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Research Article

THE FACTUAL STATE OF TRADITIONAL HERBAL MEDICINE IN THE HEALTH SYSTEM OF TAFILALET POPULATIONS (ORIENTAL HIGH ATLAS)

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ABSTRACT

In Morocco, the traditional herbal medicine is widely used: it is essential for populations in landlocked areas such as the High Atlas. The objective of this work is to present the current data on the different traditional therapeutic practices of medicinal plants used in the Tafilalt zone (High Atlas Oriental) using the ethnobotanical files submitted to 300 respondents. The analysis of the results obtained made it possible to identify 73 species of medicinal plants belonging to 68 genera and 33 families, the most represented being: Lamiaceae (10 species) and Asteraceae (7 species). The majority of the decoction-based remedies (59.66%) are the most commonly used (46.74%), and virtually all of the products obtained are administered orally (81.40%). Cooling conditions (43.02%) and digestive disorders (35.06%) are the most common pathologies associated with the use of medicinal plants in this region. Moreover, this study could provide a basis for future research in photochemistry and pharmacology, ethnobotanical files.

INTRODUCTION

The life of the prehistoric man was intimately connected with the vegetable nature till today. Rousseau and Raymond, (1945) explain how people in India used plants in every detail of their daily lives. For many centuries, plants have been the first and the most important therapeutic tool available to man (Carillon, 2009). Despite the dramatic development of modern medicine, medicinal plants still find their therapeutic indications in the treatment of a multitude of diseases in different societies and cultures, including in developed countries (De Smet, 2002; Eisenberg and *al,*1993); For example, the World Health Organization (WHO) estimates, especially in underdeveloped countries, that over 80% of the world's population use traditional treatments to meet their health and primary care needs (Farnsworth and *al*,1985) In Morocco, phytotherapy is an integral part of the local culture since the population has long been the repository of an endogenous knowledge which it has acquired empirically through the generations (Eddouks and *al*, 2007). Moreover, Morocco has a great diversity of biological, cultural and ethnic diversity and the population has a particular way of life linked to the natural environment. With 41 ecosystems and 7000 plant species (including 4500 species of vascular plants), Morocco constitutes in the Mediterranean a real phylogenetic reservoir (USAID, 2006). However, Morocco's vegetation has nearly 4200 species and subspecies that grow spontaneously among which at least 500 are potentially aromatic and / or medicinal and 250 are actually used (Sijelmassi, 1991). Moreover, in the mountainous and forest areas of Morocco, plants are an excellent and valuable resource for practical public health care since the majority of the population is faced with poverty and does not have access to the basic health care. Tafilalet area (Eastern High Atlas of Morocco) is a concrete example. The region's lack of geographical and economic access to care through modern medicine and the poor distribution of health centers and personnel are factors driving the local population to resort to traditional medicine. The purpose of this study is to identify all

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the plants which are used for therapeutic purposes by the local population and to collect all information relating to these uses. This is done in order to highlight the knowledge held by the local population in traditional herbal medicine.

MATERIALS AND METHODS

Framework of the study

The area concerned by this study is administratively part of the province of Midelt (region of Meknes-Tafilalet). This area is located at the heart of the Oriental High Atlas and belongs to the Er-riche and Imilchil circles. It is bounded on the east by the province of Figuig, on the west by the province of Beni-Mellal, on the north by the plain of the province of Midelt and on the south by the province of Er-Rachidia (Fig.1). The area is characterized by a very rugged relief and an altitude varying from 1400 to 1800 m. The highest peak is Jbel El Ayachi with 3750 m altitude (HCP, 2013). The strong topographic gradients and the variation of the exposure make the bioclimates decline in several variants. The semi-arid bioclimate (generally encountered in Imilchil) is characterized by a cold to very cold winter (-9.5 ° C) and a very hot summer (32 ° C). Snowfall can take place in December at altitudes above 1800 m; the rainfall is of the order of 250 to 300 mm / year. The pre-saharan and arid bioclimate in cool temperate winter is marked at the circle of Er-rich by a rainfall of between 120 and 180 mm; temperatures range from -2°C in winter to 35°C in summer. In addition, the area is characterized by three types of soils (Cavalla, 1950): chestnut and light chestnut with encrusted horizon extending from Gourrama to M'zizl; It develops mainly on Mesozoic rocks covered by *Artemisia herba-alba* and *Peganum harmala*. Between M'zizl and Outarbate there is a brown and skeletal soil intersected by large Mesozoic limestone rock faces and covered with dry plant formations composed mainly of *Juniperus phoenicea* and *Buxus balearica*. The soil in Imilchil is podzolized bearing *Juniperus thurifera* which is in critical degradation state and Artemisia, on Mesozoic limestone rocks.

