

# Medicinal Plants Used for the Treatment of Common Parasitic Diseases by Traditional Practitioners in Kabul City, Afghanistan

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## ABSTRACT

The use of traditional medicine (TM) methods, especially phytotherapy, for the treatment of most common and dangerous infectious diseases such as parasitic diseases (PDs) is common in many developing countries worldwide, including Afghanistan. During many centuries, humans have suffered many injuries from parasites, and PDs, such as yellow fever, malaria and hookworm infections in tropical, poor and developing countries which are among the main causes of human mortality. The main purpose of this research was to introduce medicinal plants (MPs) used for the treatment of common PDs by traditional practitioners (TPs) in Kabul city. The study was a field research conducted on the months of August and September 2020. Kabul city was selected as the field of study. Cross-sectional convenience sampling was used for data collection. The required information was randomly collected from seven districts of Kabul city and accepted as sample. TPs were selected as participants and interviewed using prepared questionnaires. The results of this study showed that a total of 29 MPs from 16 plant families were used by TPs for the treatment of common PDs, and mostly the underground parts, herbs, fruits and leaves of the mentioned plants were used in the form of decoction, infusion, extracts and powdered for this purpose. The effectiveness of using MPs to treat PDs by TPs in Kabul city, in most of the cases, matches the rational phytotherapy. However, further studies are needed to ensure the identity, purity, quality and uniformity of MPs and their recommended dosage forms throughout the city.

**Keywords:** Parasitic Diseases, Medicinal Plants, Traditional Medicine, Kabul city, Afghanistan.

## INTRODUCTION

The use of medicinal plants (MPs) for the treatment of various diseases is consistent with human history. Since ancient times, MPs have been the only accessible choice humans used for the treatment and management of diseases and for many years, natural remedies, especially herbal medicines, have been used as the basis and even in some cases the only available method of this purpose [1].

For a long time, traditional medicine (TM) has been the usual method of self-treatment of people and it is easily acceptable for them. TM emphasizes the fact that low-cost herbal medicine, under the supervision of professionals, does not have side effects and is considered one of the best treatment strategies [2]. Preparation and processing of MPs are easier compared to the chemical alternatives and their maintenance is also simple. In addition, these drugs strengthen the body's immune system. Since the application of TM approaches can be influenced by cultural and historical factors and the individual and philosophical views of the people, so the above-mentioned methods have shown variation in different countries.

The usage of synthetic and chemical medicines for the prevention, control and treatment of various diseases commonly causes several side effects and in some cases adversely affect the body's immune system. While, many of the methods used in TM contains experiences that are inherited and demonstrated their safety and efficiency in a beneficial way.

The use of TM methods, especially phytotherapy, for the treatment of most common and dangerous infectious diseases such as parasitic diseases (PDs) is usual in many developing countries of the world, including Afghanistan.

A parasite is a living organism that spends its life completely or partially on another living organism and obtains the food it needs from it. Parasites are protozoa, worms and some insects. The three main classes of parasites that cause diseases in humans include protozoa, worms, and ectoparasites. During many centuries, humans have suffered much harm from parasites. Insects such as cockroaches and their symbiotic bacteria caused the mortality of one third of the European population in the 17th century [3]. Malaria, schistosomiasis and African trypanosomiasis have killed millions of people. Even today, despite extensive campaigns and remarkable progress

against diseases such as yellow fever, malaria, and hookworm infections in many parts of the world, PDs in tropical, poor and developing countries remains as the main causes of human mortality [4]. In 1997, the global prevalence of diseases caused by the parasites was recorded as follow: *Ascaris Lumbricoides* 24%, *Trichuris Trichiura* 17% and hookworms 24%. These figures have remained objectively stable for fifty years despite the increase in the world population [3].

The increase in the possibility of the spread of PDs, especially in poor and densely populated areas, the high level of mortality caused by these diseases, the lack of availability and accessibility of safe and effective anti-parasitic drugs, the high cost and sometimes unbearable side effects of the treatment regimens for PDs, the emergence of parasitic resistances against chemical anti-parasitic medicines, etc. are among some of the reasons that have led the majority of people to still rely on and accept phytotherapy and TM for the treatment of PDs, despite the considerable developments that has happened in the field of synthetic alternatives [5].

