

Ethnobotanical Study of Medicinal Plants Used for Treating Urinary Tract Infections in N'Djamena (Chad)

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Abstract

Introduction: Infection disease is a real public health problem. The rise of resistance for modern antibiotic in infections treatment imposed us order alternatives. The study objective was to contribute in the knowledge of medicinal plants uses in urinary infections treatment in N'Djamena (Chad) in view for amelioration the traditional medicine in future. **Methodology:** The study was conducted in the city of N'Djamena in the Republic of Chad that interviewed 60 traditherapists on using 11 plants for urinary tract infections treatment. The methodology of this study consisted of the knowledge of medicinal plants that used by traditherapists, and the plants identification was done in the laboratory of IRED at Farcha. **Results:** A total of 60 traditherapists was interrogated on the plants used in the treatment of urinary tract infections among the population of N'Djamena. The majority of traditherapists interrogated in this study were male with the rate of 61.67% against female with the rate of 38.33%. The age range of traditherapists was between 20 to 80 years, 25 (41.67%) from the age range between 30 - 50 years and 35 (58.33%) in age range from 50 to 70 years. For the origin of their knowledge, the study showed that 72% of traditherapists inherited the knowledge from their family, while 15% inherited from the family and from training. The ethnic groups of the traditherapists were Sara (16%), Maraba (12%) and Massa (11%). According to the results, 18.33% were illiterates, 49% attended primary school and 33.34% the secondary school. Our study found that 11 species of plants belonging to 11 families were used in the treatment of urinary tract infection

and the *Ziziphus spina-christi* was the most represented. According to traditherapists the *Ziziphus spina-christi*, *Cassia obovata* and *Euphorbia hirta* were the most frequent plants used in the urinary tract infections treatment. The parts of plants used in the treatment were leaves and bark, grained leaves and entire plants with the proportion of 50%, 16.67 and 15% respectively. **Conclusion:** This study revealed that the medicinal plants are variously used in the treatment of infection urinary tract in the city of N'Djamena.

Keywords

Urinary Infections, Medicinal Plant and Traditherapists

1. Introduction

Medicinal plants constitute the basis of health care systems in many societies, sometimes testing hypotheses of the use and the knowledge, or sometimes describing the use of plants in given cultural contexts [1]. However, indigenous knowledge of using medicinal plants for healing human ailments is in danger of gradually becoming extinct, because this knowledge is passed on orally from generation to generation without the aid of a writing system and many traditional healers do not keep written records [2]. Plant latex is a good source of various secondary metabolites, which shows growth inhibitory effects in bacteria, fungi, viruses, tumors, and cancer cell lines. It shows toxicity to insects, act as a growth and reproductive cycle inhibitor. It also shows cytotoxic and anti-cancer activity and is widely used as laxative, anti-arthritic and conditioning agent for cosmetic purposes [3]. Because of its reliability, less toxicity, eco-friendly and straightforward [4]. The presence of various bioactive components of medicinal plants is considered to relate to pharmacological activities, which have essential effects in treating mild to severe diseases [5]. Traditional medicine plays an important role in primary healthcare in sub-Saharan Africa particularly in Chad [6]. Traditherapists use recipes and medicinal plants to treat a number of pathologies, including urinary tract infections [7]. Indeed, urinary tract infections are a major public health problem [8]. They can affect all age groups, in particular, during periods of sexual activity, pregnancy and menopause, and are more frequent in women of childbearing age [9]. Urinary tract infections are the second most common reason for consultation in infectious pathology, after pulmonary infections [10]. One third of women have a urinary tract infection in their lifetime. This frequency increases with age, with two peaks, one at the start of sexual life and the other after the menopause. In men, the frequency increases after the age of 50 due to prostatic pathology [11]. Urinary tract infections are a major public health concern in developing countries. In Mali, a prospective study conducted in 2006 in the urology department at CHU-Point G showed that urinary tract infections accounted for 27.6% of consultations [12]. Bacterial infections accounted for 70% of these deaths caused by micro organisms [13].

