

PHYTOCHEMICALS AND ANTIMICROBIAL ACTIVITIES OF SELECTED MEDICINAL PLANTS OF DISTRICT KURRAM KP, PAKISTAN

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Abstract: The current research work is designed to determine phytochemicals and antimicrobial activities from selected seven plants based chemical agents namely *Plantago major*, *Lilium polyphyllum*, *Rumex dentatus*, *Salvia moorcroftiana*, *Sophora mollis*, *Marrubium vulgare*, *Olea ferruginea*. Different four chemicals (n-hexane, ethyl acetate, methanol, extract and distilled water) are used for extraction. The different extracts like n-Hexane, ethyl acetate, methanol, and distilled water percentage extractive values of the seven selected medicinal plant were studied. The highest n-Hexane extractive values was recorded for *Olea ferruginea* 151% the next one was *salvia moorcroftiana* (Stem, flower) 128% then followed by *Lilium polyphyllum* and least for *Rumex dentatus*, *Plantago major* and *salvia moorcroftiana* (roots). The presence of alkaloids was recorded for *Lilium polyphyllum*, *Rumex dentatus*, *Salvia moorcroftiana*, *Sophora mollis*, *Olea ferruginea*. While glycosides were present in *Salvia moorcroftiana* and *Sophora mollis*. Similarly Steroids and triterpenoid were present in *Lilium polyphyllum*, *Salvia moorcroftiana* (in stem, root) and *Rumex dentatus*. The tannins were absent in *Olea ferruginea* and *Salvia moorcroftiana* root while flavonoids were absent in *Rumex dentatus*, *Plantago major* and *Olea ferruginea*. *Plantago major*, *Rumex dentatus*, *Sophora mollis*, and *Marrubium vulgare* showed positive results for Phenols and *Plantago major*, *Rumex dentatus*, *Salvia moorcroftiana* showed the presence of protein.

The plants extract are also tested for their antimicrobial activities against tested microbes, through well diffusion method. The results showed that three therapeutic plants (*Rumex dentatus*, *Salvia moorcroftiana*, *Plantago major*, *Lilium polyphyllum* (Distilled water extract) and *Marrubium vulgare*) demonstrated significant activities against tested microbes. While the remaining two plants (*Olea ferruginea* and *Sophora mollis*) no activities against tested microbes.

Index Terms- Phytochemical, anti-microbial, medicinal plants, Plant extracts, Kurram

INTRODUCTION

Medicinal plants are those plants which are used for therapeutic purposes and they are a rich resources of elements which can be used in drug development and synthesis [1]. Medicinal

plants are conventionally used in universal as remedies for the treatment of several disease including asthma, gastrointestinal symptoms, skin disorders, respiratory and urinary problems and hepatic cardiovascular disease [2]. Medicinal plants are source of various agents, many of which show antimicrobial and antioxidant properties which protect human body from both pathogens and cellular oxidation thus, it is essential to characterize it for their antioxidant and antimicrobial potential [3]. Medicinal plants contain a number of valuable substances, which can aid the prevention and treatment of several diseases. Due to contrast in the chemical composition of the mixture, biologically active substances show the activity of a different type than acting separately, which is the result of cooperative of their different elements [4]. Antimicrobials of plant emergence have expansive therapeutic potential. They are essential in the treatment of infectious diseases while at the same time reduce many of the side effects that are often associated with artificial antimicrobials [5]. In numerous parts of the world medicinal plants are utilize for antibacterial, antifungal and antiviral activities. These extracts were used as sources of medicinal agents which treatment for urinary tract infections [6].

Preliminary screening of phytochemical is a valuable step, in the detection of the bioactive principles present in medicinal plants and subsequently may lead to drug discovery and development. In the present study, chief phyto-constituents of the seven selected medicinal plants of different families were identified in order to relate their presence with bioactivities of the plants [7]. Screening of seven selected medicinal plants was performed for the presence of tannins, flavonoids, terpenoid, saponins, steroids, alkaloids, glycosides, phenols and proteins using standard methods [8].

