



# Invitro Anti-microbial activity of *Parkinsonia Aculeata* (Linn) root extract

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## Abstract:

Screening of medicinal plants for bioactive compounds leads to the development of less expensive new antimicrobial agent with improved safety and efficacy. *Parkinsonia aculeata* (Linn) is a multipurpose tree with multiple health benefits. *Parkinsonia aculeata* is spiny tree belonging to the family Fabaceae. The common names for *Parkinsonia aculeata* are Mexican palo verde, Parkinsonia, Jerusalem thorn, Jellibean tree. This plant shows many reported activities such as antioxidant, anticancer, anti diabetic, anti-inflammatory. Different parts of plant show to exhibit antimicrobial effect against a wide variety of microorganisms but there is not any reported antimicrobial activity of root extract of *Parkinsonia aculeata*. The present work aims to study the antimicrobial activity of root extract of *Parkinsonia aculeata* by cup plate method. It determines the minimum inhibitory concentration (MIC) and suggest that aqueous extract of *Parkinsonia aculeata* root exhibit more significant antimicrobial activity against various microbes/ bacteria at 2000 ug/ml concentration.

**Keyword:** *Parkinsonia aculeata*, Cup-plate method, Minimum Inhibitory concentration (MIC), anti-microbial activity

## Introduction:

In India, medicinal plants form the backbone of several indigenous traditional systems of medicine. Pharmacological studies have acknowledged the value of medicinal plants as potential source of bioactive compounds [1,2]

Natural medicines have been used to boost health since the time of immemorial and the success of modern medical science largely depends on drugs originally obtained from natural resources. In the past, a large number of antimicrobial compounds were discovered from synthetic and natural products for the treatment and control of infectious agents [3]. However, only a few of them were reachable to the needy world's market [4].

Since ancient times, medicinal plants have been used as a traditional treatment for various diseases or ailments. Several scientific studies have shown that these plants have different beneficial properties, such as antioxidant, anti-inflammatory, or antimicrobial among others.

Antimicrobials are agents that kill microorganisms or inhibit their growth [5]. Drug resistance is dreadful global problem and spread of resistance poses additional challenges for clinicians and the pharmaceutical industry. Use of herbal medicines in developed World continue to rise because they are rich source of novel drug and their bioactive principle form the basis in medicines, nutraceuticals, Pharmaceutical intermediates. Screening medicinal plant for biological active compound provide clues to develop newer antimicrobial agent. This compound after possible chemical manipulation offer new and improved drug to treat infectious disease. Plant based products are cheaper alternative to development of synthetic drugs [6].

*Parkinsonia aculeata* (Linn) belongs to family Fabaceae, commonly known as ' Vilayati kikar '. It is spiny small tree having 4-10 m height. The leaves and stems are hairless .The leaves are alternate and pinnate. The flowers are yellow- orange and fragrant. The fruit is seedpod, leathery in appearance, light brown when matured [7]. It is used in traditional medicine as a source of many therapeutic agents. *Parkinsonia aculeata* (leaves, stem, seed and roots) are known to contain antioxidant, anticancer, antidiabetic activity. Antimicrobial activity has no reported investigation on roots of *Parkinsonia aculeata* [8, 9]. Present study was undertaken to establish antimicrobial activity of *Parkinsonia aculeata* by using cup plate method to determine the minimum inhibitory concentration (MIC).

## Materials and methods:

### Collection of plant material:

The fresh roots of *Parkinsonia aculeate* (Linn) were collected from the local areas of Tembhurni, Solapur, Maharashtra (India). Then this root parts were dried under the shade for 20 days. This dried root parts was grinded to obtain fine powder. This powder of roots was sieved using the sieve no. 212 mm. Then this powder was stored in the polythene bag to protect it from moisture at room temperature before extraction.

The taxonomical identification (authentication) of the plant was done by Dr. Tembhurne R. R. Dept. of Botany, Sangola College, Sangola with the help of flora of Solapur District, Maharashtra, India and voucher specimens were deposited at the herbarium, Department of botany, Sangola College, Sangola.