There is therefore a growing interest in promoting traditional medicine. According to [14], nearly 80% of the world's population depends on traditional medicine. It is in this context that medicinal plants used in the traditional treatment of infections represent an alternative source of new molecules with antimicrobial activity. Herbal medicines represent an alternative in primary health care systems and therefore a promising avenue for the development of improved traditional medicines [6]. The aim of this was to contribute to the knowledge of medicinal plants used in the treatment of urinary tract infections in N'Djaména (Chad), with a view to develop the use of traditional medicines in the treatment the infection of urinary tract.

2. Materials and Methods

2.1. Study Area

The study was conducted in the N'Djaména the administrative capital and largest city of the Republic of Chad. Its population will exceed 1,592,000 habitants in 2022 [15]. It is the second-largest economic capital of the country (after the city of Moundou). The region is characterized by a dry tropical climate that has evolved from the Sudano-Sahelian to the Sahelian type. Rainfall fluctuates between 400 and 700 mm/year in the form of more or less violent showers. Temperature is also subject to strong seasonal variations, with very hot months (maximum in April-May). The temperature average ranges from 20°C to 45°C in the dry season and from 18°C to 30°C in the rainy season (Figure 1).

2.2. Data Collection

Data was collected from 60 traditherapists in eight (8) quarters of the city of N'Djaména-Tchad. The data collection started on 5 December 2020 and ended on 4 March 2021. Our interview guide was a questionnaire that enabled us to assess the endogenous knowledge of 60 herbalists on the knowledge of medicinal plants used for the treatment of urinary tract infections. The information was recorded on a data collection sheet. The samples were collected then identified at the Laboratory of the institute of research and agric development of N'Djaména-Chad. The collected data was entered into a database, then processed and analyzed statistically by using Excel 2016 spreadsheet and Xlstat software.

3. Results

3.1. Socio-Demographic Characteristic of Study Population

The ethnobotanic study that was realized in city of N'Djaména permitted to interrogated 60 traditherapists on the plants used in the treatment of urinary infections. The study showed that 37 (61.67%) of traditherapists were male and 23 (38.33%) were female, Table 1 illustred that from 60 traditherapists aged from 20 to 80 years 25 (41.67%) were from age groups between 30 to 50 years and 25 (41.67%) from age group between 50 to 70 years. Concerning the original of the knowledge, the study found that 48 (72%) of traditherapists inherited the