Method of study

This is a descriptive study through which we studied the use of medicinal plants in traditional herbal medicine by the local population of the southern slope of the Oriental High Atlas. The survey was carried out in June 2014 with 300 randomly selected persons in 17 strata (2 urban and 15 rural communes) defined according to the stratified sampling method (Kahouadji, 1986) and to soil and climate descriptors (Fig. 1). The proportion of the number of people in each stratum is related to the number of the recorded medicinal plants; thus, the size of each sample was rounded to more than 20 respondents. The population covered by this study consists of all persons aged 18 years and over. The individual interviews were conducted by using open, closed, direct and indirect questions in Arabic or amazigh with a translator. The questionnaires were based on the informant (age, sex, family situation, therapeutic practices,...) and the used medicinal plants (vernacular name, part used, method of preparation, diseases treated ...). Species identification was carried out in situ in the field and from the herbarium in the laboratory by using botanical works such as "Practical Flora of Morocco by Fennane *et al* (2007 and 1999)", and "The traditional Moroccan pharmacopoeia, ancient Arab medicine and popular knowledge of Bellakhdar (1997)". The collected data was subjected to statistical analysis by "Microsoft Office Excel".

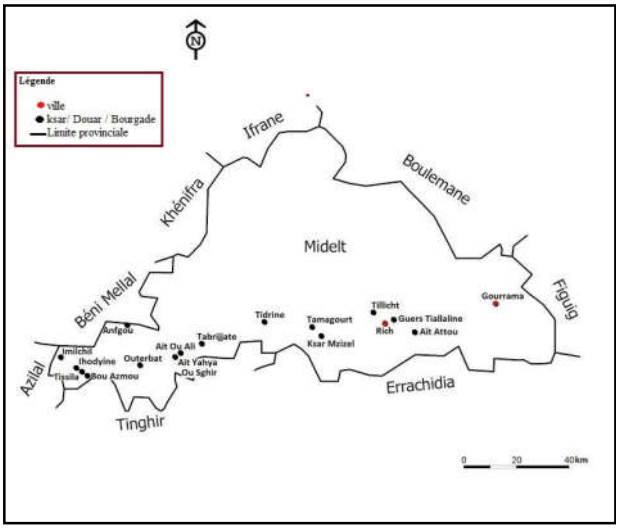

Figure 1 Map of distribution of ethnobotanical survey points in the Tafilalt region (Eastern High Atlas).

RESULTS

The collected information about the informant is shown in Figure 2. The survey of the local population of Tafilalet shows that 56.37% of respondents address their daily ailments by using both modern and traditional medicine while 29.09% exclusively use herbal medicine and 14.54% use modern medicine alone (Fig.2a). The distribution of the frequency of use of medicinal plants by age group (Fig.2b) shows that at the level of the study area, the age groups [51-61 [have a frequency of 40, 45% followed by the other age groups [41-51 [, [31-41 [,> 61 and [20-31] with 36, 48%, 32, 43%, 17,56% and 9, 45%. Moreover, the results show that among the individuals who use traditional medicine, 52% are women and 48% are men (Fig.2c). These results also show that the illiterate and those educated in primary school have a high frequency of use of medicinal plants with 40.27% and 35.51% respectively (Fig.2d) while those of the secondary school and university rely less on traditional medicine (secondary school 14.88%, university 9.34%).

