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## Diversity of medicinal plants used on oral disease in the city of Meknes, Morocco

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### Abstract

In order to study aromatic and medicinal plants (AMP) used on oral diseases in Meknes city-Morocco; an ethnobotanical study was conducted among herbalists operating traditional medicine sector in the city. This study was carried by using ethnobotanical surveys from January to March 2018, with 50 herbalists in 15 neighborhoods by using questionnaire forms. The study identified 42 species belonging to 24 families. The most representative families are: Lamiaceae (10 species), Myrtaceae (3 species) and Juglandaceae (1 species). Leaves, stems and twigs are the most used plant parts and decoction was the mostly cited way for several plants species.

**Keywords:** Ethnobotany, medicinal plants, oral disease, Meknes (Morocco)

### 1. Introduction

Since antiquity, human societies have been treated with the plants <sup>[1]</sup>. The great ancient civilizations resorted to plants for their medicinal properties, by smoking as well as ritual uses <sup>[2]</sup>.

Medicinal plants have always been associated with cultural behaviors and traditional knowledge. According to the World Health Organization statistics (WHO), 80% of the world's population use traditional medicines to satisfy primary health care needs <sup>[2]</sup>. It pushes in the world more than 20000 species of plants, for culinary uses, medicinal or cosmetic, of which 50% is used in pharmaceutical industry <sup>[3]</sup>.

The geographical situation of Morocco, constitute a climate and a framework favorable to the culture of a rich and varied flora. from 7,000 existing species and subspecies, there are about 537 endemic species of the country and 1625 rare or threatened species <sup>[4]</sup>. Morocco occupied first place in the South Mediterranean countries for his wealth on endemic plants <sup>[5]</sup>. Indeed, there is a real traditional therapeutic arsenal of recipes and practices in Morocco, the traditions and beliefs are, transmitted through the generations and / or collected from herbalists, enriched by personal experiences or those of closer persons. These traditional practices are related to several parameters such as age, sex, educational level, disease type, family of plants used and knowledge of plant toxicity <sup>[6, 7]</sup>.

The present work aims to carry out a survey, according to the herbalists in Meknes city of Morocco on using plants to cure oral diseases.

### 2. Material and methods

#### 2.1. Study area

According to the Moroccan High Commission of the Plan (HCP 2016) <sup>[8]</sup> the city of Meknes spread over an area of 1786 square kilometers. The city is located between two sets of mountains: the Pre Rif and the Middle Atlas. The other hand the Meknes city is located at the intersection of major communication arteries between the different cities of the Kingdom of Morocco (Figure 1).

