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ORIGINAL RESEARCH

Phytochemical analysis of therapeutic plants occurring in Dera Ismail Khan Region

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ABSTRACT

Plants contain different types of bio-active compounds that can be used to cure many diseases and also they can cure against many infectious diseases. These compounds are known as phytochemicals they may be primary or secondary constituents. Primary constituents have proteins, sugar, amino acids. Secondary constituents contain terpenoids, flavonoids and alkaloids. These compounds have antifungal as well as antibacterial activities.In this study different plants that are commonly found in Dera Ismail Khan region was investigated for phytochemical analysis, These plants were Acacia Nilotica, Luffa Cylindrical, Morus Nigra, Morus Alba, Punica Granatum and Psidium Guava commonly available in Dera Ismail khan region of Pakistan. Leaves, flower and fruits were washed, dried in air and ground to powdered. Aqueous extracts of leaves, flower and fruits were used for phytochemical analysis. All the parts were rich in phytochemicals i.e. terpenoids, tannins, flavonoids and steroids, etc. The phytochemical analysis has a great interest in pharmaceutical industries for new drugs and for curing different diseases. These phytochemicals found in this study can be used for curing different diseases.

Keywords: Phytochemicals, Infectious diseases, Antifungal, Antibacterial.

Introduction

Antimicrobial activities of different plants are now under study in different parts of the world because plants are the cheap and affective source of antimicrobial drugs. Plants contain many bioactive compounds that have lesser side effects but are more effective than other antimicrobial drugs commercially available. These compounds have the ability to cure and heal many infectious diseases. Due to increased microbial resistance the need of new antimicrobial drugs has been increasing day by day. With the help of plants we can develop phyto-medicine that can fight against pathogen (Kumaraswamy *et al.,* 2008).

Due to the microbial resistance, numbers of antibiotics are becoming less effective. So bio active compounds obtained from plants, seems to be one of the reduced and substitute sources for the control of these drug resistant microbes (Kumaraswamy *et al.,* 2008).

The antibacterial activities have been investigated in different plants due of its great therapeutic significance in the last few years, infections have been increasing and the resistances of the microbes, causing infections have also been increasing. Because of unsystematic use of antimicrobial drugs, most of the pathogens have developed a high resistance against an enormous number of the different antimicrobial drugs (Elujoba *et al.,* 2005).

This attached with other problems like the harmful side effects of antibiotic have led the microbiologist to think of other alternatives like new antibacterial substitution from medicinal plants. The occurrence of antimicrobial compounds in the plants provided a source of courage for producing the drugs having minor side effects. Nature has been a source of medicinal agent for millions of years and an impressive number of new drugs have been produced from natural sources, about 80% of the world's populations depend mainly on traditional drugs for their major health care (Elujoba *et al.,* 2005).

According to the WHO, medicinal plants would be the greatest basis to get a range of drugs. Therefore, these plants should be explored to get detailed information about their functions, safety, properties and efficacy. There is an improved attention in traditional medication and a growing request for further drugs from plants (Iwu, 1993).

Antimicrobial is the substances that inhibit their growth. They are widely used to cure against the different bacterial diseases. Agents that directly or reversibly inhibit the growth of bacteria are known as bacteriostatic and thus indirectly or irreversible put lethal actions on bacteria are called as bactericidal (Iwu, 1993).

Ideally, antibacterial agents upset bacterial structures that differ from those of the host. They may harm microbes by inhibiting bacterial protein, cell wall synthesis and nucleic acid synthesis, disrupting bacterial membrane function and structure or jamming metabolic pathways through inhibition of enzymes (Iwu, 1993).

In Africa, plants have been in use for hundreds of years ago (Elujoba *et al,* 2005; Okigbo and Omeka, 2006). Transmittable disease accounts for one half of all deaths in the less developed countries irrespective of efforts made in controlling the frequency of outbreak (Iwu, 1993; Okigbo and Ajalie, 2005).

Keeping in view all the above mentioned details, the present research has been considered to

assess the extracts of different plants as part of the exploration of bioactive compounds. These plants are commonly found in Dera Ismail Khan region and can be used for antioxidant, antibacterial and anti-inflammatory activities due to their excellent healing and curing activities.

Material and methods

Collection of the plant parts

Selected plants as in Table 1 leaves, flower and fruits were collected from the Dera Ismail Khan region. The plant parts were collected during the month of March. Healthy plants were chosen for the collection of plant parts. Then to eliminate dirt, they were carefully washed with water.

Table 1. List of plants and plant parts used for phytochemical analysis.

Plant Name	Plant Parts Used		
Acacia nilotica	Leaves juice	Fruit Juice	Flower Juice
Morus nigra	Leaves juice	Fruit Juice	Flower Juice
Morus alba	Leaves juice	Fruit Juice	Flower Juice
Punica granatum	Leaves juice	Fruit Juice	Flower Juice
Luffa cylindrica	Leaves juice	Fruit Juice	Flower Juice
Psidium gujauva	Leaves juice	Fruit Juice	Flower Juice

Phytochemical analysis

Qualitatively examined was done for Phytochemical analysis. For analysis of different biochemical compounds, standard methods described by Ayoola were used on fresh juices of Fruit, flowers, leaves of selected plants (Ayoola *et al.,* 2008).

