Plants extracts and their mixtures have been found to have a vital role in human health and wellbeing. *Ficus carica* have been used traditionally for various medicinal purposes. Keeping this in mind, the crude methanol leaf extracts of *Ficus carica* was tested for antibacterial, antifungal and phytotoxic activities via *in vitro* method. The organic solvent (Methanol) extracts from the plant of *Ficus carica* was obtained and then tested against *Pyogenes salmonella typhi*, *Staphylococcus aureus* and *Escherichia coli* by agar well diffusion method. The results showed significant antibacterial activity against *Pyogenes* (61 %) and *Salmonella typhi* (55.5%) but no activity was observed against *E.coli* and *S.aureus*. Antifungal activity assay showed no activity against *Aspergillus niger*, *Aspergillus flavus*, *Penicillium notatum*, *Fusarium oxysporum*, *Trichoderma harzianum* and *Alternaria alternata*. While moderate phytotoxic activity was observed for the crude methanol extract of *Ficus carica* using *Lemna minor* plant as a model plant.

**Key words:**
*Ficus carica*, *Lemna minor*, antibacterial activity, Antifungal activity, phytotoxic activity, Agar well diffusion method.

**Introduction**

Traditionally there are thousands of herbs have been investigated and suggested for therapeutic and medicinal purpose all around the world. *Ficus carica* is one among all of these investigated herbs and it belongs to Moraceae family. It is commonly known by different names in different places i.e. Figs in UK, Anjir in India and Teen in Arabic. According to available literature resources it has been suggested that *F. carica* is earliest cultivated plant and used for treatment of ailments like fever, ulcer, diabetes and cancer (Kislev et al., 2006; Sirisha et al., 2010). Patilet et al. (2010) evaluated and suggested the antipyrectic activity of ethanol extract of *F. carica* leaves through result obtained in experiment on albino rats at normal body temperature and yeast induced pyrexia. Various phytochemical studies have been performed on *F. carica* and reported numerous bioactive compounds i.e. phytosterols, organic acids, phenolic compounds (3-O- and 5-O-caffeoylquinic acids, ferulic acid, quercetin-3-O-glucoside, quercetin-3-O-rutinoside, psoralen, bergapten), phytosterols, anthocyanin composition, triterpenoids, coumarins, and volatile compounds (Oliveira et al., 2009; Gibernauet al., 1997). Different parts of plant such as leaves, roots and fruits of *F. carica* have been used traditionally for various medicinal purposes. These are also helpful for the treatment of various disorders i.e. respiratory disorders (cough, sore throats and bronchial problems), cardiovascular disorders, inflammatory disorders, gastrointestinal disorders (colic, loss of appetite, indigestion and diarrhea) (Burkill, 1935 and Penelope, 1997).

Phenolic compounds present in *F. carica* are responsible for antioxidant activity. It produces its effect by various ways such as hydrogen donors, reducing agents, free radical scavengers, singlet oxygen quenchers, and so on. Çalışkan and Polat (2011) reported that *F. carica* fruits contains highest levels of flavonoids, polyphenols and anthocyanins and produces the highest antioxidant effect (Solomon et al., 2006).

Yancheva et al. (2005) and Rubnov et al. (2001) performed in *vitro* study for evaluation of cytotoxic activity on various cancer cell lines and suggested anticancer activity of mixed 6-O-acyl-á-d-glucosyl-á-sitosterols of Fig (*F. carica*). The Hepato protective activity of *F. carica* leaves was reported by Gond and Khadbadi (2008) through rifampicin induced functional changes in rats. The hypoglycemic activity of aqueous extract of *F. carica* leaves was studied by Perez et al. (1998) through Streptozotocin-diabetic rats. The Hypolipidemic activity of mixed 6-O-acyl-á-d-glucosyl-á-sitosterols of Fig (*F. carica*).

