

Antibacterial Activity of Leaf Extracts of *Pongamia pinnata* (Family: *Fabaceae*) On the Cattle Pathogens

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ABSTRACT

Many crude preparations of herbal drugs are in clinical use in medical and veterinary practice. Ethno pharmacologist, botanists, microbiologists and natural product chemists are combing the earth for Phytochemicals which could be developed for treatment of infectious diseases. Laboratories of the world have found literally thousands of phytochemicals which have inhibitory effects on all types microorganisms invitro. The advent and continuous use of antibiotics in previous century led to success in limiting most of the prevalent bacterial diseases which affected man and animals in epidemic proportions. Herbal medicine represents one of the most important fields of traditional medicine in India, Especially in rural areas. Due to the increasing resistance exhibited by pathogens against these plant extracts. In the present study, the leaf extract of *Pongamia pinnata* was used against three different cattle pathogenic bacterial species such as, *Escherichia coli*, *Proteus vulgaris* and *Klebsiella pneumoniae*. The leaf extracts were prepared using various solvents such as, Chloroform, Acetone and Ethyl acetate. The formation of zone of inhibition on the growth of bacterial species was the clear evidence for the anti-microbial activity of the plant extracts. All the three extracts of *P.pinnata* showed highest growth inhibitory activity against *E.coli* culture. In the present investigation, the combination of plant extract has greater impact on the bacterial pathogens used for antibacterial assay. The ethyl acetate extract of leaves of *Pongamia pinnata* has greater inhibitory action on the growth of bacterial species when compared to acetone and chloroform extracts of leaves of *P.pinnata*. Hence, the plant extracts used control these pathogenic bacteria species of cattles.

Key Word: *Pongamia pinnata*- Leaf extract- cattle Pathogens-Antibacterial activity

I.INTRODUCTION

Diseases that remain most challenging in today's healthcare system tend to be complex for involving multiple mechanisms, targets and drugs for effective disease management [1]. In contrast to current combination therapies, however, plant based drugs contain a mixture of multiple components thereby saving considerable time and expense [2]. Infectious diseases are leading cause of death world-wide. Bacterial diseases occur when pathogenic bacteria get into the body and begin to reproduce and crowd out healthy bacteria, or to grow in tissues that are normally sterile [3].

India is primarily an agricultural country with the majority of the population residing in rural areas. Their main occupation is agriculture in addition cattle are valuable assets of the rural poor and are critical in supporting their live hoods particularly during unfavorable times. Cattle are raised as livestock for meat, as dairy animals for milk and other dairy products, and as draft animals [4]. Most of the antibacterial properties of the medicinal plants are due to essential oils produced by their secondary metabolism[5]. Alcoholic extract of many plants showed bactericidal, antibiotic, high hypoglycaemic and fungicidal activities. These extracts showed hyotensive, analgesic, sedative and antileptazol properties [6].

Many crude preparations of herbal drugs are in clinical use in medical and veterinary practice. Ethno pharmacologist, botanists, microbiologists and natural product chemists are combing the earth for phytochemicals which could be developed for treatment of infectious diseases [7]. Laboratories of the world have found literally thousands of phytochemicals which have inhibitory effects on all types microorganisms invitro. More of these compounds are being subjected to animal and human studies to determine their potential to restrict the growth and multiplication of pathogenic organism as well as examination of their effects on beneficial normal micro biota. Traditional healers have long used plants to prevent or cure the infectious condition such as, antibacterial activity, antifungal activities [8]. Plants are rich in a wide variety of secondary metabolite such as, tannins, terpenoids, alkaloids, and flavanoids which have been invitro to have anti microbial properties. The advent and

continuous use of antibiotics in previous century led to success in limiting most of the prevalent bacterial diseases which affected man and animals in epidemic proportions.

II. MATERIAL AND METHODS

A) Preparation of leaf extracts:

The leaves of the *Pongamia pinnata* have been used in the present investigation were collected from agriculture field in around Sivagangai. The leaves of the plant were dried and then powdered, 15 grams of the air-dried powder of the plant was taken and added separately with 100 ml of chloroform, ethyl acetate & acetone in a conical flask plugged with cotton wool and then kept on a rotary shaker at 150 rpm for 48 hrs with intermittent shaking of the content. After 48 hours, the supernatant was collected and the solvent was evaporated to make the final volume one fourth of the original volume the help of water bath and stored at 4°C in airtight bottles [9].

B) Collection of Test Organisms:

The bacterial pathogens of Cattles like *Staphylococcus aureus* (Mastitis causing species), *Escherichia coli* (Mastitis causing species), *Proteus vulgaris* (Mastitis causing species) and *Klebsiellae pneumonia* (Mastitis causing species) were obtained from the laboratory of King's institute, Chennai.

