

EVALUATION OF ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF *OLIGOMERIS LINIFOLIA* (VAHL) J.F. MACBR.

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Keywords: *Oligomeris linifolia*, Antioxidant, Antibacterial, Antifungal activity

Abstract

Fine powder of *Oligomeris linifolia* was extracted with 70% methanol. Crude *Oligomeris linifolia* methanol extract (OLME) were assessed for antioxidant, antibacterial and antifungal characteristics. All the tested OLME showed potent antioxidant, antibacterial, and antifungal activities. The results clearly showed that *Oligomeris linifolia* methanol extracts is a source of potential therapeutic compounds against antibacterial, antifungal and free radical associated disorders.

Introduction

Treatment with herbal remedies is used almost in every country of the world and has been relied on to promote, support and get good human health for hundreds of years. For example, the Chinese system of traditional remedy is running like herbal medicines has been used efficiently from 2500 years, to prevent, detect and treat numerous diseases (Sucher and Carles 2008). Treatment with herbal drugs have a vital part in maintaining human health safety and improving human life from a long time. World health organization has surveyed that 80% of the world's population rely upon treatment with herbal medicines for their better health needs and these herbal medications mostly consist of plant extracts and their vigorous constituents. Several basic concepts of their therapeutic systems are still not clarified applying new methods (Mulu *et al.* 2015). The tribal population living in periphery of India has mostly depend upon traditional remedies and phytomedicine floras division has fundamental place in the tribal and peripheral population of India. Phytomedicine has a strong origin of both traditionally and current medications. Herbal medicine has veritable effectiveness and around 80% of peripheral population depend on it for their health care needs (Akinyemi *et al.* 2005). Pharmaceutical industries currently spent a significant proportion of money and energy to separate natural constituents from herbal floras, to provide safe and economically most safe medications to the population. In the late 19th century first anti-microbial activities tests of herbal constituents of phytomedicine floras were recorded. Currently it is evaluated that western medicines consist of one half of the herbal constituents (Doughari 2006). Herbal medications are safer than pharmaceutical preparations and the crucial benefits of using herbal floras show substantial curative efficacy and more savvy treatment. Herbal floras around the world consist of numerous ingredients which has anti-microbial effects. Herbal floras constituents were utilized for the treatment of numerous ailments and these methods are the basic part of all traditional system of medications (Salwa *et al.* 2011). The knowledge about chemical composition of herbal extracts is essential, to find out such biochemical ingredients that have distinct beneficial impact on human body. Flavonoids, tannins, alkaloids and phenolic compounds are some of such basic biochemical composites of herbal floras. In addition, the knowledge about chemical composition of therapeutic floras would further

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be useful for disclose of the actual significance of herbal derived remedies (Mojab *et al.* 2003). In traditional medication Asteraceae (*Artemisia* sp.) are commonly utilized as a therapeutic flora (Proksch 1992). It was scientifically showed that *Artemisia* species wormwood improved the digestibility performance of a sheep when it was added in her diet and rice straw substituted (Ko *et al.* 2006). *Sida rhombifolia* is wildy used as a therapeutic medicine. For example, in Ayurveda its leaves and roots utilized for cure of heart diseases, all kinds of inflammations, fever and burning sensations. The roots of *Sida rhombifolia* improves child birth process if taken internally into the uterus and utilized for the treatment of pulmonary tuberculosis and rheumatism. The powder form of the leaves is applied as a remedy to boils and tumours. Its aerial extracts are utilized as an anti-venom remedy for snake bite and act as an abortifacient in pregnant women if taken orally (Holdsworth 1974). The phytochemical studies of *Sida rhombifolia* shows the presence of tannins, saponins, sterolic compounds, alkaloids, amino acids, fatty acids, carbohydrates, terpenoids, glycosides, lignans, steroids, flavonoids and phenolics (Narendhirakannan and Limmy 2010). *Oligomeris linifolia* belong to Resedaceae and is one of *Oligomeris* species. The family Resedaceae consists of 52 classes of six genera divided into three groups. *Oligomeris* species mainly found in North Africa, Middle East India, Pakistan, North America and Southern Europe. Habitat of the herb includes saline soils, deserts, coastline, and plain areas. It is 50 cm tall and an annual herb, contains linear leaves. Two phenolic acids, one sterol, five flavanols, one nucleotide and two free sugar compounds were isolated from the herb (Hussein *et al.* 2013). The present study was carried out for a detailed pharmacological investigation of *Oligomeris linifolia* methanol extracts for their antioxidant, antifungal and antibacterial activity.