The used parts of the medicinal plants, their preparation mode and administration, and the treated conditions are shown in charts a, b, c and d (fig.3). The majority of these recipes are prepared mainly from leaves (46.74%), leafy stems (18.77%) and seeds (11.11%). The other parts of the plants, namely bulbs, barks, flowers, fruits, whole plant, stems and roots show only 23.38% (Fig. 3a). Various operating instructions are used in this region (fig.3b); decoction is the most common method of use (59.66%), followed by powder form (15.03%) and infusion (11.30%). Other forms of preparation (poultice, raw, fumigated, cooked and other) have a cumulative percentage of 14.01%. Almost all traditional remedies are administered orally (81.40%), the remaining modes of administration are rarely used (Fig. 3c). In addition, analysis of the information collected shows that chilling diseases (43.02%) and the digestive system (35.06%) are the most frequently treated therapeutic indications by medicinal plants in the local population (Fig.3d).

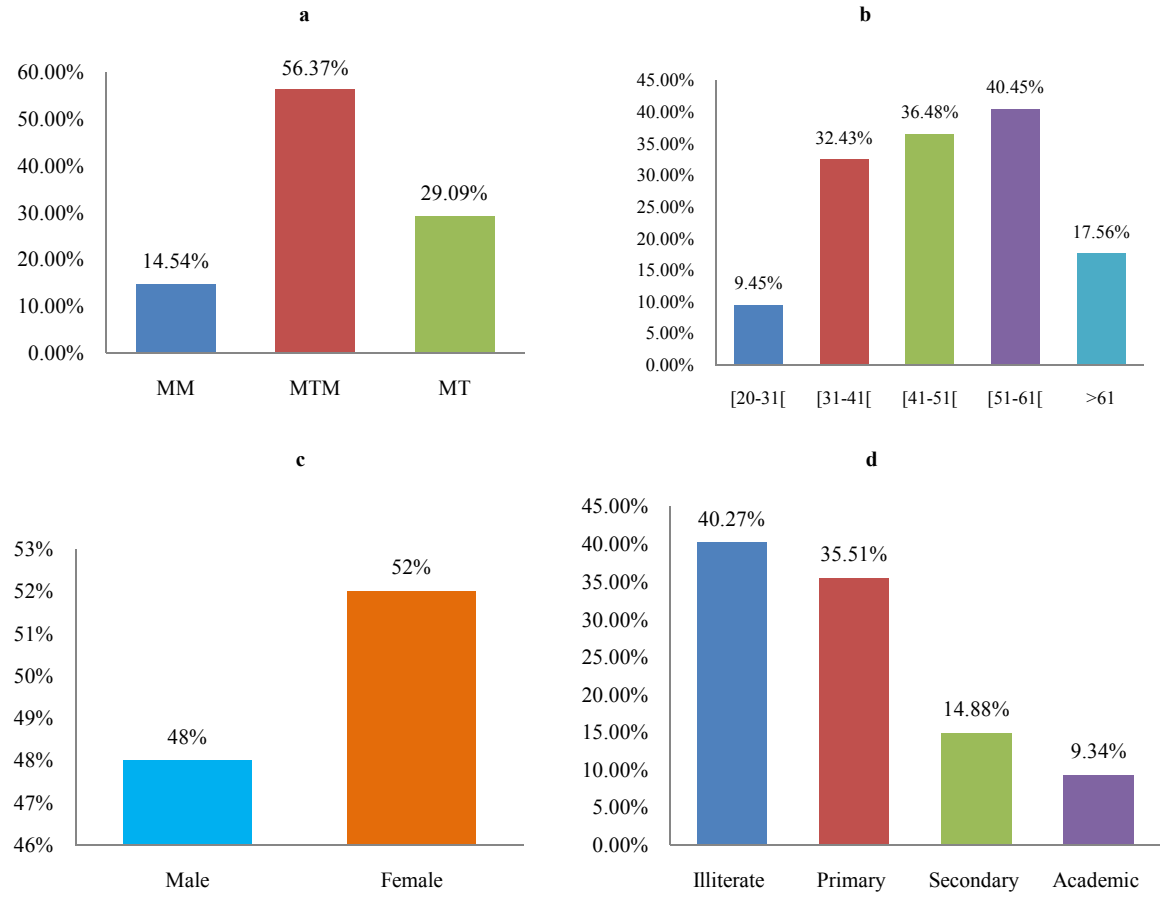

Figure 2 Distribution of users of medicinal plants according to the choice between herbal medicine and modern medicine (a), age (b), sex (c), and education level (d). MM: modern medicine. MTM: traditional and modern medicine. MT: traditional medicine.

