

Antibacterial and antioxidant activity of methanolic extract of bark of *Prunus persica*

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Abstract: In the present study *in vitro* antimicrobial and antioxidant activities of *Prunus persica* family rosaceae were carried out from the bark extract of the plant. The methanolic extract was tested for their antimicrobial study against gram positive and gram negative bacteria and for their antioxidant activity using scavenging activity of DPPH (1,1 diphenyl-2-picrylhydrozyl) radical method. The plant extract showed remarkable antibacterial and antioxidant activity.

Keywords: Antibacterial activity, Antioxidant activity, *Prunus persica*, Bacteria

INTRODUCTION

The plant extracts and active metabolites possess several types of activities such as antibacterial, antifungal, antioxidant and antiviral, etc. The various plant products, that are regularly used for their therapeutic potential (Mitscher, 1978 and Pavithra *et al.*, 2010). The alternative medical therapy has increased the interest of pharmacologists and herbalists over the past decade. Historically, plants have provided a source of inspiration for novel drug compounds, as plant derived medicines have made contributions to human health and well being (El-Astal *et al.*, 2005). Many studies indicates that in some plants there are many substances such as peptides, unsaturated long chain aldehydes, alkaloidal constituents, some essential oils, phenols and water, ethanol, chloroform, methanol, and butanol soluble compounds (Alma *et al.*, 2003). These plants emerged as compounds with potentially significant therapeutic application against human pathogens, including bacteria, fungi or viruses (Holetz *et al.*, 2002 and Perez, 2003). *Prunus persica* (L.) Aaru belongs to the family *Rosaceae* is a deciduous tree up to 10 m. high. Bark gray or ashy or serrate acuminate glabrous. Flowers pinkish white sessile or short, Pedicelled. Commonly cultivate for edible fruit from sub. Himalayan up to 2400 m. (Gaur, 1999). The leaves are astringent, demulcent, diuretic, expectorant, febrifuge, laxative, parasiticide and mildly sedative. They are used internally in the treatment of gastritis, whooping cough, coughs and bronchitis (Yeung Him-Che, 1985).

The plant has been used in folk medicines in India. There is a lack of information about the antibacterial and antioxidant activities of steam bark of *P. persica*, which is medicinal plant of the Indian flora and widely used in

treating certain disease. This study is an attempt to determine the antibacterial and antioxidant activities of methanolic extract of *P. persica* steam bark.

MATERIALS AND METHODS

Test plant material: The Plant material was collected from Singoli, Paurikhal, Tehri Garhwal, Uttrakhand, India in the month of August 2007 and identified from Taxonomy Laboratory, Department of Botany, H.N.B. Garhwal University Srinagar. A voucher specimen (GUH-8388) of the plant has been kept in the Departmental Herbarium for future records.

Test organisms: The bacterial cultures used in this study, *Staphylococcus aureus*, *Bacillus subtilis*, *Staphylococcus epidermidis*, *Klebsiella pneumoniae* and *Mycobacterium smegmatis* were obtained from the SBS Institute of Biomedical Sciences Balawala, Dehradun, India.

Extract preparation and antimicrobial assay: The Bark (3kg) was air dried, crushed, powdered and exhaustively extracted with light petroleum (60-80°C). The petroleum extract was concentrated and dried. The petroleum free mass then extracted with MeOH repeatedly, until the extractive became colorless.

In vitro antibacterial activity of the methanolic extract of plant was carried out by disc diffusion method (Elgayyar *et al.*, 2001). Actively growing a log phase culture were mixed in soft agar and plated. The extract (1g/ml) was loaded into different filter paper discs prepared from Whatman No.1 filter paper. The discs were placed on the agar medium containing the culture and incubated for 24h at 37°C. The diameter of zone of growth inhibition was measure. The effects were compared with that of the

Table 1. Antibacterial activity of bark of *P. persica*.

