RISK OF INTOXICATION THE PLANTS MORE USED IN HERBAL MEDICINE IN MOROCCO

El Yahyaoui El Drissi A.*,1, Khouchlaa A.2, Bouyahya A.3, Chebat A.1,2, Soulaymani Bencheikh R.2, Talbaoui A.1, Bakri Y.1, Tijane M.1

1Biology Laboratory of human pathologies, faculty of sciences) Center of genomics of human pathologies University Mohammed V of Rabat-Maroco.
2National Center for Pharmacovigilance, Rabat.

ABSTRACT

Plants constitute a rate of 5.1 % of the indicated poisonings, during the period 1980 to 2002, in the anti-Poisons center of Morocco (APCM), any confused causes, except the stings and the scorpionic envenomations, taking into account the sub-notification of the cases of plant poisoning. A retrospective study of all the cases of medicinal plant poisonings, collected in the Anti-poison and the Pharmacovigilance center of Morocco (APCM), at a duration of twenty eight years going from January 1980 to December, 2012, showed a frequency of mortality by healing plants used for the cancer treatment which not exceeding a rate of 1%. On the other hand, the Symptomatic distribution showed that the majority of the cases of poisonings were unknown (30%), followed by digestive signs (12%) and by thermal disorders (10%). Among these species, we have selected the most used plants in herbal medicine in Morocco. The main plants that caused poisoning in Morocco in recent years, according to the APCM, there are Peganum harmala (50%), Nigella sativa (11%), Lawsonia inermis (7.5%), oleander (5.8%) Dysphania ambrosioides (5.1%). Twelve non-toxic plants can become toxic because they contain phytochemicals, such as Camellia sinensis (Green tea), Artemisia absinthium (Chiba) and Zingember officinale (Skengbir).

KEYWORDS: Plants, herbal medicine; retrospective study; poisoning; mortality; Morocco.
INTRODUCTION

Man uses plants to treat diseases for millennia. Whether, the plants are edible or toxic some time, these plants are used for their therapeutic properties, for the maintenance of health and / or the treatment of specific diseases such as cancer.

Because of the high cost of pharmaceuticals, most people are not in a position to afford modern health care. According to estimates by the World Health Organization (WHO), more than 80% of the world's populations, especially in developing countries, use traditional treatments to meet their health and primary care needs.\textsuperscript{[31]} Even when modern health care is affordable, many people prefer to use more traditional practices.

In Morocco, phytotherapy or traditional medicine is considered particularly attractive; it occupies a very important place in therapeutics which implies a non-negligible incidence of poisonings linked to the use of the plants.\textsuperscript{[1]}

However, although the sector of aromatic and medicinal plants is more developed in Morocco than in other countries of the Maghreb, the existing potential is under exploited, often left fallow. Indeed, Moroccan flora contains about 500 potentially aromatic and / or medicinal species and subspecies of which a very small number is exploited on an industrial scale.\textsuperscript{[2]}

For its part, the families of medicinal plants present a wide range of species which can intervene at all stages of the cancer disease and for various reasons. Moreover, a strong ethnomedicinal tradition is still alive in all the regions of Morocco and no one suspects the richness of the ethnomedical knowledge accumulated during centuries and which is more and more likely to be transmitted in case no safeguard is undertaken.\textsuperscript{[3]}

Currently, this medication by plants is experiencing a remarkable revival of interest; it is thanks to scientific studies based on analytical methods and modern experiments, that the medical world discovers more and more, the well-founded empirical prescriptions of these medicinal plants.\textsuperscript{[4]} Among these scientific methods, the ethnomedical approaches constitute the main assay for the screening of medicinal plant use in popular knowledge.

Among the scientific disciplines concerned with traditional herbal medicine, ethnobotany is considered as a science that translates popular knowledge into scientific knowledge. Indeed, various works have been published since the last decades on the Moroccan ethnobotanical knowledge among which we will cite: \textsuperscript{[5; 6; 7; 8; 9; 10; 4; 3; 32]} etc.
This work aims to highlight the poisonings caused by the most used plants by the Moroccan population to fight against cancer diseases. We present the results of a retrospective study carried out on a series of cases from 1980 to 2012, which constitutes the database of cases of poisoning by plants in the AP, in order to describe the cases Socio-demographic, clinical and therapeutic characteristics and to review the toxicity of these plants used in phytotherapy.