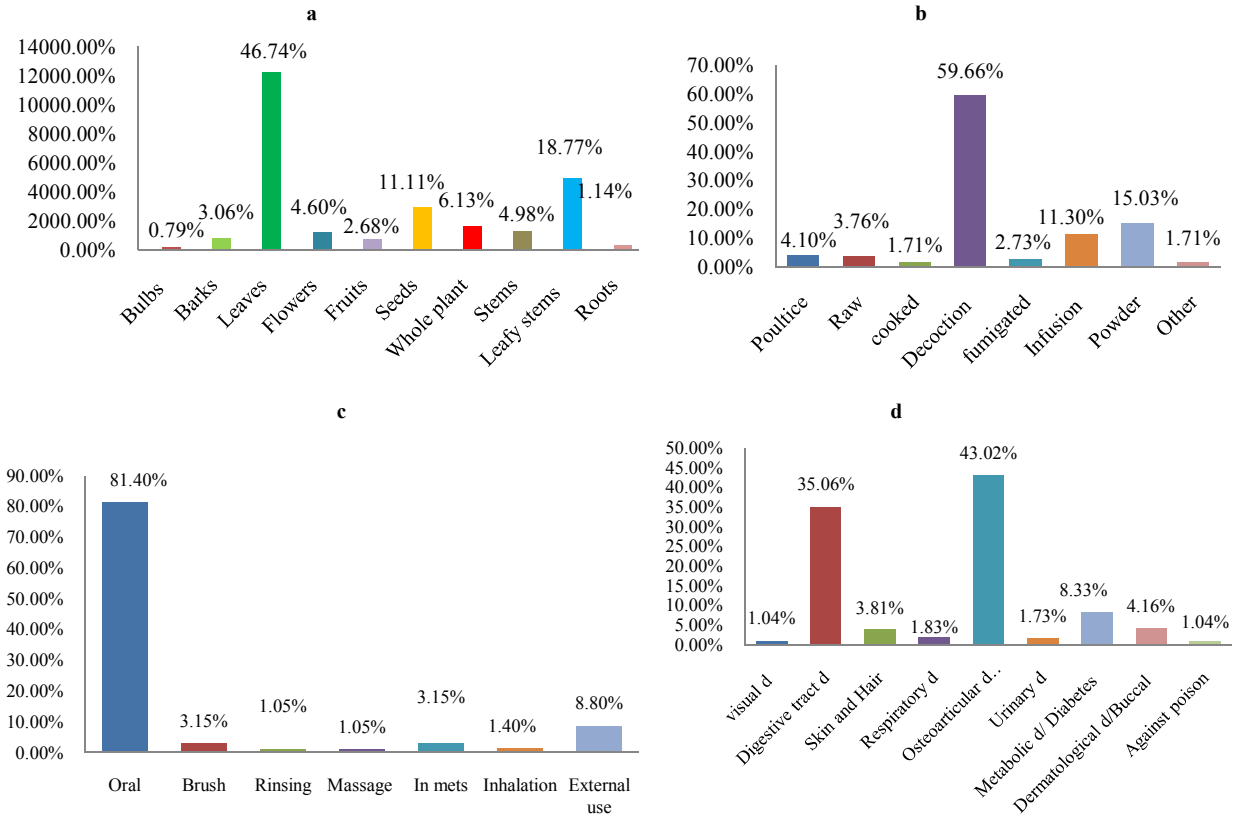

Figure 3 Ethobotanic and pharmacological aspects: the part used (a), the method of preparation (b), the mode of administration (c), and the therapeutic indications (d).