TM is valued highly in Afghanistan as well as in other countries. The people of the country still use MPs despite the rapid growth of synthetic drugs. The rich plant flora and the history and fame of TM in Afghanistan have made the majority of the people to visit traditional practitioners (TPs) for the treatment of their mental and physical diseases and use herbal remedies.

Considering the national and global importance of fight against the spread of PDs, the urgency of the prevention, control and treatment of PDs by focusing on the popular methods of treating these diseases by TPs in the country, a decision was made to investigate the use of MPs for the treatment of PDs in different districts of Kabul city, one of the most populated provinces of the country. The main purpose of this research was to introduce MPs used in the treatment of common PDs by TPs in different districts of Kabul city, Afghanistan.

### Aims and Objectives

This research aimed to investigate the traditional phytotherapy for the treatment of common PDs employed by TPs across the different districts of Kabul city. In most specific words, the main objectives of the study were:

1. To introduce MPs and their recommended preparations used for the treatment of common PDs by TPs in different districts of Kabul city, Afghanistan.

2. To compare the effectiveness of MPs used for the treatment of common PDs with the evidence-based phytotherapy.

**Method**

The study was a field research conducted on the months of August and September 2020. Kabul city was selected as the study area. Cross-sectional convenience sampling was used to collect data. The required information was randomly collected from seven districts (the first, second, fourth, fifth, sixth, thirteenth, and eighteenth districts) of Kabul city and was accepted as sample. TPs were selected as participants and interviewed using pre-prepared questionnaires. The prepared questionnaires included the information regarding the demographic characteristics of TPs, the type of MPs used

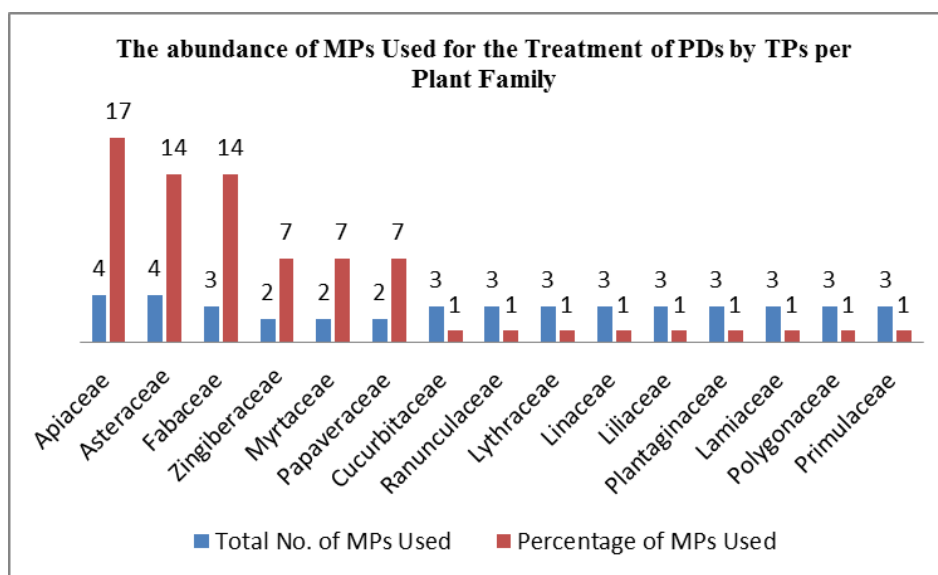
for the treatment of PDs by TPs, the MPs parts used for the treatment of PDs and their methods of preparations, the reasons for using herbal medicine for the treatment of PDs and some other general questions.

**Results**

The results of this research showed that a total of 29 MPs were used by TPs in the first, second, fourth, fifth, sixth, thirteenth and eighteenth districts of Kabul city, Afghanistan for the treatment of common PDs including amoebiasis, leishmaniasis, malaria, ascariasis and other worm diseases. The used MPs along with their scientific and local names, plant families, parts used and method of preparations are summarized in Table 1.