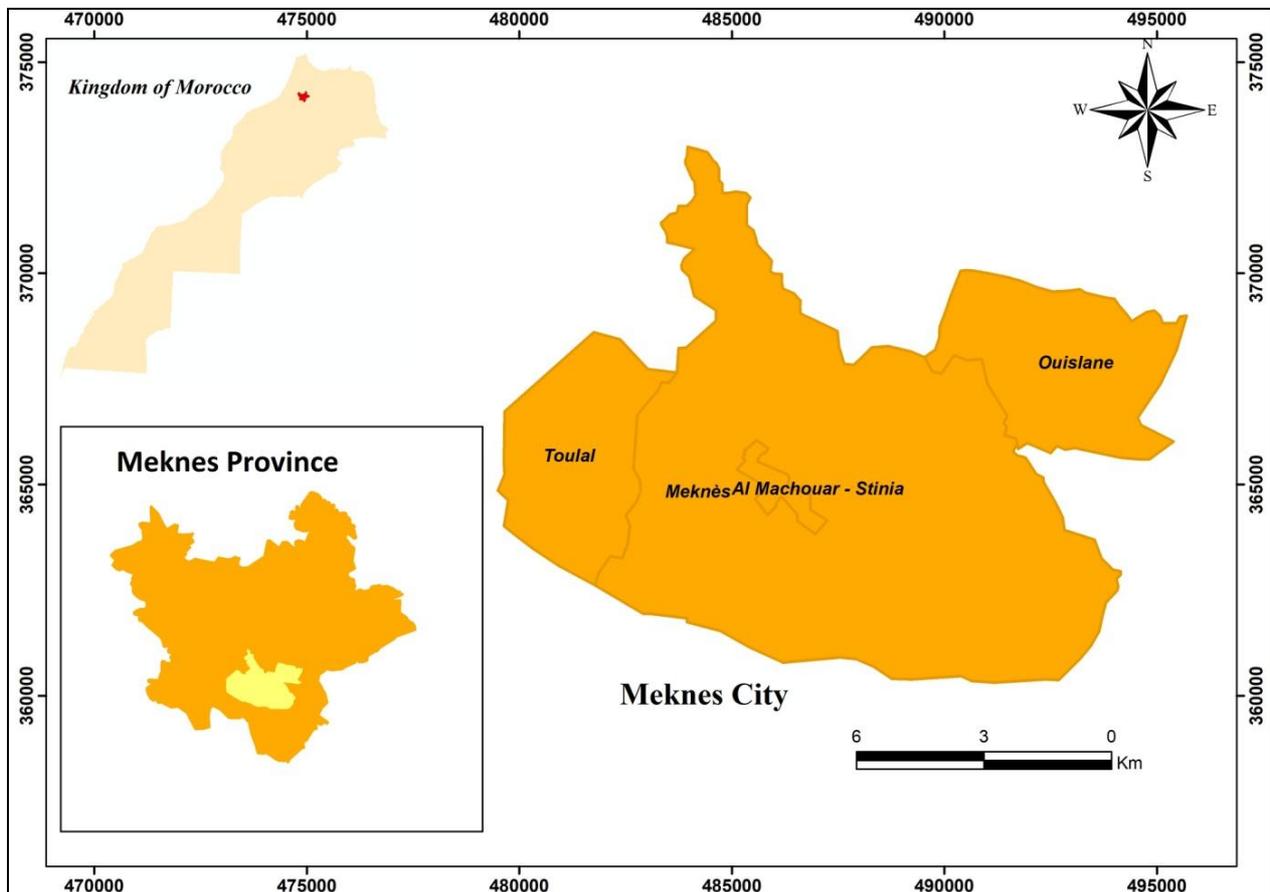


Fig 1: Location map of Meknes city-Morocco

## 2.2. Ethnobotanical survey

A field campaign spread over 3 months (January-March 2018) was carried out in Meknes city, close to the herbalists. Thus, in order to know the maximum of plants used as a treatment for dental diseases by the population in the study area.

At first, a random draw is made in the target population. Then, each of the individuals selected in this first draw is asked to include k «friend (s)» in the survey.

The latter is admitted in the survey if they are not already present, that is, they are not part of the initial draw. Finally, we can iterate this operation s times. Such a sampling procedure is called the snowball sampling procedure with s steps and k names [9].

In the second phase, field visits were initiated to the city's

herbalists. Each respondent was interviewed more than 45 minutes in order to give eight plants on average; at each interview. The data collected includes all information for the plants involved in this study: local name of each plant, its origin, abundance, used parts, plants type, preparations mode, Galenic forms, and administration route.

## 2.3. Statistical analysis

All the results obtained were collected and analyzed by using the descriptive statistics, computer software (Excel 2007) in order to identify plant diversity used for oral diseases.