The used parts of the medicinal plants, their preparation mode and administration, and the treated conditions are shown in charts a, b, c and d (fig.3). The majority of these recipes are prepared mainly from leaves (46.74%), leafy stems (18.77%) and seeds (11.11%). The other parts of the plants, namely bulbs, barks, flowers, fruits, whole plant, stems and roots show only 23.38% (Fig. 3a). Various operating instructions are used in this region (fig.3b); decoction is the most common method of use (59.66%), followed by powder form (15.03%) and infusion (11.30%). Other forms of preparation (poultice, raw, fumigated, cooked and other) have a cumulative percentage of 14.01%. Almost all traditional remedies are administered orally (81.40%), the remaining modes of administration are rarely used (Fig. 3c). In addition, analysis of the information collected shows that chilling diseases (43.02%) and the digestive system (35.06%) are the most frequently treated therapeutic indications by medicinal plants in the local population (Fig.3d).

The botanical families and their specific richness as well as the medicinal plants most cited by the population made it possible to draw the graphs of Figure 4. It must be said that 74 species of medicinal plants belonging to 69 genera and 33 families have been identified. The most represented family is the Lamiaceae (13.51%) with 10 species, followed by the Asteraceae (8.10%) with 6 species (Fig. 4a). Species such as *Artemisia herba-alba* and *Rosmarinus officinalis* have a very high frequency of use (32 quotations each). They are followed by *Thymus zygis* (24), *Mentha suaveolens* (20), *Mentha pulegium* (16), *Origanum compactum* (12), and *Juniperus phoenicea* (9).

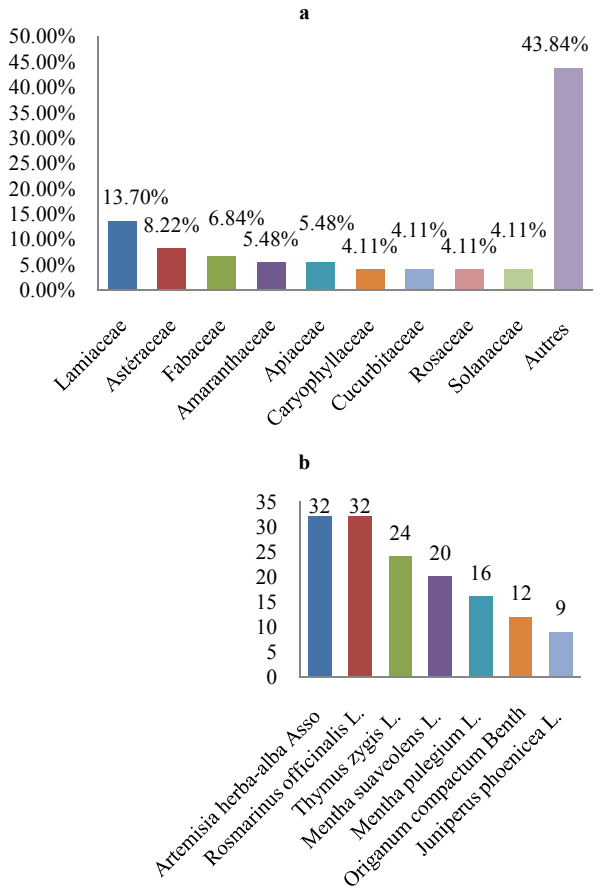

Figure 4 Floristic aspect: Specific richness of the listed families (a), the most cited medicinal plants (b).

DISCUSSION

Demographic aspect

The results in figure 2 show the obvious dependence of the local Tafilalet population on medicinal plants to treat their daily ailments. Indeed, more than 85.46% of the people interviewed in this survey practice herbal medicine, with 29.09% using plants alone while 56.37% using plants in combination with conventional medicines. The use of traditional treatment by the local population is explained by the low cost first and then by the difficulties of access to the health centers. Nevertheless, 14.54% of those surveyed opted for modern medicine finding it to be more effective and less toxic compared to herbal medicine. Moreover, the results show that the use of traditional medicine is noted in all age groups with predominance in people over the age of 51 years. This is explained by the fact that the elderly are the repositories of local knowledge which they have acquired empirically from one generation to the next; this age group also represents family authority as stated by Lakouéténé *et al.*, (2009). The results also show that 52% of respondents who use traditional medicine are females with an average age of 56 years. This is consistent with the fact that the age group above 51 years predominates. In Moroccan society, especially in rural areas, it is the woman who deals with the medication of the family members, hence the relatively greater proportion of the female sex among the users of medicinal plants. Moreover, among the respondents, 75.78% have a level of education at most equivalent to that of primary school. Indeed, according to the general census carried out in 2004 by the High Commission for Planning, illiteracy in the province of Midelt reached high levels, particularly among females, with 39.4% for men and 63.4 % for women (HCP, 2004).The high illiteracy rate means that the use of medicinal plants is not always beneficial especially when it is practiced by ignorant people and little aware of the possible nuisances of this therapy.