Identification Test for Protein

This test was used for the identification of proteins. This test is also known as ninhydrin test. In this test fresh juice was boiled with 0.2% ninhydrin solution. Presences of protein were detected by appearance of deep blue or violet color as in Fig. 1.

Identification test for Phenol and tannin

In this test 2% $FeCl_3$ solution was mixed with plant juices in the test tubes. Appearance of bluish green or Black color, showed the existence of phenols and tannins as in Fig. 2. (2 ml Juice & 2 ml 2% $FeCl_3$ solution). Tannins have antibacterial power due to their basic character that let them to react with proteins to form stable water soluble compounds, thereby directly damaging bacterial cell membrane (Mohamed *et al.,* 2010).

Identification test for Flavonoids

This test was for the identification of flavonoids and It is known as alkaline reagent test. In the test tube, Fresh Juices were slightly mixed with sodium hydroxide 2% solution. Yellowish color produced which become colorless, with the addition of a few drops of diluted acid showing the presence of Flavonoids as in Fig. 3(Ayoola *et al.,* 2008)

Identification test for Saponins

In test tubes, Juices were mixed (separately) with distilled water and then shaken energetically; the Saponin in the sample was confirmed with the presence of stable foam as in Fig. 4.

Identification test for Terpenoids

This test is used for identification of terpenoids and is also as called as Salkowski test. In the test juices was mixed with chloroform than concentrated sulphuric acid was also added carefully. The presence of terpenoids was

confirmed by appearance of reddish brown color in the sample as in Fig. 5 (2ml juices, 2ml chloroform & few drops of sulphuric acid) (Ayoola *et al.,* 2008).

Identification test for Steroid

In this test chloroform was mixed with juicesin test tube and then carefully add concentrated sulphuric acid, followed by addition of a few drops of acetic acid, the presence of steroid was confirmed by appearance of greenish color in the juice in Fig. 6 (Ayoola *et al.,* 2008).

Identification test for Acidic compound

One pinch of sodium bicarbonate was mixed with Juices, the presence of acidic compounds was examined by production of effervescences in the juice as in Fig. 7.

Identification test for Cardiac Glycoside

This test was for the identification of cardiac glycosides in different test juices separately. Juices were added with acetic acid in the test tubes. Then sidewise few drops of 10% solution of ferric chloride and then concentrated sulphuric acid was added. Formation of Brownish ring showed the presence of cardiac Glycoside as in Fig. 8 (Ayoola *et al.,* 2008).

Results and discussion

In the qualitative analysis for the presence of phytochemicals, results showed the presences of Flavonoids, steroids, tannins, saponins, cardiac glycosides, carbohydrates, proteins, phenol and tannins. It had been documented that the crude extracts of many plants contain alkaloids, flavonoids, tannins, saponins, cardiac glycosides, volatile oils and steroids (Mainasara, 2012).

Acacia nilotica flower were rich in phytochemical and contains all the tested phytochemicals while tannins acidic compounds and flavonoids were absent in fruit extract and steroids and flavonoids were absent in leaves extracts as in Table 2. The earlier studies showed that in *Acacia nilotica* crude extracts the flavonoids were present (Imran *et al.,* 2010).

Table 2. Phytochemical analysis of different juices of *Acacia nilotica* (+ = present, - = absent)

Test	Leaves	Flower	Fruit
Phenol and tannins	+	+	-
Steroids	-	+	+
Cardiac Glycosides	+	+	+
Terpenoids	+	+	+
Saponins	+	+	+
Proteins	+	+	+
Acidic compounds	+	+	-
Flavonoids	-	+	-

Table 3. Phytochemical analysis of different juices *Morus nigra* (+ = present, - = absent).

Test	Leaves	Flower	Fruit
Phenol and tannins	-	+	-
Steroids	+	_	+
Cardiac Glycosides	+	+	+
Terpenoids	+	-	+
Saponins	-	+	+
Proteins	+	-	+
Acidic compounds	+	+	+
Flavonoids	-	-	+

Morus nigra fruit were rich in phytochemicals and all the all the phytochemicals were presents except phenol and tannins .In its flower extracts steroids, proteins terpenoids and flavonoids were absent and in leaves tannins and phenol, saponins and flavonoids were absent as in

Table 3. From previous studies it has been documented that in the *Morus nigra* leaves, bioactive compounds i.e. alkaloid were present (Rajan *et al.,* 2011).

Table 4. Phytochemical analysis of different juices of *Morus alba* (+ = present, - = absent)

Test	Leaves	Flower	Fruit
Phenol and tannins	-	+	-
Steroids	-	+	+
Cardiac Glycosides	-	-	+
Terpenoids	+	-	+
Saponins	+	+	+
Proteins	+	+	+
Acidic compounds	+	-	+

Table 5. Phytochemical analysis of different juices of *Punica granatum* (+ = present, - = absent).