**Table 1.** List of MPs used for the treatment of PDs by TPs in Kabul city, Afghanistan

No	Scientific Name	Local Name	Plant Family	Part Used	Method of Preparation
1	<i>Zingiber officinale</i> Roscoe	Zangabil	Zingiberaceae	Rhizome	Infusion, Decoction
2	<i>Curcuma longa</i> L.	Zardchoba	Zingiberaceae	Rhizome	Decoction
3	<i>Achillea</i> sp.	Boy madaran	Asteraceae	Dried herb	Tea
4	<i>Artemisia cina</i> berg	Terkh, Kerm buta	Asteraceae	Flower buds	Powder, Infusion
5	<i>Cichorium intybus</i> L.	Kasni	Asteraceae	Root	Decoction
6	<i>Artemisia absinthium</i> L.	Afsentine, Marwa Hing,	Asteraceae	Leaves and herb	Decoction, Infusion
7	<i>Ferula assa-foetida</i> L.	Anghoza, Anjawan	Apiaceae	Latex	Latex+ Yogurt
8	<i>Carum copticum</i> L.	Jawani, Spirkay Badyan	Apiaceae	Fruits	Decoction, Infusion, Powder
9	<i>Foeniculum vulgare</i> Mill.	Gashniz, Gashnich	Apiaceae	Fruits	Decoction, Infusion
10	<i>Coriandrum sativum</i> L.	Shebet, Shewet	Apiaceae	Fruits	Infusion, Tea
11	<i>Anethum graveolens</i> L.		Apiaceae	Fruits and herb	Decoction, Extract
12	<i>Caryophyllus aromaticus</i> L.	Mekhak	Myrtaceae	Unbloomed flowers	Decoction
13	<i>Eucalyptus</i> sp..	Eucalyptus	Myrtaceae	Leaves	Tea
14	<i>Glycyrrhiza glabra</i> L.	Shirin boya, Shirin bayan	Fabaceae	Underground parts	Powder
15	<i>Tamarindus indica</i> L.	Tamr-e-hindi	Fabaceae	Fruits	Tea
16	<i>Cucurbita pepo</i> L.	Kadoo	Cucurbitaceae	Seeds	Powder
17	<i>Nigella sativa</i> L.	Sia dana	Ranunculaceae	Seeds	Dried fruits
18	<i>Punica granatum</i> L.	Anar	Lythraceae	Bark, Root, Stem and Twigs	Infusion, Extract
19	<i>Linum usitatissimum</i> L.	Zegher, Katan	Linaceae	Seeds	Decoction
20	<i>Fumaria</i> sp.	Shahtara	Papaveraceae	Herb	Extract
21	<i>Cinnamomum zeylanicum</i> Blume	Dalchini, Darchini, Siloni	Lauraceae	Dried stem/s bark	Infusion, Extract
22	<i>Cassia angustifolia</i> M. Vahl	Senna	Fabaceae	Leaves and Fruits	Decoction, Infusion
23	<i>Trigonella foenum-graecum</i> L.	Shanbalila	Fabaceae	Seeds	Dried seeds
24	<i>Aloe</i> sp.	Sabr-e-zard	Liliaceae	Leaves	Gel
25	<i>Plantago major</i> L.	Zoof, Espaghool	Plantaginaceae	Dried leaves and Fresh herb	Powder
26	<i>Lavandula</i> sp.	Ostokhodos, Lavanda	Lamiaceae	Fresh inflorescence	Decoction
27	<i>Chelidonium majus</i> L.	Mamiran, Mamirak	Papaveraceae	Herb	Latex
28	<i>Bistorta officinalis</i> Delarbre	Anjabar	Polygonaceae	Leaves, Rhizome and Root	Extract
29	<i>Embelia ribes</i> Burm. f.	Barang-e-kabuli, Birang, Barnaq	Primulaceae	Fruits	Dried fruits



**Figure 1.** The abundance of MPs used for the treatment of PDs by TPs in different districts of Kabul city per plant family (researcher).

As mentioned in Table 1, totally 29 MPs belonging to 16 plant families have been used by TPs in different districts of Kabul city to treat common PDs. Of these, most of these MPs (them) belonged to the plant families Apiaceae (17%), Asteraceae (14%) and Fabaceae (14%), and the rest belonged to other plant families (Figure 1).