**METHODOLOGY**

This is a retrospective study of cases of poisoning by plants collected at the APCM, over a period of 28 years, from January 1980 to December 2012. After collecting all the information, an Excel table was established to collect the various toxic plants used in phytotherapy in Morocco, with their vernacular and scientific names\(^{[29,6]}\) (Table 1). To process and analyze the results, we have used the SPSS software version 20 (Statistical Package for Social Sciences) which allowed us to perform a set of operations in a short time. The overall descriptive analysis focused on the distribution by years, gender, age group, geographical distribution, circumstances and undesirable effects. Certain no-toxic plants can have a harmful effect on various human or animal organs, due to their use at excessive doses or their absorption for a long time.

**RESULTS AND DISCUSSION**

The discussion of our results was based on a review of the literature with identification of the main toxic plants used in phytotherapy in Morocco.\(^{[11]}\) Since 1980 to 2012, the CAPM has collected 428 cases of poisoning with the used medicinal plants for the treatment of some diseases, in particular the cancer in all the regions of Morocco (Table 1).

<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Local name (vernacular)</th>
<th>Type of cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nigella sativa</td>
<td>Sanouj, haba saoudaa</td>
<td>General</td>
</tr>
<tr>
<td>Peganum harmala</td>
<td>Alharmal</td>
<td>General</td>
</tr>
<tr>
<td>Thymus ssp</td>
<td>Zitra</td>
<td>Digestive</td>
</tr>
<tr>
<td>Camellia sinensis</td>
<td>ataye</td>
<td>Digestive</td>
</tr>
<tr>
<td>Artemisia absinthium</td>
<td>Chiba</td>
<td>Digestive</td>
</tr>
<tr>
<td>Lavandula officinalis</td>
<td>Khazama</td>
<td>The urinary and genital system</td>
</tr>
<tr>
<td>Euphorbia resinifera</td>
<td>Daghmous</td>
<td>General</td>
</tr>
<tr>
<td>Lawsonia inreis</td>
<td>Henna</td>
<td>Skin</td>
</tr>
<tr>
<td>Trignoella foenum- graecum</td>
<td>Halba</td>
<td>Digestive</td>
</tr>
<tr>
<td>Chenopodium ambrosioides</td>
<td>Mkhinza</td>
<td>Tonsil</td>
</tr>
<tr>
<td>Nerium oleander</td>
<td>Deflla</td>
<td>Gingival</td>
</tr>
</tbody>
</table>

Table 1: Distribution of the plants listed according to their therapeutic indications
Catalog of the most frequently used plants in phytotherapy in Morocco.

Amongst the 428 cases poisoning, 17 were identified in this retrospective study, including 5 potentially toxic plants: *Peganum harmala* (50%), *Nigella sativa* (11%), * Lawsonia inermis* (7.5%), Pink (5.8%), *Chenopodium ambrosioides* (5.1%) (Figure 1). Twelve no-toxic plants can become toxic because they contain phytochemicals, which have beneficial effects on body and mind health. Used in small doses, these plants provide physical and mental well-being. However, in high doses they can become toxic. For example, some herbal extracts such as *Camellia sinensis* (Green tea), *Artemisia absinthium* (Chiba), *Zingemembr officinale* (Skingbir).

These results confirm other national retrospective studies have shown that the main plants causing poisoning in Morocco in recent years, according to the APCM, are thistle with 10.6% of cases, Cannabis with 10.1% followed by Harmel with 4.6%, lamina represents 3.6% poisoning and castor 2.3%, the cadet follows with 1.3% of cases, henna and poppy represent each 0.7%, oleander 0.6%, nutmeg 1% and nigelle 1% and finally mandrake with 0.5%.[12]

![Figure 1: Percentage Distribution of Toxic Plant](image_url)
**Peganum harmala**

*Peganum harmala* is a plant of the family Zigophylaceae, known in Arabic by its name Harmel. It is an herbaceous plant, perennial, hairless, shrub from 30 to 90 cm thick rhizome, strong odor, unpleasant reminiscent of the street. The erect stems, very famous, disappear in the winter; they bear alternate leaves, cut into narrow strips.\cite{13, 30} Its flowers are solitary and its fruit is a capsule with 3 boxes containing angular seeds. Harmel is found in North Africa and Spain.

