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# Phytochemical profiling Antibacterial and Antioxidant potential of *Cissampelos pareira* L. leave extracts

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**Abstract**
Different solvent extracts (Methanol, chloroform and aqueous) of *Cissampelos pareira* were evaluated for their antibacterial activity against selected clinical pathogens. The results showed that the methanol extract of *C. pareira* significant antibacterial activity against the selected pathogens. The phytochemical analysis revealed the presence of alkaloids, saponin, phenols, flavonoids, tannins, terpenoids glycosides, carbohydrates and anthraquinones. The antioxidant analysis (DPPH assay) was also carried out using the three extracts of which methanol extract showed remarkable antioxidant activity. From the results, it is clear that in the future *C. pareira* may pave the way for designing the new drugs for controlling bacterial diseases.

**Keywords:** Antimicrobial activity, *Cissampelos pareira*, Disc diffusion method, DPPH assay

## Introduction
*Cissampelos pareira* Linn**.** belongs to the Menispermaceae family is a sub-erect or climbing herb, known as *Laghupatha* in Indian traditional medicine [1]. There are 37 plant species worldwide distributed under this genus. Only one of them occurs in India [2]. A very variable, lofty, slender, dioecious, perennial climber this plant commonly distributed throughout tropical and sub-tropical India- Himachal Pradesh, Chota Nagpur, Bihar, West Bengal, Punjab, Rajasthan, particularly in the east of Aravalli, Hilly forests of Marathwada, Konkan, Deccan, Tamilnadu [3].
Historically, the development of novel drugs was primarily through the extraction of biologically active compounds from plants which were identified through medicinal use or a variety of bioactivity screening programs [4]. Herbs are easily available to human beings have been explored to the maximum for their medicinal properties. Various parts of the plants like roots, leaves, bark, exudates etc. are used as medicinal properties [1]. The present study aimed to accurse the potential phyto constituents, antibacterial and antioxidant activity present in different extracts of *C. pareira* from its leaves.

## Materials and Methods
### Plant extract preparation
Dry 50 g powder of plant leaves was soaked in 100 ml of methanol, chloroform and Aqueous for ten days at room temperature, separately. The mixture was filtered cotton thrice and also finally filtered through Whatmann No. 1 filter paper. The filtrate was concentrated to semi solid paste using rotary vacuum evaporator at 37°C. The resulting dry extract was weighed and stored in air tight sample smple bottles a $4^0$C until next use.

### Phytochemical screening
Phytochemical screening of extract was carried out according to the standard methods as described by [5].

### Antibacterial activity
The antibacterial activities were done by using bacteria strain like *salmonella typhii, Escherichia coli, Klebsiella pneumonia* (Gram negative) and *Bacillus subtilis, Staphylococcus aureus*, (Gram positive). All the strains were collected from Department of Microbiology, Presidency College, Chennai - 05. The antibacterial activity was determined by disc diffusion method [7]. Four different concentrations ie. 30µg/ml 20µg/ml, 10µg/ml and 5mg/ml respectively were prepared. Each sterile disc was loaded with 6mm of test extract and placed on the agar plates inoculated with respective micro organisms. The plates were kept for half an hour for pre incubation diffusion. Then the plates were kept for incubation at 37°C for 24 hrs. At the end of incubation period zones around the discs were measured. The same experiment was performed in triplicate.

### Antioxidant assay
DPPH (2, 2-diphenyl-1-picryl-hydrazyl-hydrate) was carried out by the standard methods of [8].

### Statistical analysis
The percentage of response, antibacterial activity indicated by zone of growth inhibition was monitored as growth parameters. Data of three independent experiments represented by 3 replicates from zone of inhibition (mm) of bacterial strain. Statistical analysis (mean ± SE), according to New Duncan's Multiple Range test was followed [9].

## Result and Discussion
### Phytochemical analysis
The results obtained from the study confirmed the presence of various phyto constituents which are known to exhibit medicinal as well as physiological activities. Alkaloids, saponin, phenols, flavonoids, tannins, terpenoids glycosides, carbohydrates and anthraquinones were analyzed from different extracts of leaf. The result was illustrated in table1. The results obtained from this study thus suggest that the

identified phytochemical compounds may be the bioactive constituents responsible for the efficacy of the plant studied and the presence of some of these compounds have also been confirmed to have antibacterial activity. From the above study it is understood that the of presence compound like flavonoids, tannins and alkaloids [6,10]. Flavonoids have been referred as nature's biological response modifiers, because of their inherent ability to modify the body's reaction to allergies and virus and they showed their anti-allergic, anti-inflammatory, anti-microbial, and anti-cancer activities [11]. Glyscosides, flavonoids, Tannins and alkaloids have hypoglycemic activities [12]. Hence it could be inferred that the plant extract could be a source for the industrial manufacture of drugs useful in the chemotherapy of some microbial infection [13].