Ethnobotany and pharmacological aspects

Different parts of the plant are exploited by the local population to satisfy their therapeutic needs. In the study area, leaves, leaf stems and seeds are the most commonly used organs. The organ of a species is a function of the utility sought by the population as well as the endogenous knowledge related to the use of the organ (Dossou and *al.*, 2012). It is also noticed that the used organs vary greatly from one species to another. In fact, the leaves of *Origanum compactum* are cited as the most frequently used, followed by the leafy stems of *Rosmarinus officinalis* and the seeds of *Peganum harmala*.

The durability and availability of a medicinal species depends, on the one hand, on the part of the plant used and on the other hand on the mode and intensity of the harvesting of the plants, from which it is necessary to sensitize the local population on the rational techniques of harvesting the organs of the plants so as not to compromise the sustainability of the species and to be able to benefit from the ecosystems and natural resources sustainably. Moreover, a great diversification in the methods of preparation of the remedies was noticed. The inventory of these recipes showed that decoction is the most common form of medication, as the local population believes that heat suppresses the toxicity of plants and allows the extraction of active ingredients. Extraction in this case is done by water, universal extraction solvent, while olive oil is often used as a solvent for

massage and preparation of masks. Most remedies are administered orally in the form of decoction, infusion or powder. This can be explained by the need to overcome the frequent affections of the digestive apparatus as well as those osteo-articular and cooling which are very frequent and are due to the severe cold conditions in winter.

Floristic aspect

According to the obtained results, the families of Lamiaceae and Asteraceae comprise the majority of the medicinal plants used in traditional herbal medicine by the local population. These results are consistent with those obtained by Kahouadji (1995) and Benlamdini (2014) in another part of eastern Morocco. It should be noticed that some species in this area, namely *Artemisia herba-alba*, *Rosmarinus officinalis*, and *Thymus zygis*, are overexploited because of their therapeutic properties. They are in fact uprooted or cut down even before their fruiting, which considerably compromises their regeneration. Caring about the population during the harvesting medicinal plants and their sensitization to a rational exploitation are necessary for a sustainable management of the natural resources.

CONCLUSIONS

The ethnobotanical surveys carried out in the Tafilalet area (the eastern High Atlas of Morocco) revealed that nearly 30% of the local population relies exclusively on traditional medicine in order to cure their daily ailments and 56% combine it with modern medicine. The use of natural treatments in this region is linked to poverty, the high cost of medicines and the remoteness of health centers. The medicinal plants usage is practiced by both sexes with a slight predominance of women. The age groups between 31 and 61 years of age are the most involved in phytotherapy as well as illiterates and those whose level of education does not exceed the primary school. The most widely used part of the plant is the leaf in the vast majority of traditional remedies and the decoction is the most used mode of preparation. The majority of the administration is oral. The floristic analysis allowed for the identification of 74 plant species used for medicinal purposes; they belong to 69 genera and 33 families. The therapeutic uses mainly concern the osteo-articular affections, the chilling and diseases of the digestive system. Families of Lamiaceae (10 species) and Asteraceae (6 species) are the most represented. Some species such as *Artemisia herba-alba* and *Rosmarinus officinalis* are over-exploited so that their perenniality is threatened. Thus, the adoption of a new management approach must be involved throughout the population by the NGOs because it is necessary for the safeguarding and preservation of natural resources. Moreover, this empirical know-how should be supervised by scientists through extension actions to avoid the problems inherent in the misuse of the plant. The most widely used medicinal plants whose virtues have been confirmed throughout the generations should be highlighted by the extraction of essential oils and bioactive molecules.

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