### Aqueous extract preparation

About 250 gm of powdered drug was kept in a 1000 ml volumetric flask and added 500 ml water as solvent. 5 ml chloroform was added to avoid the fungal growth. The mouth of the volumetric flask was covered with cotton and kept in reciprocating shaker to dissolve active constituents in aqueous solvents for 24 hours. After 24 hours the extract were collected by filtering the residue through muslin cloth. Water was removed from extract by using rotary evaporator.

### Determination of antimicrobial activity:

The aqueous extract of root of *Parkinsonia aculeata* (Linn) where screened for antimicrobial activity by cup plate method. Agar surface was cut with help of sterile cork borer having diameter of 0.6mm size. All bacterial and fungal strains were grown in nutrient broth for 4-6 hrs at specified temperature. This suspension contains approx.  $1-2 \times 10^8$  colony forming unit (CFU). Approximately 0.02 ml of microbial culture was added into petriplate. After solidification of agar, appropriate wells were made on agar surface by using sterile cork borer

(3 well per 90mm diameter plate). Different concentrations of extract were prepared using dimethyl sulfoxide (DMSO) and 50 ul of each concentration was added to well. Bacterial cultures were incubated at 37°C for 24 hrs and fungal culture at 25°C for 48 hrs. Antimicrobial activity was determined by measuring zone of inhibition surrounding the well. The assay was carried out under aseptic condition. Ciprofloxacin (5 ug/disc) and Amphotericin B (100ug/disc) were used as positive control for bacteria and fungi respectively and DMSO as a negative control.

### Cup -plate method:

Principle of cup plate method depends on the diffusion of an antibiotic from a vertical-cavity through the solidified agar layer in the petri-plate. The growth of test microorganisms is inhibited entirely in a zone around the cylinder containing antibiotic solution, also known as “cylinder plate method”. The sensitivity of antimicrobial agents against the particular bacteria or fungi can be studied. Initially zone of inhibition was carried out to evaluate sensitivity of organisms were selected for determination of MIC [6, 10].

### Determination of minimum inhibitory concentration (MIC):

Minimum inhibitory concentration of alcoholic extract was determined by Cup plate method. For MIC, two-fold serial dilution of extract were prepared (500, 1000, 2000 ug/ml) in a petriplate. Incubation of petriplate are carried out at 37°C for 18-24 hrs for bacteria, and at 25°C for 48 hrs for fungi. After incubation petriplates were observed for any visible growth. The bacterial suspensions were used as positive control and extract in broth were used as negative control [6, 10].

### Result and Discussion

Evaluation of antimicrobial activity of root extract of *Parkinsonia aculeata* (Linn) was determined by cup plate method against different bacteria and fungi, these organisms frequently encountered in infectious disease. The study show that root extract used in study exhibit antimicrobial activity against all microorganisms tested. Result of cup plate method is shown in table no.1 and Fig. no. 1

Table no.1: Antimicrobial Activity of aqueous root extract of *Parkinsonia aculeata* (Linn)

Extract/ Drug	Diameter of zone of Inhibitor			
	Concentration (ug/ml)	Staphylococcus Aureus	E. Coli	Candida Albicans
Root Extract (Aqueous)	500	12	14	00
	1000	13	15	11
	2000	15	17	12
Ciprofloxacin	5	25	29	00
Amphotericin	100	00	00	14
DMSO	99.8%	00	00	00

Fig. no. 1- Zone of inhibition in (a) E. coli, (b) S. Aureus and (c) Candida albicans



### Conclusion:

From present work of in-vitro anti-microbial activity of *parkinsonia aculeatea* Linn, it is concluded that the root extract of *Parkinsonia aculeata* (Linn) shows potential for inhibiting antimicrobial activity. The present study compared with standard ciprofloxacin and amphotericin and it is concluded that root extract of *Parkinsonia aculeata* show significant antimicrobial activity by cup plate method at 2000 ug/ml concentration.

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