



**QUANTIFICATION OF PHENOL CONTENT AND ANTIOXIDANT ACTIVITY  
FROM *ZIZIPHUS JUJUBA* (FAMILY: RHAMNACEAE)**

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**Abstract**

The presents study was aimed to determine Phenolic content and antioxidant activity of methanolic extract of the leaves of the plant *Ziziphus jujuba* (Family: **Rhamnaceae**), an important plant in the Indian system of medicine. Phenolic content of *Ziziphus jujube* leaves methanolic extract of 2.8% of total extractable poly phenolic compound. The antioxidant activity showed very promising result in both tested methods that is 2,2-diphenyl-1-picrylhydrazyl (DPPH) and ferric ion reducing capacity. The antioxidant activity is directly correlated to the presence of total phenolic contents.

**Keywords:** *Ziziphus jujuba*, polyphenols, phenol content.

**Introduction:**

Traditional knowledge about plants has become cultural heritage of many nations. Therefore it is very important to preserve and protect the traditional knowledge and also establish a data base of traditional medicine, this will help to conserve and retrieve the information to benefit of mankind [1].

*Ziziphus jujuba* plant belonging to the family Rhamnaceae is one of those plants which have been used in many disorders since long time in

many parts of India as well as other countries like Burma, Iran, Syria, Afghanistan, Europe, Australia, America and Africa as a traditional system of medicine. In India commonly it is known as a ber in Hindi and Badrah in Sanskrit. It is distributed originally from the Middle East or the Indian subcontinent, but now cultivated throughout the tropics and subtropics for its nutritious. In India it is found throughout the country to an altitude of approximately 1500 m in the Himalayas, typically on or near old village sites, and very commonly on black cotton soils in the central India.

It is a small deciduous tree or shrub reaching a height of 5–10 m, usually with thorny branches. The leaves are shiny-green, ovate-acute, 2–7-cm wide and 1–3-cm broad, with

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three conspicuous veins at the base, and a finely toothed margin. The flowers are small, 5-mm wide, with five inconspicuous yellowish-green petals. The fruit is an edible oval drupe 1.5–3-cm deep; when immature it is smooth-green, with the consistency and taste of an apple, maturing dark red to purplish-black and eventually wrinkled, looking like a small date. There is a single hard stone similar to an olive stone.[2]

Traditionally, various parts of the plant is useful in variety of disease conditions like, Roots are useful in vitiated conditions of pitta, fever, wounds, ulcer and cephalalgia. Bark is useful in dysentery, diarrhea, gingivitis and boils and ulcers. Leaves are useful in stomatitis, wounds, syphilitic ulcers, asthma, leucorrhoea, typhoid fever, diarrhea and obesity. Paste of leaves is applied on wounds, cuts and boils, etc. Fruits are useful in vitiated condition of pitta, burning sensation, hyperdipsia, consumption, vomiting, constipation, flatulence, dyspepsia, nausea, leprosy, thirst, anorexia, fatigue, leucorrhoea, pruritis, wounds and ulcers. Seeds are useful in encephalopathy, opthalmopathy, cough, and asthma, vitiated condition of pitta, burning sensation, diarrhea, vomiting, leucorrhoea, the Indian jujube *Z. jujuba* L. (syn., *Z. mauritiana* Lam.) is adapted to warm climates.

#### **Materials And Methods**

##### **Chemical and reagents**

2,2-diphenyl-1-picrylhydrazyl (DPPH) and gallic acid purchased from sigma Aldrich India Pvt. Ltd. The other chemicals used were procured from Ranbaxy Fine Chemicals Ltd.

##### **Plant material and preparation of the extracts Plant material**

The plant was identified and authenticated as a *Ziziphus jujuba* by Dr. Netrabhanu Pradhan Botanist, Prof. and H.O.D. Dept. of Botany, [Retd.] Bargarh (Orissa) and specimen of flower was deposited GCP Herbarium museum. The leaves of *Ziziphus jujuba* was collected from Sambalpur, Odisha, India during the month of September.

The leaves were shade dried, coarsely powdered and about 100 g of powder was extracted with methanol by hot extraction process (soxhlet). After completion of the extraction the solvent was recovered by distillation and concentrated *in vacuo*.

##### **Total Phenolic Content**

Total soluble phenolics in the extracts were determined with Folin-Ciocalteu reagent using gallic acid (50-250 µg) as a standard phenolic compound. 1.0 mL of extract solution containing 1.0 mg extract was diluted with 46 mL of distilled water in a volumetric flask. 1.0 mL of Folin-Ciocalteu reagent was added and the content of the flask mixed thoroughly. 3 min later 3.0 mL of 20% sodium carbonate was added and the mixture was allowed to stand for 2 h with intermittent shaking. The absorbance of the blue color that developed was read at 760 nm. The concentration of total phenols was expressed as gallic acid equivalents in mg/g of dry extract<sup>[3]</sup>.