## 3. Results and Discussions

### 3.1. Solicited plant diversity for oral use

Table 1: Medicinal plants list used on oral diseases according to the herbalists

Scientific name	Local name /Plant name	Floristic aspect	Use Percentage
<i>Origanum compactum</i>	Zaatar / Oregano	Herbaceous plant	13,62%
<i>Syzygium aromaticum</i>	Lakranfal / Clove	Tree	12,69%
<i>Juglans regia</i> L.	Swak/Walnut	Tree	12,07%
<i>Olea europaea</i> L.	Waraq zaytoun /Olive	Tree	8,05%
<i>Punica granatum</i> L.	Kchour roman /Pomegranate peel	Tree	7,43%
<i>Myrtus communis</i> L.	Rayhan /Myrtle	Shrub	5,26%
<i>Ammi visnaga</i> L.	Lbachnikha/Cumin	Herbaceous plant	4,95%
<i>Camellia sinensis</i>	Hboub atay/Green tea	Shrub	3,72%
<i>Thuya orientalis</i>	Elaafs /Thuya	Tree	3,72%
<i>Artemisia herba alba</i>	Chih /White wormwood	Herbaceous plant	3,10%
<i>Mentha pulegium</i>	Flio /Pouliot Mint	Herbaceous plant	2,17%
<i>Salvadora persica</i>	Oud arak /Wood of araq	Shrub	2,17%
<i>Nerium oleander</i> L.	Dafla /Oleander	Shrub	1,86%
<i>Pistacia atlantica</i> Desf.	Labtam /Atlas pistachio	Tree	1,86%
<i>Anacyclus pyrethrum</i> L.	Ikandaz /African pyrethrum	Herbaceous plant	1,55%
<i>Thymus bleicherianthus</i> Pomel	Zeitra /Thyme	Herbaceous plant	1,55%
<i>Acacia raddiana</i>	Esalaha /Acacia	Tree and shrub	1,24%
<i>Glycyrrhiza glabra</i> L.	Aark sous /Licorice	Herbaceous plant	1,24%

<i>Lavandula angustifolia</i>	Lakhzama /The lavender	Shrubs	1,24%
<i>Foeniculum vulgare</i>	Nafaa /Fennel	Herbaceous plant	0,93%
<i>Matricaria camomilla</i> L.	Elbabonj /Chamomile	Herbaceous plant	0,62%
<i>Eucalyptus globulus</i>	Lkalibtous /Eucalyptus	Tree	0,62%
<i>Pimpinella anisum</i> L.	Lyansoun /Green anise	Herbaceous plant	0,62%
<i>Peganum harmala</i> L.	Elharmal /Harmal	Herbaceous plant	0,62%
<i>Majorana hortensis</i> Moench.	Mardadouch /Marjoram	Herbaceous plant	0,62%
<i>Rosmarinus officinalis</i> L.	Azir /Rosemary	Shrubs	0,62%
<i>Salvia officinalis</i> L.	Soja /Sage	Subshrub	0,62%
<i>Citrus limonum</i> L.	Alaymoun /The Lemon Tree	Small tree	0,62%
<i>Marrubium vulgare</i> L.	Mariwta /The white horehound	Herbaceous plant	0,62%
<i>malus domestica</i>	Atafah /Apple	Tree	0,31%
<i>Cassia absus</i> L.	Elhaba sawda /Black beans	Shrub	0,31%
<i>Cinnamomum burmanni</i>	Elkarfa /Cinnamon	Tree	0,31%
<i>Alpinia officinarum</i> Hance	Elkhodanjel /Galanga officinal	Herbaceous plant	0,31%
<i>Laurus nobilis</i>	Waraq sidna moussa /Laurel sauce	Shrub	0,31%
<i>Linum usitatissimum</i>	Zariaat al katan /Lin	Herbaceous plant	0,31%
<i>Mentha spicata</i>	Naanaa /Mint	Herbaceous plant	0,31%
<i>Teucrium Polium</i> L.	Jeidiya /Pennyroyal	Herbaceous plant	0,31%
<i>Capparis spinosa</i> L.	Al kabar /The common caper	Shrub	0,31%
<i>Rosa Damascena</i>	Lward lfilali /The Rose of Damascus	Shrub	0,31%
<i>Curcuma longa</i>	Al kharkoum /Turmeric	Herbaceous plant	0,31%
<i>Lepidium sativum</i> L.	Elharf /Watercress	Herbaceous plant	0,31%
<i>Salix alba</i>	Waraq safsaf /White willow	Tree	0,31%

According to Table 1, 42 medicinal plants distributed into 24 family was identified in the study area (Figure 2). It therefore appears that in Meknes city, as in many other Moroccan regions, many developing countries in Asia, Africa and Latin America, large populations, mainly rural, depend on herbal medicine for the treatment of dental diseases. This is due to the accessibility of this type of care given its affordability, but also to the difficulties of access to medicine [10, 11, 12].