Materials and Methods

The whole mature and healthy plant of *Oligomeris linifolia* was collected from the nearby agricultural fields of Bannu, Khyber Pakhtoonkhwa, Pakistan during April and May, 2016. The plant was carefully washed in distilled water to remove dirt and latex and cut into pieces with knives and a pair of scissors. For shade drying the plant fragments were placed and scattered on the floor above clean sheet approximately for 30 days. In a hot air oven, the plant shade dried pieces further dried for an hour at 40°C just before start of the extraction process to eliminate the residual moisture and to obtained fine powder of it. In a conical flask 70 g fine powder of the dried plant were soaked in 300 ml of 70% methanol for 72 hrs at room temperature. Then Whatman filter paper was used for filtering the plant extracts to get methanol filtrate. Through rotary evaporator the methanol was evaporated to obtain crude. For antibacterial activity test agar well, diffusion method was used (Nisar *et al.* 2010). Nutrient broth was used for the test bacterial isolate and a few colonies of the bacterial isolate were transferred into it. Then the broth was placed at 37°C in an incubator shaker until the visible turbidity was greater than or equal to the 0.5 McFarland standard and within 30 min of preparation process was used. According to slandered protocol 7.5 mg methanolic extracts of the plant were dissolved in 1 ml of dimethyl sulfoxide (DMSO) to obtain 5.0 and 2.5 mg/ml.

To determine antifungal activity of the methanolic extracts of the plant the agar tube dilution assay was used as already defined (Ijaz *et al.* 2010). The antioxidant activity was carried out as mentioned (Nabavi *et al.* 2008). Following formula was used for determination of scavenging (antioxidant) activity: Scavenging % = [(control absorbance-sample absorbance)/(control absorbance) × 100.

Results and Discussion

To investigate antimicrobial activity of *Oligomeris linifolia* methanol extracts, its different concentrations were used against 4 different bacterial isolates *viz.* *Staphylococcus aureus*,

Enterococcus faecalis, *Salmonella typhemurium* and *Klebsella pneumonia*. Fig. 1 shows that high concentrations of *O. linifolia* methanol extract has maximum effects against *Staphylococcus aureus*, *Salmonella typhemurium*, *Enterococcus faecalis* and *Klebsella pneumonia* as compared to other concentrations viz. 5.0 and 2.5 mg/ml. Ceftriaxone (1 mg/ml) used as a positive control shows significant effects as compared to all the tested concentrations of *O. linifolia* and negative control of DMSO. Another investigation stated that plant extracts have antimicrobial manifestations due to presence of flavonoid and phenolics contents in it (Baba *et al.* 2015). In human being fungi causes various fungal infections. In the market different antifungal drugs are available but these pharmaceutical preparations have various side effects. Hence, researchers in current conditions are trying to prepare such type of treatments which are safe and more effective to human. From herbal floras antifungal extracts are obtained which have vital role in controlling of various fungus infections. In the present study *Oligomeris linifolia* methanol extracts were tested against 4 strains of fungus viz. *Aspergillus flavous*, *A. niger*, *A. fumigatus* and *Candida albicans*. Fig. 2 presented 65% inhibition of OLME against all tested fungal strains hence proved that it has strong antifungal activity. OMLE inhibited the *C. albicon*, *A. fumigatus*, *A. flavus* and *A. niger* with inhibition percentage of 71.2 ± 1.33 , 67.1 ± 1.12 , 61.5 ± 1.11 and 53.3 ± 1.37 , respectively as compared to control of terbenafene (1 mg/ml). Some earlier reports study were same as this result (Bylka and Goslinska 2001).

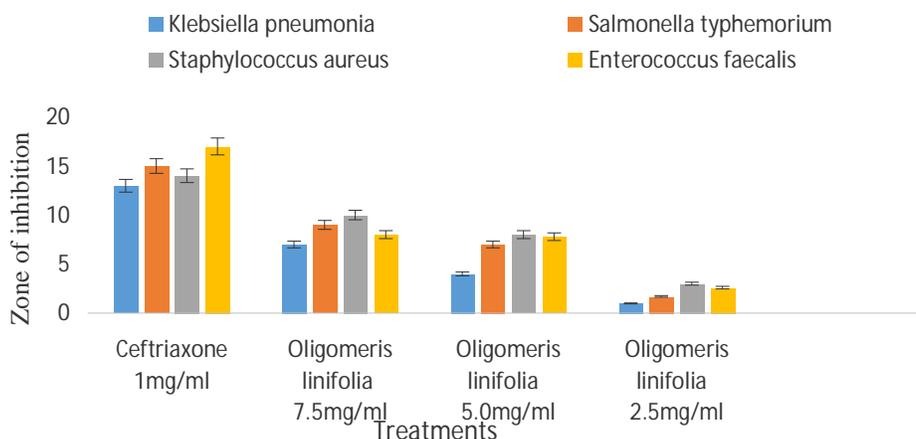


Fig. 1. Effect of methanol extract of *Oligomeris linifolia* against bacteria.