**Abstract**

Plants extracts and their mixtures have been found to have a vital role in human health and wellbeing. *Ficus carica* have been used traditionally for various medicinal purposes. Keeping this in mind, the crude methanol leaf extracts of *Ficus carica* was tested for antibacterial, antifungal and phytotoxic activities via *in vitro* method. The organic solvent (Methanol) extracts from the plant of *Ficus carica* was obtained and then tested against *Pyogenes salmonella typhi*, *Staphylococcus aureus* and *Escherichia coli* by agar well diffusion method. The results showed significant antibacterial activity against *Pyogenes* (61 %) and *Salmonella typhi* (55.5%) but no activity was observed against *E.coli* and *S.aureus*. Antifungal activity assay showed no activity against *Aspergillus niger*, *Aspergillus flavus*, *Penicillium notatum*, *Fusarium oxysporum*, *Trichoderma harzianum* and *Alternaria alternata*. While moderate phytotoxic activity was observed for the crude methanol extract of *Ficus carica* using *Lemna minor* plant as a model plant.
tuberculosis activity through methanol extract of *F. carica* leaves was reported by Khadbadi et al. (2007) and has been screened against H37Rv (*Mycobacterium tuberculosis*). Various other biological activity have also been reported such as irritant potential (Sahir, 2002), Nematocidal activity (Liu et al., 2001), Antispasmodic and Antiplatelet activity (Mohamad et al., 2011). Anthelmintic activity (De Amorinet al., 1999), Antimitogenic activity (Agabedoli and Kasimova, 2005) and Anti HSV activity (Wanget al., 2004).

Apart from above reported biological activity it is essential to investigate other additional activities, hence present study was performed to investigate the antibacterial, antifungal and phytotoxic activity.

**Material and Methods**

**Plant material Collection**

It is found in almost all areas of Pakistan. *Ficus carica* leaves were collected from Uthmanzai District Charsada, Khyber PukhtoonKhwa, Pakistan and identified by Prof. Dr. Abdur Rasheed, plant taxonomist, Department of Botany, University of Peshawar, Khyber PukhtoonKhwa, Pakistan. Leaves of *Ficus carica* were dried in shadow at room temperature for 15 days. The dry materials were ground in an electric grinder.

**Plant Extracts**

Fifty grams of dried plant leaves were soaked in 500ml of pure methanol (100%) in 1000ml beaker with constant stirring then left the beaker for about 10 days with daily basis stirring. After ten days the sample was filtered with filter paper. The filtrate was then transferred and concentrated at 40°C under vacuum using rotary evaporator which gave a greenish oily crude methanol extract of 17g in a rotary evaporator.

**Tested Organisms**

Bacteria: *Staphylococcus aureus* (gram positive), *Pyogenes* (gram positive), *Escherichia coli* (*E. coli*) (gram negative), *Salmonella typhi* (gram negative) bacteria were taken from their pure cultures at centre of Biotechnology and Microbiology University of Peshawar, Pakistan.

Fungi: The antifungal activity of *Ficus carica* plant’s methanolic extracts was tested on *Aspergillus niger*, *Aspergillus flavus*, *Penicillium notatum*, *Fusarium oxysporum*, *Trichoderma harzianum* and *Alternaria alternata* provided by centre of Biotechnology and Microbiology University of Peshawar, Pakistan.

**Antibacterial activity**

Crude Methanolic extract of *Ficus carica* leaves was tested against different bacteria i.e. *Staphylococcus aureus* (gram positive), *Pyogenes* (gram positive), *Escherichia coli* (*E. coli*) (gram negative), *Salmonella typhi* (gram negative) for antibacterial activities. Agar well diffusion method was used to determine this activity (Ahmad et al., 2011). Bacterial lawn was prepared on sterile agar plates using 24 hrs old bacterial cultures of organisms of interest from nutrient broth. After 15 min. sterile 6mm borer was used to dig the wells on plate. Stock solution of test samples (100mg/ml) was prepared in sterile dimethyl sulfoxide (DMSO) (Merck). 100µl of crude methanolic extract were introduced in the wells and labelled. DMSO (d” 1%) and amoxicilin were used as negative and positive controls respectively. Percent zone of inhibition was measured in comparison with positive control using the following formula

$$\text{Formula for } %\text{ inhibition} = \frac{\text{Linear growth in test (mm)}}{\text{Linear growth in standard (mm)}} \times 100$$

**Physiotoxic activity**

In order to check the phytotoxic activity of *Ficus carica* plant, the crude methanolic extracts of *Ficus carica* leaves was tested against *Lemna minor* obtained from the Department of Botany, University of Peshawar. The method of McLaughlin et al. (1991) was followed for this activity. Stock solutions (20mg/ml) of the test samples were prepared in methanol.E-medium was also prepared for the growth of *L. minor*. Ten fresh and healthy *Lemna minor* plants were selected and transferred to each Petri plates, 10, 100 and 1000µg/ml from the stock solution were introduced into three petri plates and left at room temperature till methanol was evaporated. 20 ml of media with ten healthy plants with rosette of three leaves were added to all petri plates. Two replicates were prepared for each sample concentration. Experimental dishes were incubated at 28 ± 1°C. Paraquat at a concentration 0.015 µg/ml was used as standard growth inhibitor. Results were taken after 7 days by counting the number of damaged and healthy plantlets.