Microbial organism such as bacteria & fungi most properly cause hold up wound healing and infections. Wound infection are most usual in developing countries due to poor hygienic conditions, while most of the people in developing countries who hurt an infected wound cannot provide to buy expensive drugs, which might have side effects, furthermore as time went by microorganism develop resistance against antibiotics. So after occasionally these antibiotics are not effective against the microbes. Herb products are seen as another solution to the problem of wound curing in developing countries. Herb products are potential agents for wound healing, and largely favored because of their extensive availability and effectives as raw preparations [9]. Plants obtain medicines have been part of conventional healthcare in most part of the world for thousands of years and these are increasing interest in plants as sources of representative to fight microbial diseases [10]. Some antifungal agents are available and permit for use in human being treatment. The use of extensive drugs is limited and problems of residues in products calculated for human expenditure [11]. Fungi are found everywhere in the environment and cause variety of infections [12]. The discovery of new antifungal agents remains an important challenge for the organized community and conventional medicinal plants may provide good material for the development of antifungal drugs [13].

Many conventionally medicinal plants have been reported to have powerful antiviral activity and some of them have already been utilize to cure animals and human being who suffer from viral infection. One hundred British Columbian medicinal plants were showed for antiviral activity against seven viruses [14]. A huge numbers of plants are use in the African for the curing of several infectious diseases. As a result, a number of reports about the antiviral activity of African medicinal plants have appeared but the studies have not been sustained and thousands of plants still need to be exploring [15]. The study of flora in general and medicinal plants in specific has been observed a fruitful approach in the search for new drugs. Ethno medicine gives a source of information about these plants which is a great value for scientists loyal to their exploration. Screening studies have been follow in order to find antiviral agent from natural sources and the

event of antiviral activity in decoction of plants is persistent [16]. The objectives of the current study to find out the chemical screening, antimicrobial activity selected plants such as *Lilium polyphyllum*, *Plantago major*, *Salvia moorcroftiana*, *Sophora mollis*, *Marrubium vulgare*, *Olea ferruginea*, *Rumex dentatus*. These plants are conventionally used for the treatment of infectious diseases that caused by microbial agents like bacteria, fungi and viruses. So the medicinal plants are searched for their anti-inflammatory and anti-urease activities. The objectives of the current study were to find the Phytochemicals and Antimicrobial activities of selected medicinal plants, to develop the relationship between the present medicinal plants uses and traditional medicinal uses and to preserve the knowledge of medicinal plants for future generation.

MATERIALS AND METHODS

Plants material collection and study area

A total of eight medicinal plants namely *Lilium polyphyllum*, *Rumex dentatus*, *Plantago major*, *Salvia moorcroftiana*, *Sophora mollis*, *Marrubium vulgare*, and *Olea ferruginea*, were collected from natural resources from different regions of the Parachinar District Kurram during March to May 2021. A specimen of each collected medicinal plant species were submitted to the herbarium department of Botany Government Post Graduate College Parachinar, Pakistan for future reference. Plants were selected on the basis of occurrence in natural habitats, availability, market value and little information on their inflammatory potential.

Preparation of plant extracts

The eight collected samples were first washed under running tap water and air dried in shade at room temperature for several days. Using a home grinder, the plant parts were then ground to fine powder. The weight of the ground powder was taken and the extract from each plant was prepared by using a cold percolation method. Twenty gram (20g) of powdered material was soaked 60ml extracted with different solvents like n-hexane, Ethyl acetate, and Methanol and Distal water at room temperature for three successive days. The supernatant was filtered through Whatman filter paper while the residues were used for a second and third extraction. All extracts were evaporated under reduced pressure. All extracts were stored in sterile glass bottles at room temperature until screen.

Phytochemical analysis:

Preliminary qualitative phytochemical analysis was carried out with the following methods.

Test for alkaloids

Hager's test. 1mL of solution of an extract was taken and placed into a test tube. Then 1mL of saturated ferric solution was added and shaken. Formation of yellow-colored precipitate shows the presence of alkaloids [17].

Test for glycosides

Keller-killiani test. Two milliliter (2mL) of the extract was taken and diluted with equal volume of water. Then 0.5mL of lead acetate was added, shaken, and filtered. Again, the mixture was extracted with equal volume of chloroform, evaporated and dissolved the residue in glacial acetic acid. Then few drops of ferric chloride were added. Again, the whole mixture was placed into a test tube containing 2mL of sulfuric acid. Emergence of reddish brown layer that turns bluish green implies indicates of digitoxose [18].

Test for steroids and triterpenoid

Salkowski's test. One milliliter (1mL) solution of the extract was taken and 2mL of chloroform was added, shaken, and filtrate. Few drops of concentrated sulfuric acid were added to filtrate, shaken, and allowed to stand. Developments of golden-yellow precipitate show the occurrence of triterpenes [19].

Test for tannins

Crude extract was mixed with water and heated on water bath. The mixture was filtered and ferric chloride was added to the filtrate. A dark green solution indicates the presence of tannins. [20].