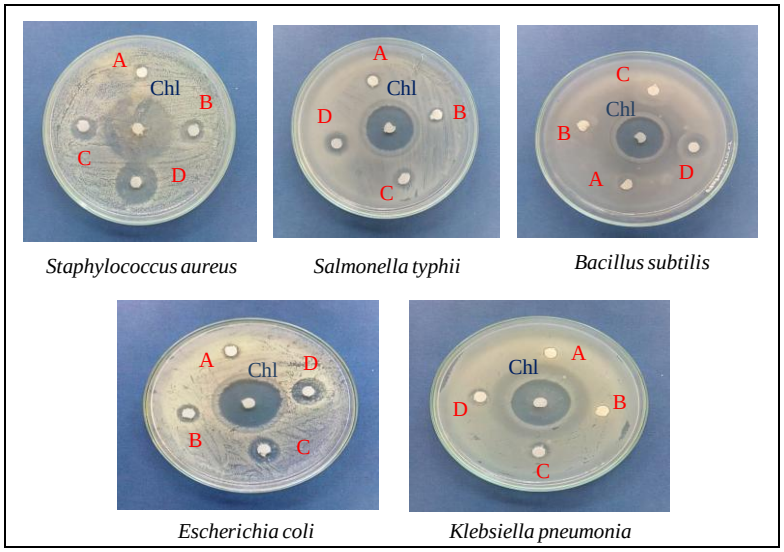
**Table 1:** Qualitative phytochemical analysis of different plant leaves extract of *C. pareira*

| Phytochemical | Methanol | Chloroform | Aqueous |
|---|---|---|---|
| Flavonoids | + | - | - |
| Saponins | - | - | - |
| Phenol | + | + | - |
| Tannins | + | - | - |
| Alkaloids | + | + | + |
| Terpenoids | + | - | + |
| Carbohydrates | + | - | - |
| Anthraquinones | - | + | - |
| Glycosides | - | - | + |

**Antibacterial activity**

The antibacterial activities of plant may be influenced by some of the factors such as habitat, season of plant collection, different growth stages of plant and experimental methods etc [6].

The antibacterial activity of methanol extract of *C. pareira* leaves against *E. coli*, *S. typhii* and *K. pneumonia* was found to be present at different concentrations. The extract has shown its higher activity against *S. aureus* and *E. coli* among 5 strains. The appearance of zone of inhibition increase when the concentration of extract increases. Earlier report by [14, 15] also observed similar activity of methonal extract of whole plant *C. pareira* against *S. aureus* and *K. pneumonia*. The present study in antibacterial activity of *C. pareira* was shown in table.2 and Fig.1.




Chl – Chloramphenicol

**Fig 1:** Antibacterial activity of methanol extract of *C. pareira*

**Table 2:** Antibacterial activity of methanol extract of *pareira* on the tested microorganism

| Microorganism | Zone of inhibition (mm) | | | | |
|---|---|---|---|---|---|
| | Control (Chloramphenicol) (10µg/ml) | (5µg/ml) | (10µg/ml) | (20µg/ml) | (30µg/ml) |
| *S. typhii* | 12.8±0.34 | 7±0.182 | 7.1±0.124 | 7.8±0.12 | 8.3±129 |
| *S. aureus* | 16.1±0.12 | 8.1±0.10 | 8.5±0.22 | 10.1±0.34 | 12.1±0.12 |
| *K. pneumonia* | 14.6±0.28 | 7.1±0.06 | 7.1±0.12 | 7.5±0.22 | 8.1±0.129 |
| *E. coli* | 14.5±0.22 | 7±0.40 | 7.5±0.12 | 8.5±0.223 | 10. ±223 |
| *B. subtilis* | 15.1±0.34 | 7±0.18 | 7.5±0.22 | 7.6±0.12 | 7.8±0.129 |

Value of mean ± Standard error for triplicate sample

**Antioxidant activity**

Free radical (DPPH) scavenging activity of *C. pareira* was shown in Fig.2. The result displays that the methanol based extract of *C. pareira* has exhibited highest free radical activity leaves exhibited highest radicals scavenging activity, that is, (35.84 ± 0.05) at 100 µg/ml concentration, whereas the aqueous extract of *C. pareira* has lower free radical scavenging efficacy recorded on 33.84 ± 0.05 at same concentration. Also reported the protective effect of leaf on cisplatin-induced nephrotoxicity and oxidative damage has been reported by ameliorate the oxidative stress parameters [16] [17].

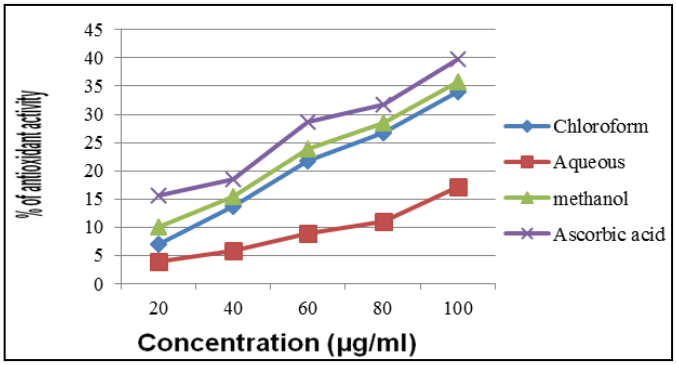



**Fig 2:** DPPH Activity of *C. pareira* different plant leaves extracts

**Conclusion**

Taken together, this findings demonstrate that the *C. pareira* has very high elective potential as a source of novel lead for antituberculosis, antibacterial and antioxidant. The particular excitement is its high activity against *E. coli* and *S. aureus* which are currently posing great public health challenge due to drug resistance development and as major sources of community and hospital based infections. We therefore suggest that methanol fraction provide a viable candidate to be tapped for novel safe antimicrobial drugs.

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