	Gui (Wo)	Leaves	Decoction
4. *Annona muricata* L. (Annonaceae)	Corossol tree	Carossol (Wo)	Leaves and barks	Decoction
5. *Anogeissus leiocarpus (*DC.) G. et P. (Combretaceae)	African birch	Ngediane (Wo)	Barks	Maceration or infusion
6. *Anthocleista vogelli* G. Don (Loganiaceae)	Indetermined	Bubagalat (D)	Barks	Decoction
7. *Azadirachta indica* A. Juss. (Meliaceae)	Neem Tree	Neem (Wo, Ser, Pl)	Leaves	Decoction
8. *Balanites aegyptiaca* (L.) Del. (Balanitaceae)	Date Palm desert	Sump (Wo)	Stems	Decoction
9. *Boerhavia diffusa* L. (Nyctaginacaea)	Indetermined	Wom i gelém (Wo)	Roots	Decoction
10. *Boscia senegalensis* (Pers) Lam. Ex Poir. (Capparidaceae)	Senegalese Boscia	Niandam (Wo)	Roots	Decoction
11. *Calatropis procera* (Ait.) Ait. F. (Apocynaceae)	Sodom Apple	Faftan (Wo)	Barks	Decoction
12. *Carapa procera* L. (Meliaceae)	Condou	Tulukuna (Wo)	Barks	Oïl extraction
13. *Carica papayer* (Caricaceae)	Papaya	Papayo (Wo)	Fruit and Leaves	Cook with chicken
14. *Cassia albida* L. (Fabaceae)		Kad (Wo)	Barks and Fruit	Decoction
15. *Cassia italica* (Mill.) Spreng. (Fabaceae)	African Senna	Laydour (Wo)	Leaves	Maceration
16. *Cassia occidentalis* L. (Fabaceae))	False kinkeliba	Mbanta maré (Wo)	Roots	Decoction
17. *Cassia sieberiana* DC. (Fabaceae)	Cassia sieber	Sindian (Wo)	Barks	Decoction
18. Ceiba pentandra (L.) Gaertn. (Malvaceae)	Cheese tree	Benténié (Wo)	Barks	Decoction
19. *Citrus aurantifolia* Swingle (Rutaceae)	Lemon	Limong (Wo)	Fruit Juice	Drink
20. *Citrus paradisi* Swingle (Rutaceae)	Grapefruit	Pampalimousse (Wo)	Seeds	Infusion
21. *Cnesti ferruginea* DC. (Connaraceae)	Indetermined	Budianad (D)	Fruits	Drink
22. *Cochlospermum tinctorium* Perr.ex A. Rich. (Cochlospermaceae)	Indetermined	Fayar (Wo)	Roots	Decoction
23. *Cocos nucifera* L. (Arecaceae)	Coconut tree	Coco (Wo)	Coconut water	Drink
24. *Combrétum micranthum* G. Don (Combretaceae)	Kinkeliba	sekhew(Wo)	Leaves and Barks	Decoction
25. *Desmodium adscendens* (Sw.) DC. (Fabaceae)	Indetermined	Gerté golo (Wo)	All the tree	Decoction or Infusion
26. *Entada africana* Guill. Perr. (Fabaceae)	Sword bean (A)	Mbatiar (Wo)	Roots	Decoction