Test	Leaves	Flower	Fruit
Phenol and tannins	+	+	-
Steroids	-	+	+
Cardiac Glycosides	+	+	+
Terpenoids	+	+	+
Saponins	+	+	+
Proteins	+	+	+
Acidic compounds	+	+	-
Flavonoids	-	+	-

Morus alba fruits were deficient in phenol and tannins and flavonoids .its leaves were deficient in flavonoids, steroids, tannins and acidic glycosides. While acidic compounds, terpenoids and cardiac glycosides were absent in flower extracts as in Table 4. It was examined that in *Morus alba* crude extracts, flavonoids were present and excellent antioxidant activities have been found in the flavonoids it is significant bioactive components in *Morus alba* leaves extracts, which can effect inhibition of the oxidative modification of the lipoproteins (Balakrishnan and Sharma, 2013)

Table 6. Phytochemical analysis of different juices of *Luffa cylindrica* (+ = present, - = absent).

Test	Leaves	Flower	Fruit
Phenol and tannins	+	-	-
Steroids	-	+	+
Cardiac Glycosides	+	-	+
Terpenoids	+	+	+
Saponins	-	-	-
Proteins	+	+	+
Acidic compounds	-	-	+
Flavonoids	-	+	-

Table 7. Phytochemical analysis of different juices of *Psidium guava* (+ = present, - = absent).

Test	Leaves	Flower	Fruit
Phenol and tannins	-	-	-
Steroids	-	+	+
Cardiac Glycosides	-	-	+
Terpenoids	+	+	+
Saponins	-	-	+
Proteins	+	+	+
Acidic compounds	+	+	-
Flavonoids	-	+	-

While examining *Punica grantum,* its flower extracts were rich in all the compounds while in

leaves there were absence of steroids and flavonoids and in fruits extracts there were absence of phenol and tannins, acidic compounds and flavonoids as in Table 5. It has been documented that extracts of *Puncia grantum* was low in phenol and tannins (Mainasara, 2012).

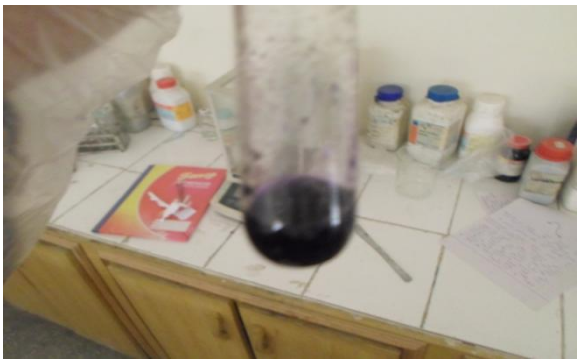

Fig. 1. Protein in the *Acacia nilotica* flower juice.

Fig. 2. Phenol and tannin in the *Morus nigra* flower juice.

Fig. 3. Flavonoids in the *Punica granatum* flower juice.

Leaves of *luffa cylindrical* were deficient in steroids, saponins, acidic compounds and flavonoids, while its flower were deficient in phenol and tannins, cardiac glycosides, saponin, acidic compounds and its fruit extracts were deficient in flavonoids, saponins and phenol and tannins while all the other phytochemicals were present in them as in Table 6. The previous research studies showed that flavonoids and alkaloids were present in *luffa cylindrical* extracts (Said *et al.,* 2010).

Fig. 4. Saponin in the *Morus alba* fruit juice.

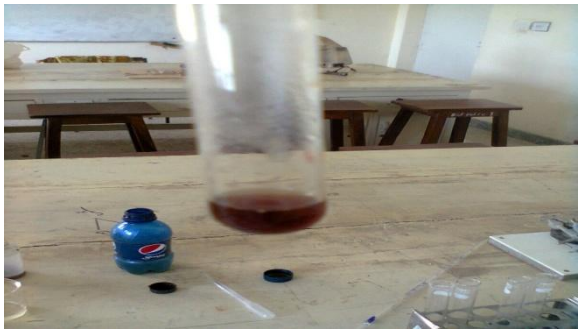

Fig. 5. Terpenoids in the *Luffa cylindrica* leaf juice.

Fig. 6. Steroids in the *Luffa cylindrica* fruit juice.

Fig. 7. Acidic compounds in the *Morus alba* leaf juice.

Fig. 8. Cardic glycosides in *Psidium guava* fruit juice.

In case of *Psidium gujauva* among test phytochemicals its leaves extracts only contains terpenoids, proteins and acidic compounds, while there were absence of phenol and tannins, cardiac glycosides and saponins in its flower and fruits extracts were deficient in phenol and tannins, acidic compounds and flavonoids as in Table 7. Reducing sugars are present only in 2 plants out of 10 plants i.e. *Acacia nilotica* and *Psidium gujauva*. Terpenoids are present in *Acacia nilotica, Psidium gujauva* and *Fagonia cretica*. Terpenoids are reported to have antiviral, antimalarial, antiinflammatory, and antibacterial (Mahato and Sen, 1997).

Conclusion

The study showed that plants used in this study can be used as a medicine and in future more and more antibacterial drugs can be produced by plants for the betterment of human beings because they are rich in phytochemicals. They are easy and cheap source of these phytochemical so they can fulfill the medicinal need of the present day.

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