The most common method of preparations recommended for the treatment of PDs by the TPs of Kabul city were decoction (30%), infusion (24%), extract (14%) and dry powders (14%) and other less commonly used forms included tea, the combined forms of drugs (hing + yogurt), dry fruits and seeds and gel (19%). TPs have recommended decoction forms of MPs orally, in most of the cases. The dosage and the administration frequency of different preparations were decided based on the severity of the disease, the overall health condition of the patient, the occurrence of any kind of side effects and allergic reactions etc. TPs of Kabul city have used different parts of the MPs, including underground parts (19%), herbs (19%) and fruits (19%), leaves (17%), seeds, flowers/flower buds, bark and resin (26%) to treat PDs.

**DISCUSSION**

There are a number of MPs used by TPs for the treatment of various diseases; including PDs. MPs attract much attention due to their complex composition, high effectiveness, availability, lesser side effects and low price.

PDs are diseases that are caused by parasites and create various complications and even death. Considering the results of this research, which was conducted in order to introduce and study the MPs used for the treatment of common PDs by TPs in the first, second, fourth, fifth, sixth, thirteenth and eighteenth districts of Kabul city, it was revealed that a total of 29 MPs including *Z. officinale*, *C. longa*, *Achillea sp.*, *A. cina berg*, *C. intybus*, *A. absinthium*, *F. assa-foetida*, *C. copticum*, *F. vulgare*, *C. sativum*, *A. graveolens*, *C. aromaticus*, *Eucalyptus sp.*, *G. glabra*, *T. indica*, *C. pepo*, *N. sativa*, *P. granatum*, *L. usitatissimum*, *Fumaria sp.*, *C. zeylanicum*, *C. angustifolia*, *T. foenum-graecum*, *Aloe sp.*, *P. major*, *Lavadula sp.*, *C. majus B. officinalis* and *E. ribes* are used to treat common PDs such as ascariasis, amoebiasis, malaria, leishmaniasis and diseases caused by roundworms in the selected areas. This is while the anti-parasitic effects of most of the aforementioned plants have been already proven by separate scientific research.

TPs have used different types of preparations, including decoction of MPs (orally in most of the cases) for the treatment purposes. The dosage and the administration frequency of different types of preparations adjusted according to the severity of the disease, the overall health condition of the patient, the occurrence of any kind of side effects and allergic reactions etc.

The results of this study showed that TPs mostly use the powdered, infusion and decoction of *Z. officinale* to treat amoebiasis. Other studies have shown the anthelmintic,

effects against the worms *Shistosoma mansoni*, *Hymenolepis nana* and *Toxocara canis* [6-8]; anti-protozoa, activities against *Giardia lamblia*, *Trypanosoma brucei* and *Toxoplasma gondii* [9,10]; and in-vitro effectiveness of this plant against cystic echinococcosis [11]. The essential oil of *Z. officinale* is responsible for its anti-parasitic effects.

TPs in different districts of Kabul city have used *C. longa* decoction to treat PDs. Meanwhile, the extract of this plant along with *Aloe sp.* has been used for the treatment of chronic leishmaniasis [12] and its ethanolic extract has good efficacy against *Plasmodium vivax* resistant to chloroquine [13]. Curcumin one of the main phytoconstituents of *C. longa* prevents the enzymatic activity of Tg Glol1 and has been effective in the treatment of toxoplasmosis [14].

The dried herb of *Achillea sp.* in the form of tea or infusion has used by the TPs of Kabul city for the treatment of diseases caused by roundworms and also malaria. The results of the researches conducted on *A. millefolium* have shown that the essential oil of this plant is used to eliminate the causative agents of malaria, Chagas, toxoplasmosis and hydatid diseases and the chamazulene present in the essential oil of the plant is responsible for its anti-parasitic effects [15]. In addition, the *A. millefolium* has anti-malarial, anti-hepatitis and anti-jaundice effects [16]. Based on the findings of a research conducted on mice, the extract of *Achillea sp.* improved the wounds caused by Leishmania parasite in experimental animals [17].

TPs of Kabul city have used the infusion, decoction and powdered forms of *A. cina* for the treatment of diseases caused by Ascaris and beef tapeworm. The conducted studies stated that *A. cina* is one of the strongest anthelmintic plants, especially in children, which directly destroys roundworms, but has no effect on tapeworms. The essential oil and santonin are responsible for the anti-parasitic effect of this plant [18].