1,1-diphenyl-2-picrylhydrazyl (DPPH) is a free radical and from antioxidant it can attract electrons. The antioxidant activity of the *Oligomeris linifolia* methanol crude extract is presented in Fig 3. Graph represents a direct relationship between the concentration of methanol extract and the per cent scavenging of *Oligomeris linifolia*. Free radical scavenging activity of the plant at a concentration of 3 and 0.38 mg/ml was 59.5 and 21.31%, respectively. The order of per cent free radicals scavenging activity is 3, 1.5, 0.75 and 0.38 mg/ml, respectively. Bioactive compounds are found in medicinal flora which play significant role in the cure of numerous oxidative stress causing ailments including cancer, heart disease, inflammation, diabetics and infections all over the world (Kumar *et al.* 2016). For treatment of various kind of ailments different floras are locally used in all over the world and have been under research to obtained active compounds for medications. Wide variety of herbal floras and other natural resources are found in Pakistan which have been used by local people for treatment various diseases including infectious diseases, skin

diseases and gastrointestinal tract diseases as well. For research purpose, knowledge from local healers play vital part to get information about therapeutic nature of numerous herbal species. The present findings revealed that methanolic extracts of the plant *Oligomeris linifolia* has marked antioxidant potential (59.5 and 21.31% at 3 and 0.38 mg/ml) concentrations, respectively. The plant *Oligomeris linifolia* has marked antioxidant potential which is due to phenolic and polyphenolic compounds present in it which decreases the free radicals that causes oxidative stress in living cell. Same results obtained by other researchers correlate with the present findings (Duenas *et al.* 2006).

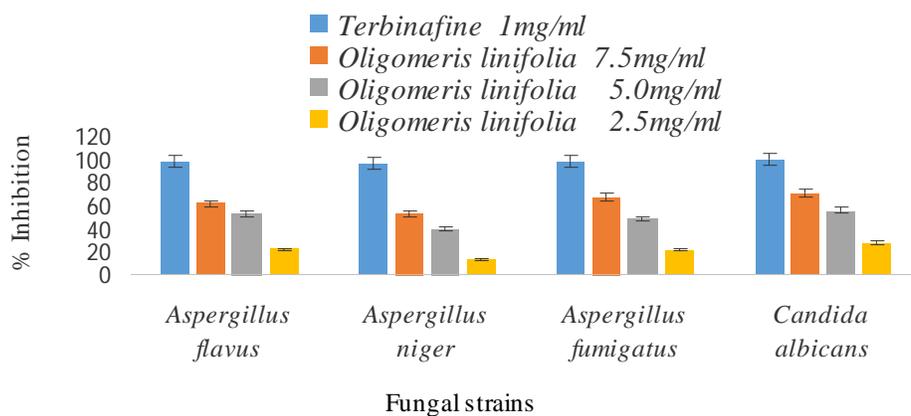


Fig. 2. Antifungal effect of *Oligomeris linifolia* methanolic extract on *Aspergillus flavous*, *A. niger*, *A. fumigatus* and *Candida albicans*.

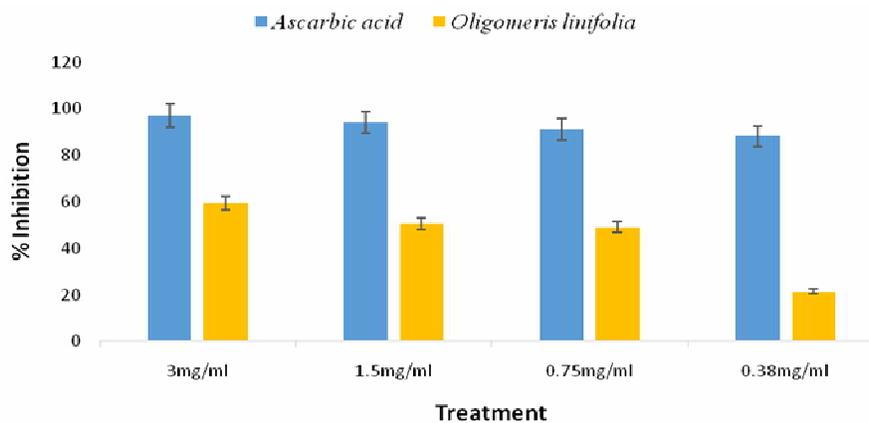


Fig. 3. DPPH free radical scavenging activity by the *Oligomeris linifolia* extracts.

The antioxidant, antifungal and antibacterial activities were investigated for the methanol fractions of *O. linifolia*. The present study reveals that the methanol fractions of *O. linifolia* were active against all the tested microorganisms and had good antioxidant activities.

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(Manuscript received on 9 February, 2018; revised on 8 January, 2019)