Test for flavonoids

Lead acetate test. 1mL of extract was taken and placed into a test tube. Then few drops of lead acetate added and shaken. Formation of yellow precipitate signifies the occurrence of flavonoids [9].

Test for phenols

Lead acetate test. 1mL solution of an extract was taken and placed into a test tube. Then 1mL of alcoholic solution was added, followed by dilution with 20% sulfuric acid. Finally, solution of sodium hydroxide was added. Formation of red-to-blue color signifies the presence of phenols [20].

Test for protein

Xanthoproteic test. 1mL of the extract was taken and placed it into test tube. Then few drops of nitric acid were added and shaken. Emergences of yellow –color show the presence of protein [8].

RESULT AND DISCUSSION

The preliminary phytochemical screening of *Rumex dentatus*, *Plantago major*, *salvia moorcroftiana*, *Sophora mollis*, *Marrubium vulgare*, *Olea ferruginea*, and *Lilium polyphyllum* (Fig,1) extract showed the presence of bio active components like alkaloids, Glycosides, Steroids and triterpenoid, Tannins, Flavonoids, Phenols and Proteins in table 1. The presence of alkaloids was recorded for *Lilium polyphyllum*, *Rumex dentatus*, *Salvia moorcroftiana*, *Sophora mollis*, *Olea ferruginea* While glycosides were present in *Salvia moorcroftiana* and *Sophora mollis*. Similarly Steroids and triterpenoid were present in *Lilium polyphyllum*, *Salvia moorcroftiana* (in stem, root) and *Rumex dentatus*. The tannins were absent in *Olea ferruginea* and *Salvia moorcroftiana* root while flavonoids were absent in *Rumex dentatus*, *Plantago major* and *Olea ferruginea*. *Plantago major*, *Rumex dentatus*, *Sophora mollis*, and *Marrubium vulgare* showed positive results for Phenols and *Plantago major*, *Rumex dentatus*, *Salvia moorcroftiana* showed the presence of protein.

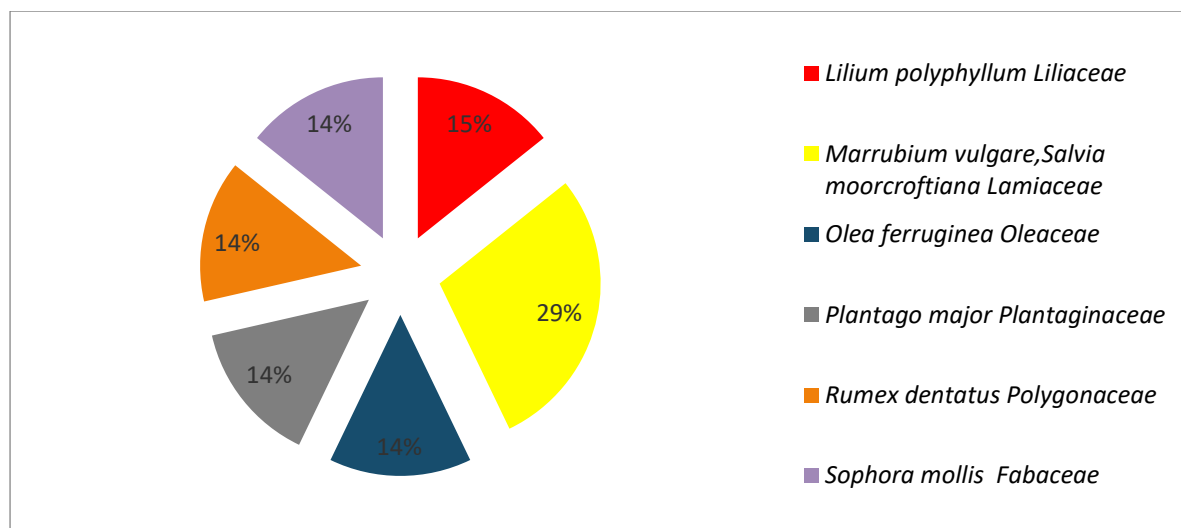


Figure 1. Shows the percentage of family in the term of number of species

Table 1 Phytochemical screening of n-hexane , ethyl acetate, methanol and distal water of seven Selected Plants.