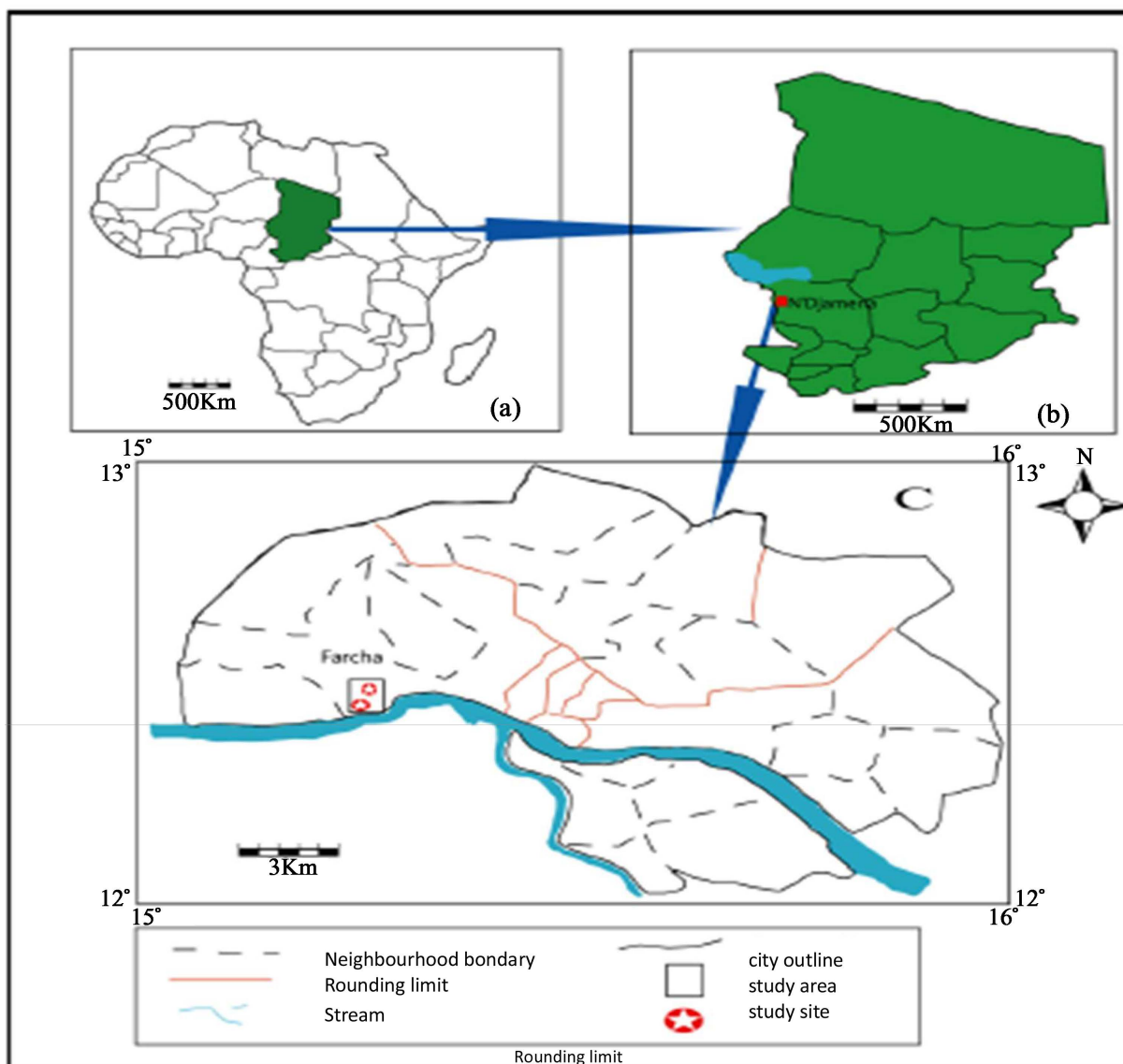


Figure 1. Map of N'Djamena city.

knowledge from their family and 49% from them attended a primary school.

3.2. Distribution of Traditherapists According to Their Ethnic

According to results of our survey, we found that 16% of traditherapists were from Sara ethnic and 12 % from Maraba (**Figure 2**).

3.3. Family and Plant Species Used in the Treatment of Urinary Infections

The medicinal plants used for the treatment of urinary tract infection by the herbalists of the population of N'Dajemena showed that 11 species of plants used for the treatment belonged to 11 botanical families. Several parts of these plants were used in traditional medicine, such as roots, bark, whole plant, stem and leaves (**Table 2**).

Table 1. Characteristic of study population.

Variables	(N)	Percentage (%)
Gender		
Male	37	61.67
Female	23	38.33
Total	60	100%
Age groups		
20 - 30 years	1	1.66%
31 - 50 years	25	41.67%
51 - 70 years	25	41.67%
≥70 years	9	15%
Total	60	100%
Source of knowledge		
Familial heritage	43	72%
Familial heritage plus training	9	15%
Training	8	13%
Total	60	100%
Educational level		
Illiterates	11	18.33
Primary level	29	48.33
Secondary level	20	33.34
Total	60	100

Legend: N = Study population; (%) = percentage.

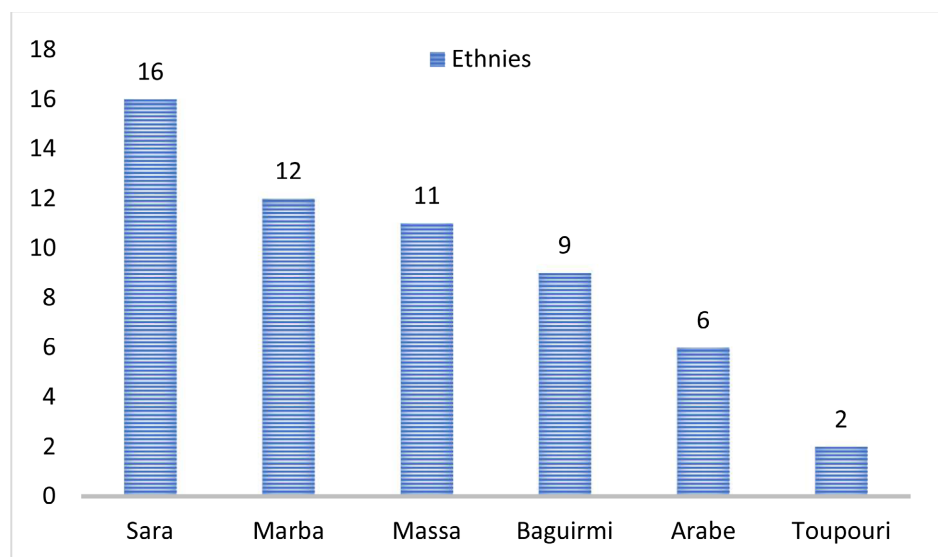


Figure 2. Distribution of traditherapists according to their ethnic.