The most represented families are: Lamiaceae (10 species). It is also the family of medicinal plants more used in Morocco and Mediterranean countries [13, 14]. The other families of plants are Myrtaceae (3 species) and Juglandaceae (1 species). It is quite clear that *Origanum compactum* (zaatar), *Syzygium aromaticum* (laqranfal) and *Juglans regia* L. (swak) are the most cited plants followed by *Olea europaea* L. (ourak zaytoun), *Punica granatum* L. (kochour araman), *Myrtus communis* L. (rihane), *Ammi visnaga* L. (al bachnikha), *Thuya*

*orientalis* (dbagh), *Camellia sinensis* (chay al akhdar), *Artemisia herba alba* (chih), while the other species have percentages less than 3% (Figure 2).

Contrary to Fadil *and al* [15] who found, according to an ethnobotanical study in the Meknès-Tafilalet region on the plants exploited by cooperatives and associations that *Rosa centifolia* Mill (lowered lfilali) and *Trigonella foenum-graecum* L (lhalba) they are the most frequently used, whose treated pathologies are usually toothache, inflammations and gum abscesses, canker sores and bad breath. On the other hand, results concerning oregano, which is mostly used in the form of essential oil, are consistent with the work of Békro *and al* in 2010 [12] who evaluated the antibacterial effect of essential oi from different species of this plant against a virulent causal strain of Aggressive periodontitis, the results were very satisfactory.

