



**ISSN: 0975-766X**  
**Research Article**

**Available Online through**  
**www.ijptonline.com**

**ANTI BACTERIAL ACTIVITY OF VARIOUS EXTRACTS OF GYMNEMA SYLVESTRE AND  
EMBELIA RIBES**

**A.Pradeep kumar\*, Kethireddy sravani, J.Ramya, V.Asha jyothi**

Vignan Institute of Pharmaceutical Sciences, Deshmukhi, Nalgonda.

Email: ashajyothivadlapudi@gmail.com

*Received on 24-03-2011*

*Accepted on 10-04-2011*

**Abstract:**

In the present study, leaves of *Gymnema sylvestre* and berries of *Embelia ribes* were selected based on ancient literature and are subjected to scientific pharmacological screening on cup plate method to evaluate anti bacterial activity as a validation to the ancient literature and to identify which of its phytochemical fractions have a greater potential to combat both helminthes and bacteria. Both *Gymnema sylvestre* and *Embelia ribes* are subjected to preliminary phytochemical screening for the organoleptic characters, microscopic profile, phytochemical constituents and pharmacological study for Anti bacterial study respectively. Both *Gymnema sylvestre* and *Embelia ribes* were found to have both the potentials Anti helminthic and anti bacterial activities respectively when they are extracted with various solvents, among which anti bacterial activity profile varied with the strain of the bacteria used and the extract. All the extracts of 200 µg/ml were found to be significant \* $p < 0.05$  when compared to standard drug streptomycin.

**Key words:** Antibacterial activity, *Gymnema sylvestre*, *Embelia ribes*, Cup plate method.

**Introduction:**

Antibacterial agents are the substances that are produced by the bacteria and they can inhibit the growth or the kill bacteria when applied in low concentrations. Bacteria are classified broadly as gram positive or gram negative bacteria based on the cell wall structure. Many agents are effective only on either gram positive or gram negative

bacteria which are termed as narrow spectrum antibiotics while many others are effective on both forms of the bacteria which are termed as broad spectrum antibiotics. Many natural sources with the anti bacterial property such as turmeric are already reported while many other plants are not explored.

**Taxonomical profile of plants<sup>1,2</sup>:**

***Embelia ribes***

Kingdom : Plantae  
Phylum : Angiosperms  
Order : Ericales  
Family : Myrsinaceae  
Genus : Embelia  
Species : ribes