In Morocco, harmel is used to treat various gynecological disorders such as female infertility, but also as sexual impotence. Some women use it as an abortive. It is a hypnotic, antipyretic, analgesic, antitussive, antidiarrheal in the infant, antiseptic and cicatrizing, it is used also to treat some skin problems, dermatoses (eczema), burns, purulent conjunctivitis and blepharitis and alopecia. The whole plant is toxic by means of an alkaloid which is higher in the seed (3 to 4%) than in the root or stem (0.36%) or the leaf (0.52%).\cite{14}

**Nigella sativa**

*Nigella sativa* (nigelle) belongs to the family of Ranunculaceae, it vernacular name is Sanouj. It is an annual herbaceous plant with an erect stem, 60 cm tall, bearing two- or three-celled leaves. The plant is hermaphrodite with autonomous reproduction. The fruit corresponding to the whole of the welded follicles forms the capsule containing several whitish triangular seeds which, when the capsule opens at maturity, exposed to the air become black.

Originating from the Mediterranean and Western Asia, the nigelle is grown to India, via Sudan and Ethiopia. Nigella is anti-inflammatory, analgesic, antibacterial, antifungal, antioxidant, antiviral, antidiabetic, hypotensive, stimulant, digestive and diuretic.\cite{15} They are toxic by the presence of melanthin, this intoxication is manifested by symptomatic signs such as dry mouth, buccopharyngeal irritation, and inflammation of the tongue, palate, tonsils and rhinopharynx.\cite{16}

**Lawsonia inermis**

Henna is a thorny shrub of the Lythraceae family, whose leaves produce tints, such as red and yellow, used since antiquity in textile and body dyeing. One extracts from its small flowers a much appreciated perfume.\cite{17} Henna grows naturally in tropical and subtropical regions of Africa, South Asia and Australasia. Under latitudes between 15 and 25° (N and S) from Africa
to the Pacific.[18] Henna is omnipresent in the Maghreb culture, where women use it in poultice, as well as to decorate the soles of their feet and the palms of their hands. In the Moroccan countryside, they call it "paradise leaf" because they see in the application of henna a message of love, an invitation to pleasure and a promise of happiness.[19]

Considered by the Maghreb as a first-rate medicinal plant, because of its astringent, antiseptic and cicatrizing virtues, it is used in poultices against eczema, mycoses, boils, abscesses or panaritis, cracks, bruises ... Or to reduce the inflammation and pain of sprains, dislocations, fractures.

The plant part used is the leaf.[20;21] The use of henna, of vegetable origin, poses few problems for health. The toxic principles are tannin, mucilage, flavonoidic and naphthoquinone pigments.[22] When applied to the skin, henna is recognized as little or no toxic, it is a weak sensitizer. By ingestion, there is severe bloody diarrhea, abdominal pain and pulmonary congestion. The treatment is based on the application of creams based on corticosteroids. General corticosteroids are sometimes necessary.[23]

**Nerium oleander**

The pink laurel (Nerium oleander), in Arabic "Defla", is an ornamental shrub 2 to 4 m tall, blooming from June to September, with pink flowers, sometimes red or white and elongated, matt green. The whole plant is toxic (leaf, flower, seed, sap and wood), but the leaves are known for their toxicity. The pink laurel is the third plant mentioned among those incriminated in the equine intoxications. The ingestion of only one of them by an adult can cause vomiting, diarrhea, heart problems and be fatal. This plant is used to control scabies, colic, headache, colds and is considered abortive.[24;25]

The whole plant is toxic and contains cardenolides, including the oleandrine of structure close to that of the digitalis heterosides. Cardenolides inhibit Na + K + -ATPase activity. The toxic dose is a few leaves or a few flowers. Pink laurel is one of the categories of dangerous plants with little therapeutic interest.[11] A single leaf can be fatal to humans. From the simple problem of digestion to the sign of heart failure, the symptoms vary according to the amount ingested.