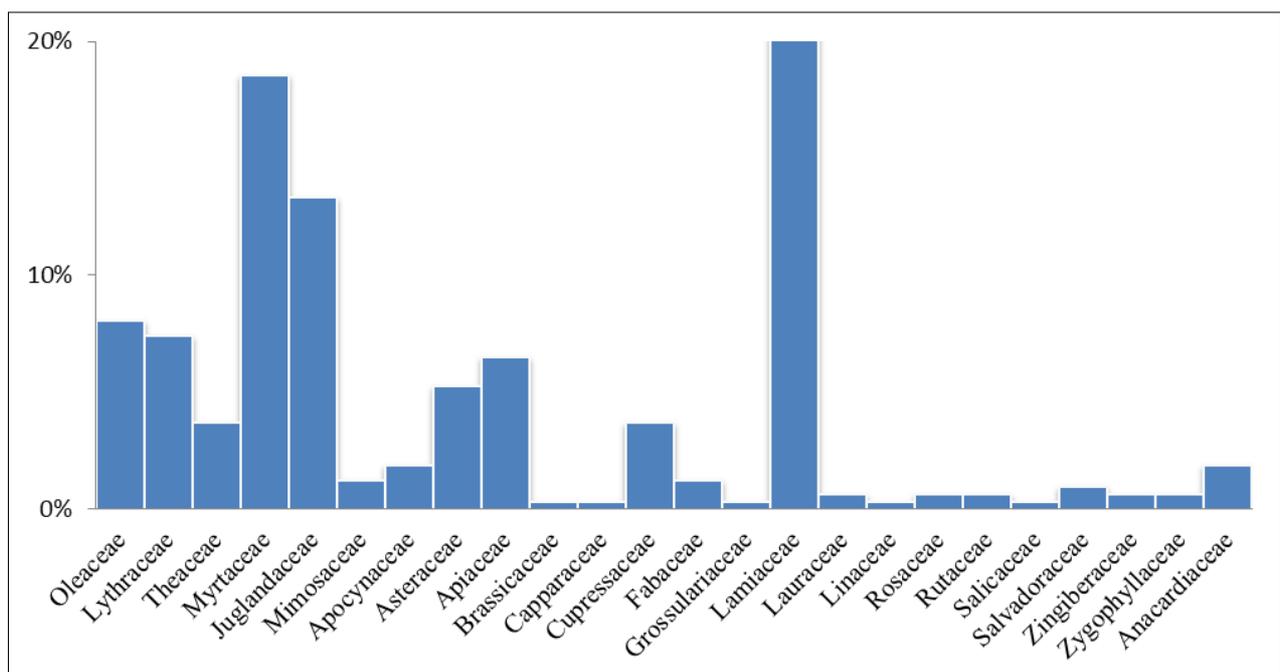


Fig 2: Plants families list for dental use

### 3.2. Origin and plants abundance

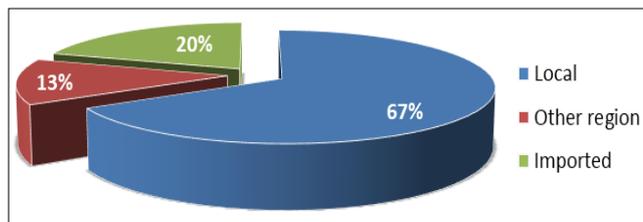


Fig 3: Plants origin

Most of plants are locally sourced (figure 3), so that natural resources must valued in the study area. Species abundance (figure 4) found gives us the opportunity to go further for a

Synthesis or formulation on an industrial scale of a treatment against infectious diseases of the oral cavity.

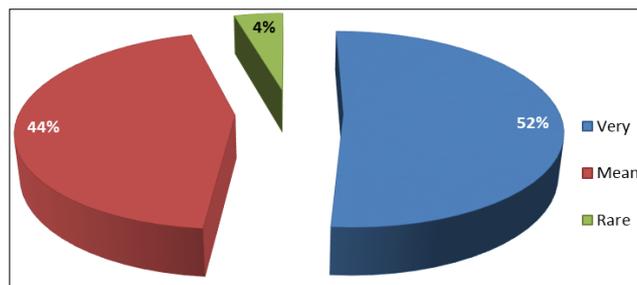


Fig 4: Plants abundance

### 3.3. Plants type

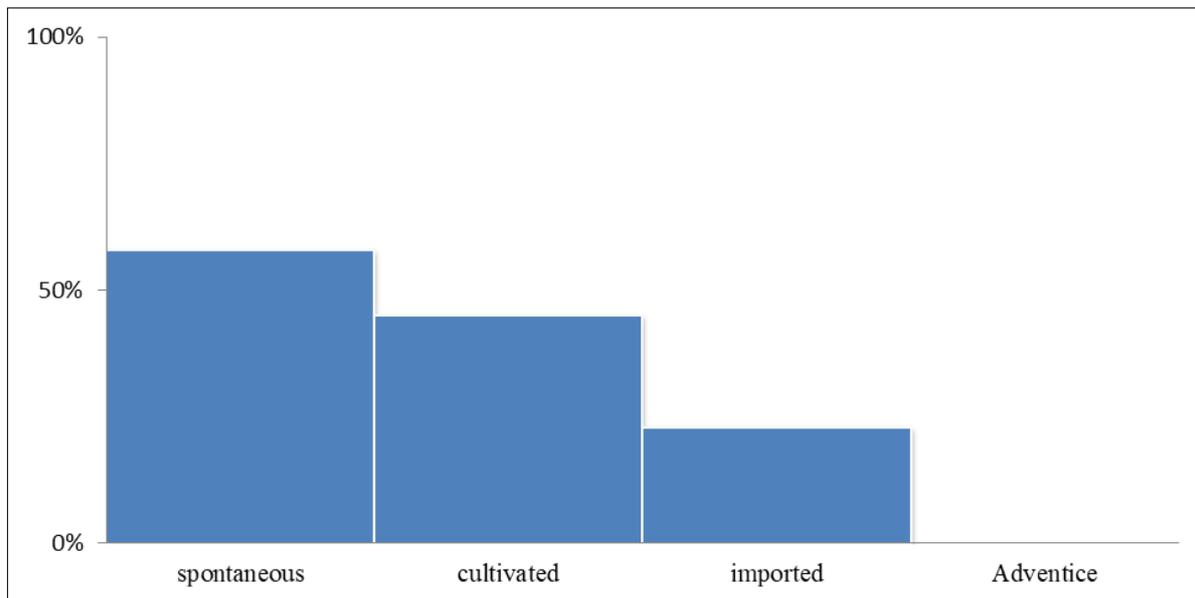


Fig 5: Plants type

Most of the solicited plants are spontaneous (figure 5) followed by those cultivated then the imported one, this shows well the richness of the study zone in spontaneous

medicinal plant used to cure this pathologies.