S. No	Species	Plant parts	Alkaloids	Glycosides	Steroids and triterpenoid	Tannins	Flavonoids	Phenols	Proteins
1	<i>Rumex dentatus</i>	Leaves	+	-	+	+	-	+	+
2	<i>Plantago major</i>	Leaves	-	-	-	+	-	+	+
3	<i>Salvia moorcroftiana</i>	Stem, flower	+	+	+	+	+	-	+
		Leaves	-	-	-	+	-	-	-
		Roots	+	+	+	-	+	-	+
4	<i>Sophora mollis</i>	Whole plant	+	+	-	+	+	+	-
5	<i>Marrubium vulgare</i>	Whole plant	-	-	-	+	+	+	-
6	<i>Olea ferruginea</i>	Leaves	-	-	-	-	-	-	-
7	<i>Lilium polyphyllum</i>	Whole plant	+	-	+	+	+	-	-

Antimicrobial activities of medicinal plants

Seven different plants *Lilium Polyphyllum*, *Salvia moorcroftiana*, *Sophora mollis*, *Marrubium vulgare*, *Olea ferruginea* have been tested for antimicrobial activities by using well diffusion method. In the recent study seven medicinal plant extracts were examined for antimicrobial activity for tested microbes. The results showed that five therapeutic plants (*Rumex dentatus*, *Salvia moorcroftiana*, *Plantago major*, *Lilium polyphyllum* (Distilled water extract) and

Marrubium vulgare) demonstrated significant activities against tested microbes. While the remaining two plants (*Olea ferruginea* and *Sophora mollis*) is null showing no activities against tested microbes Table 2.

Table 2: Antimicrobial activity of medicinal plants used in the treatment of infections

Scientific name	Family name	Parts used	Antimicrobial activity
<i>Lilium polyphyllum</i>	Liliaceae	Root	Positive
<i>Plantago major</i>	Plantaginaceae	Leaves	Positive
<i>Salvia moorcroftiana</i>	Lamiaceae	Root, stem and leaves	Positive
<i>Sophora mollis</i>	Fabaceae	Whole plant	Negative
<i>Marrubium vulgare</i>	Lamiaceae	Whole plant	Positive
<i>Olea ferruginea</i>	Oleaceae	Leaves	Negative
<i>Rumex dentatus</i>	Polygonaceae	Leaves	Positive

The current research aims to determine the phytochemical screening, antimicrobial (Anti-inflammatory activities) and ant urease activities of selected seven highly medicinal plants of district Kurram Parachinar Pakistan. Like other developing countries, the people of this area traditionally used these eight therapeutic plant species to treat inflammation due to their easy availability. The following bioactive compounds which are found during testing the samples are Alkaloids, Flavonoids, Phenols, Tannins, Glycosides, Triterpenes and proteins. The results of present study are very attractive and unique compared to that previous work like [21] documented a wide variety and quantity of phenolic and adequate quantities of flavonoids components in *Albizia odoratissima* leaves. But we also determined the high quantity of phenolic and flavonoids contents in various plant species such as *Salvia moorcroftiana* and *Marrubium vulgare* have phenolic and flavonoids contents, *Sophora mollis*, *Lilium polyphyllum* and *Rumex dentatus*. *Marrubium vulgare* have sufficient amount of flavonoids contents and *Sophora mollis*, *Plantago major*, *Rumex dentatus* and *Salvia moorcroftiana* root also show the existence of phenolic compounds. [22] reported the alkaloids in five plant species namely *Marrubium vulgare* *Sophora mollis* *Lilium polyphyllum* *salvia moorcroftiana* and *Plantago major* but we have numerous plant species like *Plantago major*, *Marrubium vulgare*, *Olea ferruginea* which are not contain alkaloids. [23] evaluated the antimicrobial activity of *A. odoratissima* plant extracts and determined the MIC and MBC. The extracts of *A. odoratissima* were found to possess strong antimicrobial activity. The antimicrobial activeness of plants is supposed to be due to the presence of phenolic compounds, tannins, flavonoids, and essential oils. Moreover, even crude extracts of these plants demonstrated strong activity against multidrug resistant strains. The result of this study revealed that methanol and ethyl acetate extracts inhibited the growth of *K. pneumonia*, *E. coli*, *P. aeruginosa*, *P. vulgaris* and *S. aureus*. However, the chloroform and hexane extracts of *A. odoratissima* could not inhibit the growth pathogens. To compared our results with Venkanna previous work in our current research various plants like *Salvia moorcroftiana* leaves *Sophora mollis* and *Marrubium vulgare* exhibit number of chemicals such