##### **DPPH**

The antioxidant activity of the TEP, based on the scavenging activity of the DPPH free radicals, was determined by the method described by Kumaran *et al.*, [4]. *Ziziphus jujube* leaves methanolic extract (0.1 mL) was added to 3 mL of a 0.004% MeOH solution of DPPH. Water (0.1 mL) in place of *Ziziphus jujube* leaves methanolic extract was used as control. Absorbance at 517nm was determined after 30 min. Graph was plotted between absorbance and concentration with methanolic extract and gallic acid taken as standard anti-oxidative compound.

##### **Reducing Power Determination**

The reducing power of *Ziziphus jujube* leaves methanolic extract was determined according to the method of Chatterjee *et al.* [5]. Different amounts of methanolic extract (100-300 mL) were mixed with phosphate buffer (2.5ml, 0.02 M, pH 6.6) and potassium ferricyanide (2.5 ml, 1%). The mixture was incubated at 50°C for 20 min. A portion (2.5 ml) of trichloroacetic acid (10%) was added to the mixture, which was

then centrifuged 3000rpm for 10 min. The upper layer of solution (2.5 mL) was mixed with distilled water (2.5 mL) and FeCl<sub>3</sub> (0.5 ml, 0.1%). A higher absorbance indicates a higher reducing power property.

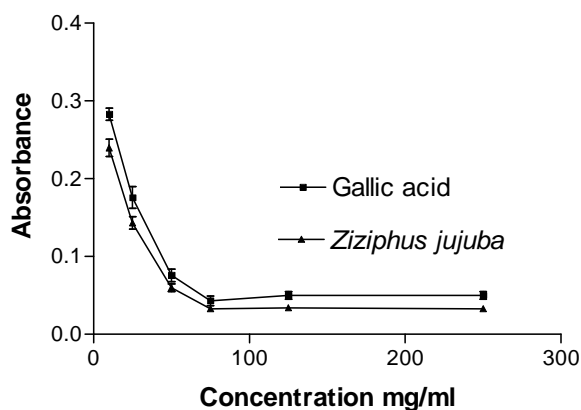
### Statistics

The results were presented as mean  $\pm$ SEM. "One-way Anova with Dunnett's post test was performed using Graph Pad Prism version 3.00 for windows. Graph Pad Software, San Diego California USA, P<0.01 were considered significant.

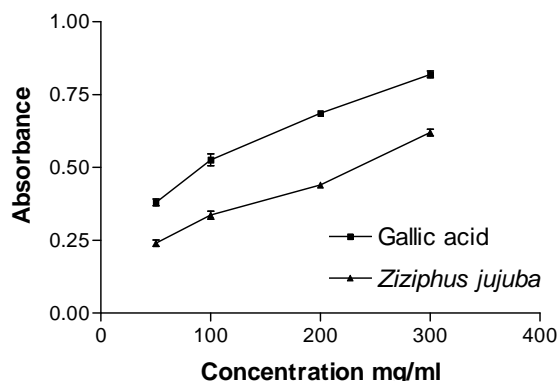
### Results

Total phenolic content for methanolic extract of *Ziziphus jujuba* was found to be 2.8% total extractable polyphenol.

Phenolic contents are directly correlated to antioxidant activity. DPPH activity had shown Fig 1. Methanolic extract at the dose of 250 mg had 0.033, however gallic acid had 0.05. The reducing power was found similar result as DPPH. The antioxidant activity result was strongly supported by the presence of extractable phenolic compound in the methanolic extract of *Ziziphus jujuba* directly correlate its activity.



**Fig 1- Plot of absorbance vs. concentration of DPPH scavenging activity of Gallic acid and *Ziziphus jujuba***



**Fig 2- Plot of reducing power of Gallic acid and *Ziziphus jujuba***

### Discussion

**Total Phenolic Content** - Phenolics present in fruits and vegetables have received considerable attention because of their potential antioxidant activities. Phenolic compounds undergo a complex redox reaction with phosphotungstic and phosphomolybdic acids present in the Folin Ciocalteu reagent.

### Conclusion

The results obtained in the present study indicate that *Ziziphus jujuba* leaves extracts contain good amount of phenolic content and can be used as a of natural source antioxidant that could have great importance as therapeutic agents in preventing or slowing the progress of aging and age associated oxidative stress related degenerative diseases.

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