C) Assay of antimicrobial activity using disc diffusion method:

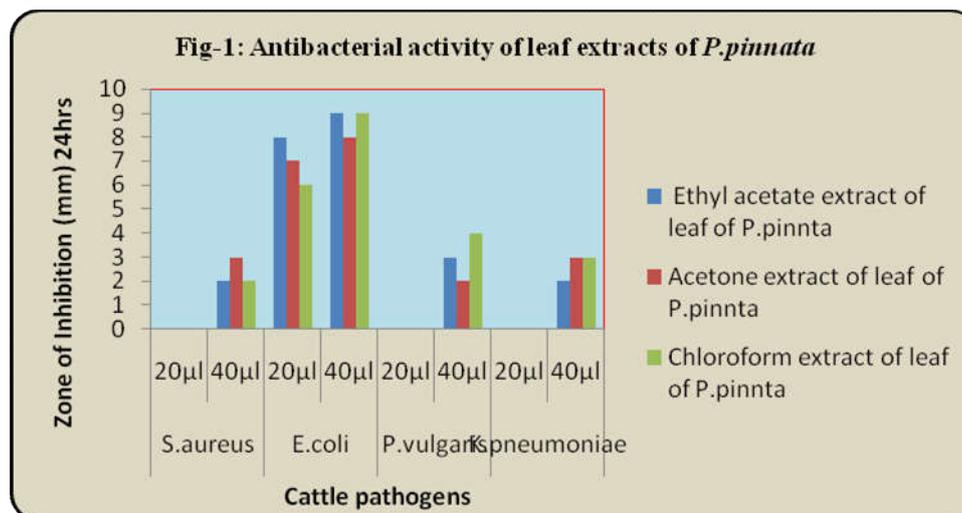
Liquid nutrient agar media and the Petriplates were sterilized by autoclaving at 120°C for 30 minutes. The sterilized petriplates were then labelled with the selected bacterial strains. Under aseptic conditions in the laminar flow hood, 20 ml of agar medium was dispersed into the petriplates labelled with bacterial strains. After solidification of the media, microbial strains (cattle pathogenic bacterial species) were swabbed on the surface of the agar plates separately. Using sterile forceps, the paper discs loaded with experimental samples (20 & 40µl) were placed on the surface of the agar plates. The plates were then incubated at 37°C for 24 hours. The measurement of zone of inhibition was recorded with 24 hours of interval for all the control and experimental samples.

IV. RESULTS AND DISCUSSION

The two different concentrations (20 & 40µl) of Ethyl acetate extract of leaves of *Pongamia pinnata* was found to have greater extent of anti-microbial activity on *Escherichia coli* (8 & 9 mm), the acetone extract of leaves of *P.pinnata* was found to have greater extent of anti-microbial activity on *E.coli* (7 & 8 mm) whereas, the chloroform extract of leaves of *P.pinnata* was found to have greater extent of anti-microbial activity on *E.coli* (6 & 9 mm) a larger zone of clearance was recorded with the two different concentrations like 20µl and 40µl respectively (Table -1 & Figure - 1).

Table-1. Antibacterial activity of leaf extracts of *P.pinnata*

| S.No | Experimental samples used | Zone of inhibition 24hrs (mm) | | | | | | | |
|------|---|-------------------------------|------|---------------|------|-------------------|------|---------------------|------|
| | | <i>S.aureus</i> | | <i>E.coli</i> | | <i>P.vulgaris</i> | | <i>K.pneumoniae</i> | |
| | | 20µl | 40µl | 20µl | 40µl | 20µl | 40µl | 20µl | 40µl |
| 1 | Ethyl acetate extract of leaf of <i>P.pinnata</i> | 0 | 2 | 8 | 9 | 0 | 3 | 0 | 2 |
| 2 | Acetone extract of leaf of <i>P.pinnata</i> | 0 | 3 | 7 | 8 | 0 | 2 | 0 | 3 |
| 3 | Chloroform extract of leaf of <i>P.pinnata</i> | 0 | 2 | 6 | 9 | 0 | 4 | 0 | 3 |



In the present investigation, phytochemical present in the plant extract have also significant impact on the pathogenic bacteria. Ethyl acetate, acetone and chloroform extracts of leaf of *P.pinnata* were tested for antibacterial activity against four selected bacterial pathogens of cattle (*S.aureus*, *E.coli*, *P.vulgaris* and *K.pneumoniae*). The formation of zone of inhibition was the clear evidence for the anti-microbial activity of the medicinal plants. The clearance zone was found to vary according to the leaf extract of medicinal plant species. The presence of antimicrobial activity has been positively tested in many species of higher plants [10].

In the present study, leaf extracts prepared using different solvents, the chloroform and ethyl acetate extracts of *Pongamia pinnata* have maximum antibacterial activity against *E.coli* than the rest of the bacterial cultures used in the study. Thus the experimental samples have showed different antibacterial activity on the 4 cattle pathogens used in the study.

V. CONCLUSION

In the present investigation, the extracts of leaves of *Pongamia pinnata* showed antibacterial activity against cattle pathogens. It is clear that the extracts have greater potential as antibacterial compounds against enteric pathogens and that they can be used in the treatment of enteric infectious. This plant can be used to discover bioactive natural products that may serve as leads for the development of new pharmaceuticals that address hitherto unmet therapeutic needs. It is hoped that this study would lead to the establishment of some compounds that used to formulate new and more potent antimicrobial drugs of natural origin.

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