as tannins, phenols, flavonoids alkaloids compounds [24]. To possess these chemicals recent study showed superior inhibition activities against *Pseudomonas aeruginosa*. The results showed that five therapeutic plants (*Rumex dentatus*, *Salvia moorcroftiana*, *Plantago major*, *Lilium polyphyllum* (Distilled water extract) and *Marrubium vulgare*) demonstrated significant activities against tested microbes. While the remaining two plants (*Olea ferruginea* and *Sophora mollis*) is null showing no activities against tested microbes. The current study used different methods like Keller kiliani test in which the ethyl acetate extract of various plant samples like leaves of *Plantago major*, whole plant of *Sophora mollis*, leaves of *Salvia moorcroftiana* exhibit the high amount of digitoxin. The lead acetate test is used to check out the flavonoids content in aqueous and ethyl acetate extracts. The flavonoids content which was display in aqueous extract was in the leaves of *Rumex dentatus* stem, flower and roots of *Salvia moorcroftiana* whole plant of *Marrubium vulgare* and *Lilium polyphyllum*. While ethyl acetate extract of *Rumex dentatus*, leaves of *Plantago major*, whole plant of *Sophora mollis*, and flavonoids were absent in *Rumex dentatus*, *Plantago major* and *Olea ferruginea*. The tannins contents are present in high amount of aqueous extract of *Plantago major* (leaves) *Rumex dentatus* (leaves) *Lilium polyphyllum* (whole plant) *Marrubium vulgare* (leaves) while tannins were absent in *Olea ferruginea* and *Salvia moorcroftiana* root. The Kurram is rich in term of biodiversity and medicinal flora. Further study should be conducted on these plants in case to identify its properties against fungal and viral illnesses which can give new way to new researchers [25, 26].

Conclusion

The current research work is designed to determined phytochemicals and anti-microbial activities from selected seven plants based chemical agents namely *Plantago major*, *Lilium polyphyllum*, *Rumex dentatus*, *Salvia moorcroftiana*, *Sophora mollis*, *Marrubium vulgare*, *Olea ferruginea*. Different four chemicals (n-hexane, ethyl acetate, methanol, extract and distilled water) are used for extraction. The different extracts like n-Hexane, ethyl acetate, methanol, and distal water percentage extractive values of the seven selected medicinal plant were studied. The highest n-Hexane extractive values was recorded for *Olea ferruginea* 151% the next one was *Salvia moorcroftiana* (Stem, flower) 128% then followed by *Lilium polyphyllum* and least for *Rumex dentatus*, *Plantago major* and *salvia moorcroftiana* (roots). The presence of alkaloids was recorded for *Lilium polyphyllum*, *Rumex dentatus*, *Salvia moorcroftiana*, *Sophora mollis*, *Olea ferruginea* While glycosides were present in *Salvia moorcroftiana* and *Sophora mollis*. Similarly Steroids and triterpenoid were note down in *Lilium polyphyllum*, *Salvia moorcroftiana* (in stem, root) and *Rumex dentatus*. The tannins were absent in *Olea ferruginea* and *Salvia moorcroftiana* root while flavonoids were absent in *Rumex dentatus*, *Plantago major* and *Olea ferruginea*. *Plantago major*, *Rumex dentatus*, *Sophora mollis*, and *Marrubium vulgare* showed positive results for Phenols and *Plantago major*, *Rumex dentatus*, *Salvia moorcroftiana* showed the presence of protein.

The present study concludes that the extracts of different selected medicinal plants named, *Rumex dentatus*, *Salvia moorcroftiana*, *Plantago major*, *Lilium polyphyllum* (Distilled water extract) and *Marrubium vulgare*) demonstrated significant activities against tested microbes. *Pseudomonas aeruginosa* is much susceptible to methanolic and ethyl acetate extracts of *Salvia moorcroftiana* ethanolic and ethyl acetate extract of *Sophora mollis* and methanolic extract of *Marrubium vulgare*. The remaining two plants have no such effects on bacterial strain.

Author Contributions: All authors contributed to the study, conception and design. The research idea was perceived by Dr. Wahid Hussain, the practical work was performed by Rida Ali and Shabiha, RA, S wrote the first draft of article which was reviewed and edited by Dr. Wahid Hussain. The final version of paper was prepared by Dr. Wahid Hussain. All authors read and approved the final manuscript. The consent of all authors was taken before submitting the paper to the journal.

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Recommendations

Local people should be warned about the value and right use of these medicinal plants. More and more production of these therapeutic plants should be encouraged among the communities.

Conflicts of Interest: The authors declare no conflict of interest

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