***Gymnema sylvestre***

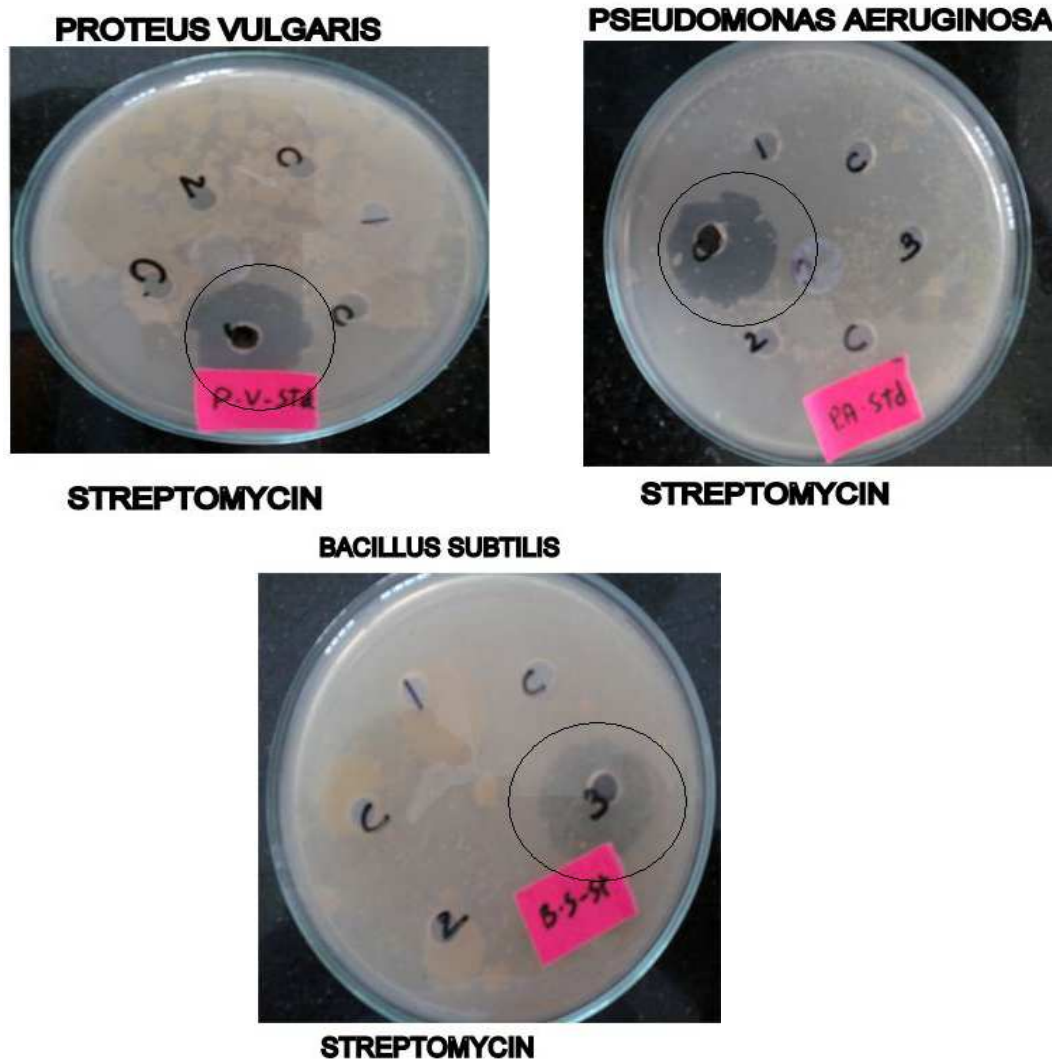
Kingdom : Plantae  
Division : Angiospermae  
Class : Dicotyledoneae  
Order : Contortae  
Family : Asclepiadaceae  
Genus : Gymnema  
Species : sylvestre

**Methodology:**

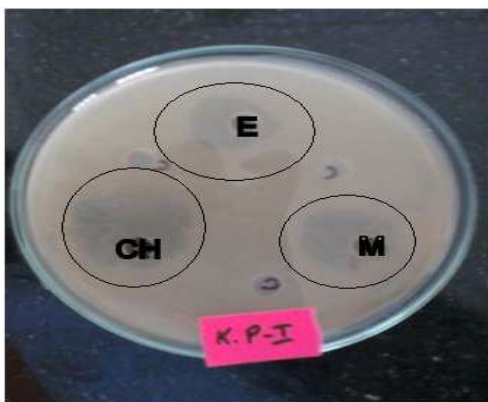
The selected plant materials were obtained from the botanist after the authentication. They were shade dried and powdered to the make a coarse powder with the help of a grinder. They were extracted with the Ethanol (Chanshu yangyan chemical), Methanol (Merk), Chloroform (SD Fines) and petroleum ether(SD Fines) with the soxhlet extractor. A pilot trial was conducted to assess the antibacterial profile of the various extracts before the main trail was conducted. The main trail was studied on gram positive and gram negative strains including Staphylococcus aureus (MTCC740), Bacillus subtilis (MTCC441), Pseudomonas aeruginosa (MTCC424), Proteus vulgaris (MTCC426), Klebsiella pneumonia (MTCC432). All the strains were obtained from Institute of Microbial Technology, Chandigarh, India.