Families/botanical name of plants	Common names	Locals names	Used part	Preparation
27. *Garcinia kola* T. Anders. (Clusiaceae)	Small cola	Petit cola (Wo)	Fruit and Leaves	Decoction
28. *Gardiena ternifolia* Schumach. Thonn. (Rubiaceae)	Gardiena	Dibitone, poss (Wo)	Barks	Decoction
29. *Icacina senegalensis* A. Juss. (Icacinaceae)	Indetermined	Bankanass (So)	Barks	Infusion
30. *Khaya senegalensis* (Desr.) A. Juss. (Meliaceae)	Cailcedrat	Khay (Wo)	Barks	Decoction or Maceration
31. *Lawsonia inermis* L. (Lythraceae)	Henné	Foudenn (Wo)	Leaves	Maceration
32. *Lophira lanceolata* Van Tiegh. Ex Keay (Ochnaceae)	False shea	Méné (Wo)	Barks and Roots	Decoction
33. *Morinda lucida* DC. (Rubiaceae)	Sulfur tree	Wada (Wo)	Barks	Decoction
34. *Moringa olaifera* Lam. (Moringaceae)	Neverdier	Sab sab (Wo)	Leaves	Infusion
35. *Sarcocephalus latifolius* Sm. (Rubiaceae)	African sin	Nandok (Wo)	Roots	Decoction
36. *Newbouldia laevis* (P. Beauv.) (Bignonaceae)	Indetermined	Egompa (D)	Barks	Decoction
37. *Ocimum basilicum* L. var. basilicum. (Lamiaceae)	Basilic	Ngun ngun (Wo)	Flowers	Infusion
38. *Parkia biglobosa* (Jacq.) R. Br.ex G. Don (Fabaceae)	Purple mimosa	Ul (Wo)	Fruits and Barks	Decoction
39. *Persea gratissima* C. F. Gaertn. (Lauraceae)	Avocado tree	Indetermined	Leaves	Decoction
40. *Petroselinum crispum* (Mill.) Nyman ex A. W. Hill (Apiaceae)	Parsley	Persil (Wo)	Leaves	Infusion
41. *Pililostigma reticulata* (DC.) Hochst. (Fabaceae)	Camel's foot	Nguiguis (Wo)	Leaves	Decoction
42. *Prosopis africana* Taub. (Fabaceae)	Prosopis	Hiir (Wo)	Barks	Decoction or Maceration
43. *Securidaca longepedunculata* Fres. (Polygalaceae)	Snake tree	Fouf (Wo)	Roots	Infusion
44. *Securinega virosa* (Roxb. Ex Willd.) (Euphorbiaceae)	Balan savannah	Keng (Wo)	Leaves and boughs of leaves	Decoction
45. *Terminalia avicennoides* Guill. Perr. (Combretaceae)	Fluffy badamier	Robrob (Wo)	Roots	Maceration
46. *Tinospora bakis* (A. Rich.) Miers (Menispermaceae)	Bakis	Bakis (Wo)	Roots et Barks	Decoction
47. *Trichilia emetica* Vahl (Meliaceae)	Mafura	Soulafinga (B)	Roots et Barks	Decoction
48. *Vernonia colorata* (Willd.) Drake (Asteraceae)	Bitter leaves	Docteur (Wo)	Leaves	Decoction
49. *Ximenia americana* L. (Fabaceae)	Sea lemon	Ngologn (Wo)	Roots	Decoction
50. *Xylopia aethiopica* (Dunal) A. Rich. (Annonaceae)	Black pepper	Ndiar (Wo)	Fruits	Powder eat before lunch
51. *Zingiber officinalis* L. (Zingiberaceae)	Ginger	Jinjer (Wo)	Rhizomes	Decoction

These two authors had found that a decoction was the best way to benefit more from the virtues of these medicinal plants. Although some real traditional healers often advising customers to use the infusion method also would provide satisfactory results.

The results of the study provide a solid scientific basis for the development of herbal medicine and also for the isolation of active principles contained in these plants mentioned. We must preserve these species effective for protection of biodiversity; this for the creation of conservation areas for species threatened with extinction. And finally to carry out a toxicological study to test the toxicity of the plants frequently mentioned.

4. CONCLUSION

Fifty-one plant species were registered as antihepatitis plants. The information collected from this survey indicates that they are aware about of the presence of antihepatitis plants in their areas. The ethnobotanical study carried out is very promising for scientists for further studies. These studies will isolate and identify the active compounds that could lead to effective and accessible therapies.

CONSENT

It is not applicable.

ETHICAL APPROVAL

There are no ethical considerations the people surveyed were chosen according to their consent.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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