TPs have prescribed decoction of *C. intybus* root for patients after meals for the treatment of malaria. *C. intybus* is a plant traditionally used in some Asian, European and Middle Eastern countries to treat malaria [19]. The iridoids and lactocine are responsible for the antimalarial effect of *C. intybus* against *P. falciparum* [20].

*A. absinthium* has been used as an anti-parasitic medicine since the ancient Egyptians [21]. This plant is one of the most common plants used in the treatment of intestinal worms, and scientific research has shown that the alcoholic extract of *A. absinthium* is effective against *T. cati* and intestinal nematodes

[22]. It is active against the malaria parasite, especially the drug-resistant type of *P. falciparum* [23].

*F. assa-foetida* is another herb used for the treatment of PDs, and the TPs of Kabul city have used its resin mixed with milk and yogurt to treat beef tapeworm and Ascaris. The results of the studies conducted in Iran, Nepal and China shows that *F. assa-foetida* is traditionally used for the treatment of intestinal parasites [24] and the sesquiterpenic coumarins present in the composition of the plant resin have an anti-leishmaniasis effect [25].

The TPs of Kabul city have used the fruits of different species of Apiaceae family including *C. copticum*, *F. vulgare*, *C. sativum* and *A. graveolens*, for the treatment of common PDs. The anti-parasitic effects of the mentioned MPs against different parasites have been studied. *C. copticum* has anthelmintic effects against Ascaris and Oxyur worms. The essential oil of *F. vulgare* fruit has lethal effects on malaria parasite vector larvae, and the oil of its leaves, flowers and root are effective against *Culex pipiens* mosquito larvae [26]. In some countries, the fruit of *C. sativum* is used to treat Ascariasis and hepatitis in humans. This plant is effective against nematode worms and *H. nana*, and this effect is due to the presence of the essential oil [27]. The flavonoid, phenolic, and essential oil of leaves, stems, and roots of *A. graveolens* are effective against giardiasis [28].

*Eucalyptus sp.* is another MP that is recommended by TPs in different districts of Kabul city for treatment of PDs. This plant shows considerable activity against *Entameba histolytica* and *Trichomonas sp.* [29]. The phenolic and non-phenolic extracts of *Eucalyptus sp.* leaves, which contain terpenic and phenolic phytoconstituents, are effective against *Trichomonas sp.* [30,31].

TPs have used the decoction and powdered form of *G. glabra* for the management of leishmaniasis and malaria. The anti-parasitic effects of *G. glabra* have been proven by scientific research. The results of these studies have made it clear that Glycyrrhizic acid, glycyrrhetic acid and licochalcone A present in the composition of *G. glabra* are responsible for the anti-parasitic effect of this plant, especially against *Leshmania donovani* infection [32].

*T. indica* is effective for the treatment of various PDs, especially malaria [33]. The tannins in this plant cause the destruction and death of intestinal parasites [34] and its fruit is used as an antipyretic in the treatment regimen of malaria [35].



Based on the findings of this research, the seeds of different MPs such as *N. sativa*, *C. pepo*, and *L. usitatissimum* are effective for the treatment of PDs. The powdered form of *C. pepo* seeds is used with honey to repel beef tapeworm. The seeds of *C. pepo* have anthelmintic properties in humans and other organisms [36,37] and are used to repel various worms, especially tapeworms. . In the same way, the seed of *N. sativa* is considered a good choice for the treatment of PDs. Studies conducted by Egyptian scientists have shown the anthelmintic effect of *N. sativa* against *S. mansoni* [38]. Researches have revealed that ethyl linoleate in *L. usitatissimum* protects mice deficient in vitamin E against the malaria parasite [39].

The dried peel of *P. granatum* is another medicine that the TPs of Kabul city have prescribed in the form of powder, infusion and decoction for the treatment of amoebiasis. The peels of *P. granatum* have an anthelmintic effect against *S. mansoni* [40]. The bark of stem, and root and fruit peels have been used since ancient times in various TMs for the treatment of intestinal PDs and diarrhea and even Dioscorides was prescribed its decoction to get rid of beef tapeworm. The methyl isopelletierine alkaloids present in the drug have selective effects against all kinds of tapeworms. The product called pelletierine tannate, which contains a set of alkaloids with tannic substances is used to get rid of tapeworms. In addition, due to the existence of a large amount of tannins, the peel of the fruit is used to treat diarrhea and dysentery.