Plant extract	Concentration (%)	Zone inhibition(mm)				
		<i>S.a</i>	<i>B.s</i>	<i>S.e.</i>	<i>K.p.</i>	<i>M.s.</i>
Methanolic	50	22	15	15.5	23	16
	100	23	17	17	24	17.5
	150	23.50	19	18.5	24	18
Marginal Mean		22.83	17	17	24	17.83
Ampicillin(5µg/ml)		35	-	17	17	24

S. a.- *Staphylococcus aureus*, B. s.- *Bacillus subtilis*, S.e.- *Staphylococcus epidermidis*, K. p- *Klebsiella pneumoniae*, M.s.- *Mycobacterium smegmatis*

standard antibiotic Ampicillin (5µg/ml).

Determination of antioxidant activity: In order to measure antioxidant activity DPPH free radical scavenging assay was used. This assay measures the free radical scavenging capacity of the extract under investigation. DPPH is a molecule containing a stable free radical. In the presence of an antioxidant, which can donate an electron to DPPH, the purple colour which is typical for free radical decays and the absorbance was measured at 517nm using a double beam UV-VIS spectrophotometer (Brand *et al.*, 1995). The methanolic extract were redissolved in methanol and various concentration (10, 20, 50 and 100 µg/ml) of extract was used. The assay mixture contained in total volume of 1 ml, 500µl of extract, 125µl prepared DPPH and 375 µl solvent (methanol). After 30 min of incubation at 25°C, the decrease in absorbance was measured at 517 nm on spectrophotometer. The radical scavenging activity (RSA) was calculated as a percentage of DPPH using a discoloration using then equation.

$$\% \text{ RSA} = [(A_0 - A_s)/A_0] \times 100$$

Where A_0 and A_s are the absorbance of control and test sample respectively

RESULTS AND DISCUSSION

The result of this study showed that methanolic extract of *P. persica* inhibited the growth of various species of gram positive and gram negative bacteria (Table 1). The extract showed significant effect on all gram positive and gram negative bacteria in lower concentration. The

inhibition zone of gram positive bacteria was found *Staphylococcus aureus* (22-23.5mm), *Bacillus subtilis* (15-19mm), *Staphylococcus epidermidis* (15.5-18.5mm) and gram negative bacteria *Klebsiella pneumoniae* (23-25mm), *Mycobacterium smegmatis* (16-18mm). The methanolic extract shows very good antibacterial activity due to the presence of several bioactive compounds such as - sitosterol, its D-glucoside, hentriacontane, hentricontanol and flavonoids naringenin, di hydro-kaempferol, quercetin (Chandra *et al.*, 1988), persicaside a new alkaloids (Jung-Rae *et al.*, 2007) and also phenolic compounds have been isolated from the plant to exhibit antibacterial activity.

The DPPH radical has been widely used to test the potential of compounds as free radical scavengers of hydrogen donor and to investigate the antioxidant activity of plant extracts (Porto *et al.*, 2000). The methanolic extract of plant showed a high effective free radical scavenging in DPPH (2,2 diphenyl-1-picryl hydrazyl) assay (Fig. 1). The extract of the plant exhibited a remarkable antioxidant effect at low concentration. When the extract of the plant was tested for DPPH radical scavenging activity, it was found that 50µg/ml and 100µg/ml of the extract lowered the DPPH radical levels above 57% and 94% respectively. Inhabitation of DPPH radicals 50% considered as significant antioxidant properties of any compound (Sanchez-Moreno *et al.*, 1998).

The results obtained in the present study showed that plant extract had good significant antibacterial activity against gram positive and gram negative bacteria and also remarkable antioxidant activity on DPPH free radical.

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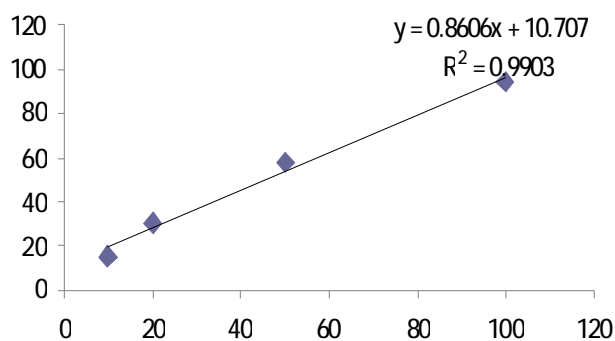


Fig. 1. DPPH activity of extract of *P. persica*.

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