### 3.4. Used parts of plants

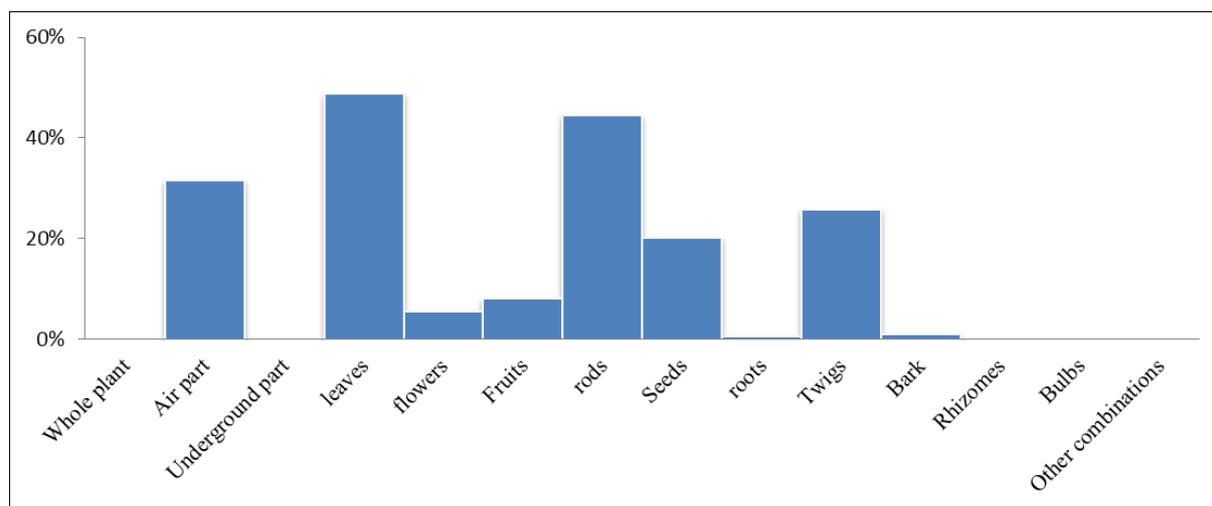


Fig 6: Used parts of plants

Almost half of respondents (figure 6) say that leaves are the most used part of plants (48.92%), which is consistent with the results of several studies that report leaves are the most used part in medicinal recipes [16, 17, 18], this is due to the

Storage of secondary metabolites responsible for the biological properties of the plant [19], the stems come second (44.58%) followed by the aerial part of certain plants (31.58%).

### 3.5. Preparation Method

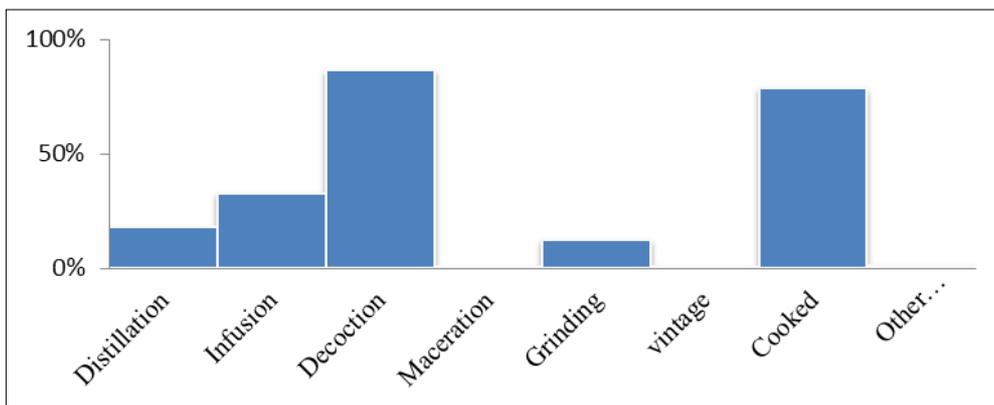


Fig 7: Preparation mode

Figure 7 shows that the decoction is the most used form and also the most recommended by herbalists. (86.69%) because it is often reported that the decoction allows to collect the most active ingredients and attenuates or cancels out the toxic effect of certain recipes [20]. The following form of use are

cooked way (78.64%), infusion (32.51%) and hydro-distillation (18.27%) for some plants.