**Result and Discussion**

According to World Health Organization report about 80% people of the world used traditional medicines for health care (Bentley, 1910). Plant products and their derivatives are the important source of therapeutic agents (Judd and Borden, 1980). Plants produce secondary metabolites, which are potentially useful structures for the development of new chemotherapeutic agents. The antibacterial, antifungal, anti-inflammatory, phytotoxic and haemagglutination activities of plants have been reported (Samy and Ignacimuthu, 2000, Palombo and Semple, 2001, Afelaynet al., 2002 and Khan et al., 2013). Some of these observations have helped in identifying the active principle responsible for such activities and in the developing drugs for the therapeutic use in human beings. These secondary compounds may produce either toxic or non-toxic effect to animals. Indeed, many of these compounds have been used in the form of whole plants.
Figure 1. Antibacterial activity of crude methanolic extract of *Ficus carica*.

![Graph showing antibacterial activity](image1)

Figure 2. Antifungal activity of crude methanolic extract of *Ficus carica*.

![Graph showing antifungal activity](image2)
or plant extracts for preservation of food and for medicinal purpose in human wellbeing (John, 2004). Because plants are the natural reservoir of many active ingredients they produce various therapeutic activities i.e. antimicrobial, anticancer agents, analgesics, anti-diarrheal, antifungal (Lucy et al., 1999).

In the present study, the methanol leaf extracts of *Ficus carica* were tested for the antibacterial activity against *Pyogenes*, *Salmonella*, *S. aureus* and *E. coli* and the antifungal activities against *Aspergillus parasiticus*, *Aspergillus flavus*, *Penicillium notatum*, *Fusarium oxysporum*, *Trichoderma harzianum*, *Fusarium solani* and *Alternaria alternate* and for the phytotoxic activity using *Lemna minor* model plant.

Results obtained in the present study revealed that the tested *Ficus carica* plant extracts posses potential antibacterial activity against some pathogens and these plant based products have been effectively proven for their utilization as source for antimicrobial compounds as shown in figure 1 but showed no antifungal activity against the tested fungi as shown in figure 2. The leaf methanolic extract of *Ficus carica* showed moderate phytotoxic activity which is shown in figure 3.

When tested by the disc diffusion method, the methanol leaf extracts of *Ficus carica* showed significant activity against *Pyogenes* and *Salmonella typhi*. The highest antibacterial activity of 16 mm (61 %) in *Pyogenes* and least activity recorded in *Salmonella typhi* measured 15 mm (55.5%). The extract showed no antibacterial activity against *E. coli* and *S. aureus*.

Leaf extract of *Ficus carica* exhibit noantifungal activity against any of the tested fungi showing that the methanolic leaf extract of *Ficus carica* is unable to suppress any of the tested fungi and the tested fungi grew on the medium in their presence.

The results of phytotoxic assay of methanolic extract of *Ficus carica* were positive and showed activity against the *Lemna minor* model plant. *Lemna* plants are miniature aquatic monocotyledonous plants that are very sensitive to bioactive compounds having phytotoxic properties. *Lemna* assay has been used to detect natural phytotoxic and antitumor compounds Rehman, 1991. Hence it can be used to detect new plant growth inhibitors. The phototoxic activity of the methanolic extract from *Ficus carica* plant at 1000, 100 and 10 μg/ml was 60, 51 and 45 % respectively. The results presented in this paper showed that *Ficus carica* contains phototoxic compounds that inhibit germination and growth of *Lemna minor* model plant, thus showing a good allelopathic potential.

**Conclusion**
The results of present investigation clearly indicated that the methanolic extract from *Ficus carica* exhibits very potential antibacterial and moderate phytotoxic effect. Thus, the study ascertains the value of plants used in ayurveda, which could be of considerable interest to the development of new drugs. However, further studies are necessary to seek out its active constituents and their pharmacokinetic properties.

**References**