Table 2. Family and plants species used for the treatment of urinary tract infection.

Family	Scientific name	Local names	Used parts	Preparation and posology
Rhamnaceae	<i>Ziziphus spina-christi</i>	Korno (arabic)	Leaves, bark	Maceration: half glass 3/dr thought to two weeks.
Césalpiniacées	<i>Cassia obovata</i>	Tor azarak (arabic)	Leaves seeds	Infusion and maceration 1 glass/dr thought to one week
Euphorbiaceae	<i>Euphorbia hirta</i>	Amalabane (arabic)	Whole plant	Maceration 1 glass 2/dr thought to one week
Fabaceae	<i>Cassia Tora</i>	Kawal (arabic)	Leaves, stem	Maceration and decoction half glass 2/dr thought to one weeks
Amaryllidaceae	<i>Allium sativum</i>	Toum (arabic)	Seeds, roots	Maceration one glass 3/dr thought to three days.
Moraceae	<i>Ficus capensis</i>	Kote mbay (sara doba)	leaves	Maceration one glass once after breakfast thought one week.
Apocynaceae	<i>Leptadenia hastata</i>	Am salup (arabic), rusa (sara)	leaves	Decoction 3/dr thought to two days
Anacardiaceae	<i>Sclerocarya birrea</i>	himet (arabic), bololo (sara)	leaves	Maceration half glass 2/dr thought to one week
Poaceae	<i>Schizachyrium exile</i>	Kororo katie (baguirmi), aye, gaway, himera (arabic)	leaves	Herbale tea half glass 2/dr thought to two days
Zygophyllaceae	<i>Balanites aegyptiaca</i>	Hidjilij (arabic)	leaves	Maceration, decoction and infusion every day for three days
Asteraceae	<i>Acanthospermum hispidum</i>	Rarousa (arabic)	leaves	Decoction one glass 2/dr thought to one week

Table 3 showed that the mainly plants used to treat urinary tract infections were *Ziziphus spina-christi* with the rate of 50%, *Cassia obovata* with the rate of 16.67% and *Euphorbia hirta* with the rate of 15%.

4. Discussion

This study conducted in eight quarters of the city of N'Djamena from 5 December 2020 to 4 March 2021, sixty traditherapists males and females participated in this study. The participation was higher in the male with the percentage of 61.67% against female with the percentage of 38.33%. This result confirmed the findings of other ethnobotanical studies conducted by [16] in Niger who found that in his study 85.70% of participants were male. On the other hand [17] and [18] in Moroccan Rif found in their study a predominance of women with percentage of 52.3%. The men's predominance showed the primary role they play in the exercise of their professions in the societies, as women tend to be absorbed in household. According to age, our study showed that tradiherbalists in the group age from 30 - 50 years and 51 - 70 years were more participated in this study with percentage of 41.66% for each. Same results found by [19] in Indonesia who reported that 50.8% of participants were between age ranged > 60 years, also [18] in Moroccan Rif reported that the tradiherbalists ranged age between 40 - 60 years

Table 3. Rate of plants species used in the treatment of urinary tract infections.