**Chenopodium ambrosioides**

M'khinza (Morocco) or anserine vermifuge (*Dysphania ambrosioides*, formerly known as
Chenopodium ambrosioides, also known as false ragweed, Mexican tea, or epazote, is an annual or perennial herbaceous plant from 30 cm to 1 m high, covered with glands Sessile, highly viscid, strongly aromatic Stem usually streaked with red Leaves whole, lanceolate or sinuate- toothed Inflorescence very branched and leafy, giving off an odor when wrinkled It grows in uncultivated fields, along roadsides And in abandoned places.\[26]\n
In Morocco, it is used as vermifuge, galactogenic, against gastrointestinal affections, typhoid, dysentery, oral abscesses, fever ulcerations. The essential oil of the plant is used as anthelminthic, it is quite toxic, especially in the child. The plant, at high doses, can cause signs of intolerance reminiscent of the symptoms of poisoning by essential oil. It is often the aerial part of M'khinza that is used against fever in poultices on the forehead and temples of the patient. It can also be ingested as an infusion or decoction. A maceration of leafy stem, with vinegar, is used to reduce fever.\[26; 5; 6]\n
The active ingredient of the toxicity of this plant is an essential oil which contains ascoridol, aritasone, L-pinocarvone and terpene carbides. The high toxicity of M'khinza would be related to the dose used, since the toxic dose is very close to the supposedly effective dose.

Data analysis

Plant poisoning according to age

The retrospective study over a period of 32 years, from 1 January 1980 to 31 December 2012, which constitutes the database of cases of poisoning by medicinal plants reported to the Antipoison and Pharmacovigilance Center of Morocco, by mail or telephone, showed that the most of victims of poisoning due to plants are children, and more specifically children under 5 years-old (21%). Indeed, the use of medicinal plants in Morocco is widespread in all age groups, with predominance among people aged 15 to 35 (22%) (Figure 2). For older people, the use of medicinal plants (6%) is not of great therapeutic interest. Knowledge of medicinal plants is relatively important. This is due to knowledge of the properties and uses of medicinal species, which is generally acquired through long experience accumulated with age and transmitted from one generation to another.
Plant poisonings by genus (sex of belonging)

According to the sex distribution, there is a female predominance with a rate of 63% (Figure 3). Therefore, women use much more medicinal plants than men. This result can be explained by the use of plants by women in fields other than therapy and by their responsibility as mothers, they are the ones who give first aid especially for their children. According to one study, 70-80% of Moroccans use plants for treatment, 60% of them are female and more than 50% are illiterate and over 50 years-old.[27]
Plant poisoning by years
Declarations of poisoning by plants were generally time-dependent, but were larger after 2000 (Figure 4).

Plant poisoning by geographical distribution
The geographical distribution of poisonings to all plants shows a predominance of the Grand Casablanca region (27%), followed by the region of Rabat-Sale-Zemmour-Zaer (21%) and Marakech-Tensift-Al Haouz (%) (Figure 5).
The poisoning by plants according to the circumstance of poisoning

Conventional accidents were the most frequent (53%), followed by voluntary accidents (27%) and unknown circumstances (19%). Suicide attempts were few in number and accounted for only 1%. These results confirm other national retrospective studies, have shown that the main cause of plant poisoning is accidental exposure due to a misidentification of plants\cite{28} (Figure 6).

![Figure 6: Distribution of users of plants according to circumstances of poisoning](image)

Plant poisoning according to symptoms

The symptomatic distribution showed that the majority of poisoning cases were unknown (30%) followed by digestive signs (12%) and thermal disruption (10%). A retrospective study of a series of cases from 1983 to 2011 that constitutes the database of cases of poisoning by *Peganum harmala* in CPAM in 2014 showed a dominance of neurological symptoms (34.4%) followed by Digestive (31.9%) and cardiovascular (15.8%) signs (Figure 7 and Appendix 2).
CONCLUSION

Plants are implicated in 5.1% of reported poisonings at the Anti-Poison Center of Morocco; they are often at the origin of morbidity and mortality important. It is therefore important to stimulate vigilance and awareness by the public and health professionals about poisoning to plants. This requires being able to identify and recognize the main toxic plants, to manage and assess the level of risk and to ensure the rapid and adequate management of this health problem.

REFERENCES