### 3.6. Galenic form

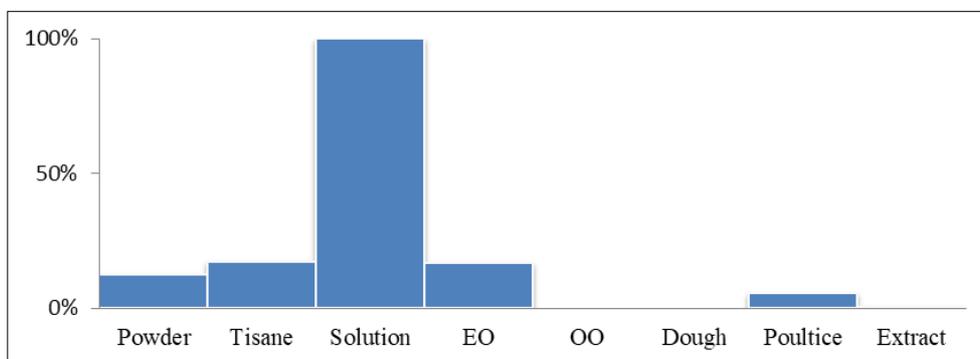


Fig 8: Galenic form

The most cited Galenic form (figure 8) is: solution (100%), tisane (17.34%) and EO (17.03%).

### 3.7. Administration Route

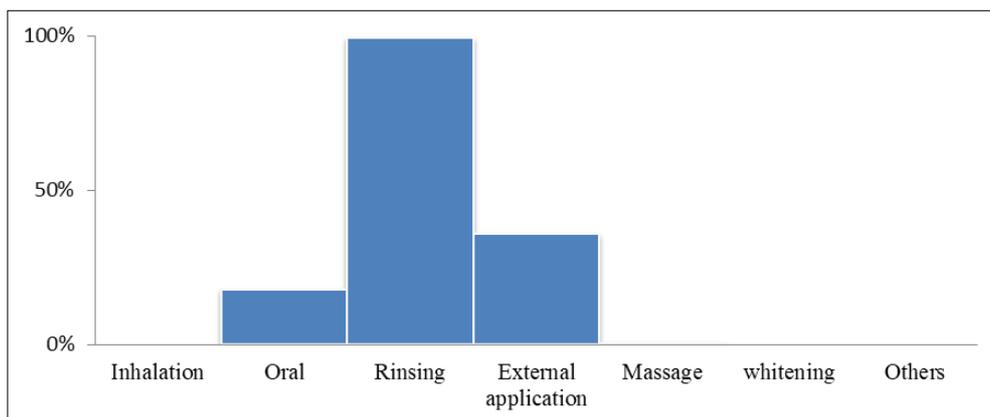


Fig 9: Administration route

According to the herbalists (figure 9) the rinsing of oral cavity has the most remarkable effect (99, 38%), the external application on the surfaces of the teeth or gum (35, 91%) and finally by oral route (17.96%), including the case of herbal teas for example. it is important to note that herbal medicine is not a harmless treatment, some medicinal plants are toxic, others may have cumulative side effects. Plant knowledge and respect for their indications are fundamental for safe herbal practice [21].

### 4. Conclusion

The present study allowed us to inventory the various aromatic and medicinal plants sold and prescribed by the herbalists of Meknes city, for the traditional use on oral diseases. We have inventoried 42 species spread over 24 families, the most represented were Lamiaceae, Myrtaceae and Juglandaceae.

This survey can be considered as a source of information contributing to a better knowledge of the Moroccan flora and

the local popular know-how; moreover, these data can constitute a database for the valorization of the recipes based on the medicinal plants used on oral diseases and the development of toothpaste or a natural product based on medicinal plants.

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