Family	Scientific name	Local names	Used parts	Numbre	Sollicitation rate (%)
<i>Rhamnaceae</i>	<i>Ziziphus spina-christi</i>	Korno (arabic)	Leaves, bark	30	50.00
<i>Césalpiniacées</i>	<i>Cassia obovata</i>	Tor azarak (arabic)	Leaves, seed	10	16.67
<i>Euphorbiaceae</i>	<i>Euphorbia hirta</i>	Amalabane (arabic)	Whole plant	09	15.00
<i>Fabaceae</i>	<i>Cassia Tora</i>	Kawal (arabic)	Leaves, stem	03	5.00
<i>Amaryllidaceae</i>	<i>Allium sativum</i>	Toum (arabic)	Seed, roots	02	3.33
<i>Moraceae</i>	<i>Ficus capensis</i>	Kote mbay (sara doba)	leaves	01	1.67
<i>Apocynaceae</i>	<i>Leptadenia hastata</i>	Am salup (arabic), rusa (sara)	leaves	01	1.67
<i>Anacardiaceae</i>	<i>Sclerocarya birrea</i>	himet (arabic), bololo (sara)	leaves	01	1.67
<i>Poaceae</i>	<i>Schizachyrium exile</i>	Kororo katie (baguirmi), aye, gaway, himera (Arabic)	leaves	01	1.67
<i>Zygophyllaceae</i>	<i>Balanites aegyptiaca</i>	Hidjilij (arabic)	leaves	01	1.67
<i>Asteraceae</i>	<i>Acanthospermum hispidum</i>	Rarousa (arabic)	leaves	01	1.67

were the most participated in his study with percentage of 40.9%. These results confirm that older people are more familiar with traditional herbal medicine than other age groups, and this explain why knowledge of the properties and uses of medicinal plants is generally acquired through long experiences and passes down from one generation to the other. The study found that (71.66%) of tradiherbalists learned about medicinal plants from family members, same results were obtained by [19] from Indonesia in a study of ethnobotanical study of medicinal plants used for treating urinary tract problems in eastern Indonesia, who reported that 57.0% of tradiherbalists learned plants used from family. [16] reported that in Africa the knowledge of medicinal plants had been orally passed from family members. Another study had revealed that 77% gained knowledge through observing their family members [20]. The threat of loss of acquired knowledge from generation to generation due to transmission between parents and younger generations is not always guaranteed [21]. The study discovered that 48.43% of participants had junior level and 33.34% had high school education, followed by 18.33% by uneducated. Meanwhile, we know that literation competency is related to education. In addition, the majority of the tradiherbalists of N'Djamena comes from rural areas. Our study showed that the 20% of tradiherbalists were from Sara ethnic and 12% from Maraba, also [22] in a study ethnobotanical study of latex plants in the Maritime region of Togo reported that 39.9% of tradiherbalists were from Ewe ethnic and 33.6% were from Ouatchi ethnic. The most used plants for treating the urinary tract infections were steeds followed by leaves. The reason for leaves and steeds as the primary plant material for the preparation of traditional medicine is their easy availability as both ingredients and drug preparation. Furthermore, leaves are also the site of

photosynthesis so that they might have a high content of metabolites [23].

Then, the organs (leaves and seeds) of species like *Ziziphus spina-christi*, *Cassia obovata* and *Euphorbia hirta* are used in our study for the treatment of urinary tract infections. The high frequency of leaf use can be explained by the ease and speed of harvesting, but also by the fact that the leaves are the seat of photosynthesis and sometimes the storage of secondary metabolites responsible for the biological properties of the [24]. The present study revealed that *Ziziphus spina-christi* is one of the most used plant species in the treatment of urinary tract infections with a rate of 50%. This claim corrupts those of [22], who reported that *Ziziphus spina-christi* and latex plants are most used by traditional healers in the maritime region of Togo against urinary tract infections. This could be due to its power for treating urinary tract infections in comparison with other species in the family. Botanical data reveal that the plant *Euphorbia hirta* is among the most used species in the three targets considered in the survey for the treatment of urinary tract infections. This species has been the subject of several studies that have shown the antimicrobial power of several species in this family. These include the work of [6] [25] on the antimicrobial properties of the plant *Euphorbia hirta*.

5. Conclusion

Based on the results, *Ziziphus spina-christi*, *Cassia obovata* and *Euphorbia hirta* are the most employed medicinal plants for treating urinary tract problems in N'Djamena. Their safety and efficacy have been proven by previous research. Hence, people far from health care facilities can adopt both plants as medication for treating urinary tract problems.

6. Suggestion

The results of the present study showed the existence of indigenous ethnomedicinal knowledge of medicinal plants for treating genito-urinary disease in Chad. Further research on phytochemical, pharmacological and other biological activities should be considered to discover new drugs from these documented plants.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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