*Fumaria sp.* has been used in TM for the treatment of various diseases since ancient times. Alkaloids, especially protopine, have anti-inflammatory effects and therefore its products are used in the treatment of skin manifestations such as scabies. Due to the presence of various alkaloids, this plant has anti-malarial and anti-nematode effects, and its ethanolic extract is traditionally used in Iran, Pakistan and India [41-43].

The bark of *C. zeylanicum* is another herbal drug used for the treatment of PDs. TPs has used the infusion of *C. zeylanicum* bark for the treatment of malaria. Studies have shown that the extract of *C. zeylanicum* bark has anti-plasmodial effect, which is done through inhibiting the enzyme enoyl-ACP-reductase [44]. In the same way, the research conducted on aqueous, hexane, methanolic and ethanolic extracts of *C. zeylanicum* bark have proven its activity against *Leishmania* and *Toxoplasma* species [45,46]. Another report shows the strong effects of plant bark extract against *Ascaris* worm and

nematode larvae in-vitro. *C. angustifolia* is usually effective as an anthelmintic. It destroys parasites and expels worms from the intestines. The drug of this plant is used in combination with other anthelmintic plants (*Z. officinale* and *F. vulgare*) to treat roundworms. Phytoconstituents present in *C. angustifolia*, such as sennosides, are responsible for its anti-parasitic or anthelmintic effects [47].

TPs of Kabul city have used the gel of *Aloe sp.* leaves for the management of wounds due to leishmaniosis. The available evidence has shown that usage of the combination of *Aloe sp.* with *C. longa* extract for the treatment of leishmaniosis had good results [12]. The leaf extract of *Aloe sp.* has anti-protozoan activity against *T. brucei* parasite [48]. Similarly, the methanolic extract of the plant has shown remarkable activity against the parasite *Trichomonas vaginalis* [49]. Although the anti-malarial effect of *Aloe sp.* has not yet been proven, researches have shown that it is used in Tanzania and Kenya to treat malaria symptoms [50].

*P. major*, *Lavandula sp.*, *C. majus*, *B. officinalis* and *E. ribes* are among the other MPs that TPs of Kabul city have recommended for the treatment of various PDs. According to the existing reports, the leaves of *P. major* are used as ant-parasitic and anthelmintic in Guatemala and Argentina [51]. Likewise, the essential oil of *Lavandula sp.* has anti-parasitic effect and inhibits the growth of *T. vaginalis* [52]. The sanguinarine alkaloid of *C. majus* is effective against *Trichomonas sp.* [53] and the plant latex is used to treat warts and roundworms [54]. *B. officinalis* is a strong repellent of body parasites, especially parasites of the digestive system, and shows good anthelmintic effects [55].

## CONCLUSION

TPs in different areas of Kabul city have used a total of 29 MPs to treat common PDs. In general, most of the underground parts, herbs, fruits and leaves of the MPs are used in the form of decoction (mostly oral), infusion, extracts and powdered for the treatment purpose. TPs have set the dosage and the administration frequency of different preparations according to the severity of the disease, the overall health condition of the patient, the occurrence of any kind of side effects and allergic reactions etc. The effectiveness of using MPs to treat PDs by TPs in Kabul city, in most of the cases, matches the rational phytotherapy. As most of these plants have anti-parasitic effects and modern scientific research shows the mentioned activities. However, further studies are needed to

ensure the identity, purity, quality and uniformity of MPs and their recommended dosage forms throughout the city.

## RECOMMENDATIONS

- In order to ensure the safety and efficacy of recommended herbal remedies, it is suggested that more research and studies should be done for the approval of the identity, purity, quality and uniformity of MPs and their recommended dosage forms throughout the city.
- The results of scientific research conducted on MPs with anti-parasitic effects should be published nationwide. Publication of these studies not only increases the public awareness to use rational phytotherapy but also facilitate and improve the development of country's TM.

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