Main trial was performed by taking the 24 hour cultures of each of the above said strains prepared by inoculating a loop full of the pure culture into 100 ml of nutrient broth. This is allowed to incubate for 24 hours. The standard drug selected for the study was Streptomycin whose MIC was found to be 200µg/ml for the above strains. The

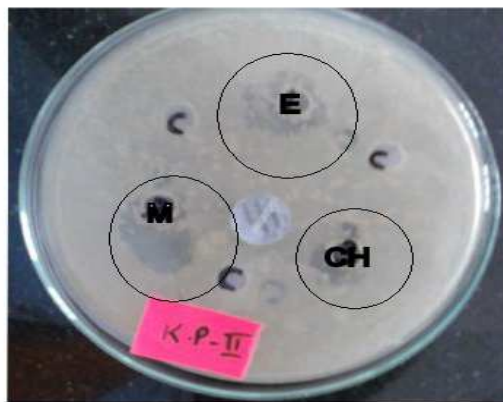
solutions of 200 µg/ml of the following extracts were prepared: Ethanolic, methanolic and chloroform extracts of Embelia ribes along with Ethanolic, methanolic and chloroform extracts of Gymnema sylvestre. The Petroleum ether extract of both the plant species was excluded as it was found to possess no antibacterial activity against the strains of bacteria used in the initial pilot trial. Cup and Plate method was followed to screen the various extracts of the selected plants. Six bores were made into each petre plate containing agar medium using a borer of 6mm diameter, after it is inoculated with the micro organism culture prepared earlier. A control i.e., sterile water is poured into three alternate bores of each petre plate. The extracts with the dilutions prepared are introduced into the remaining bores. These were now kept for incubation for 24 hours. The zone of inhibitions of the various extracts is measured after the stipulated time of 24 hours<sup>3</sup>.



### KLEBSIELLA PNEUMONIAE

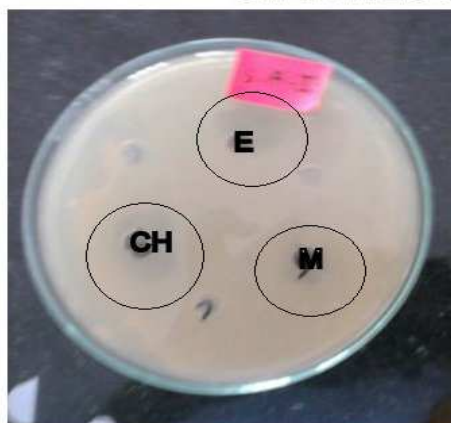


**GYMNEMA SYLVESTRE**

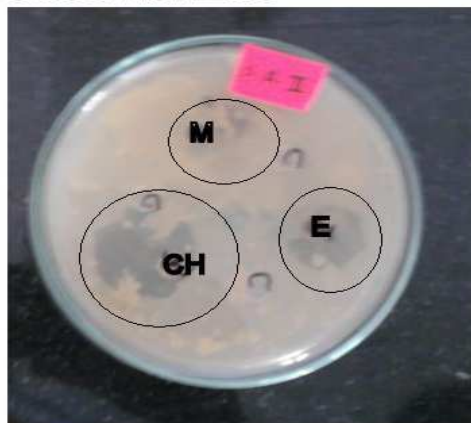


**EMBELIA RIBES**

### STAPHYLOCOCCUS AUREUS

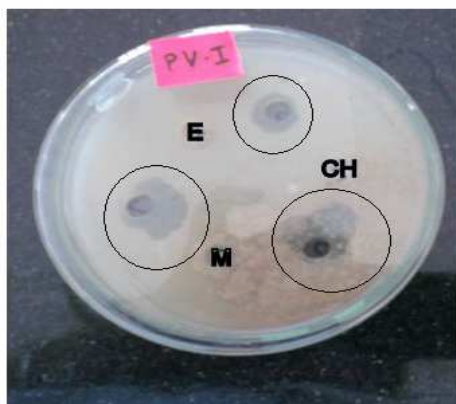


**GYMNEMA SYLVESTRE**

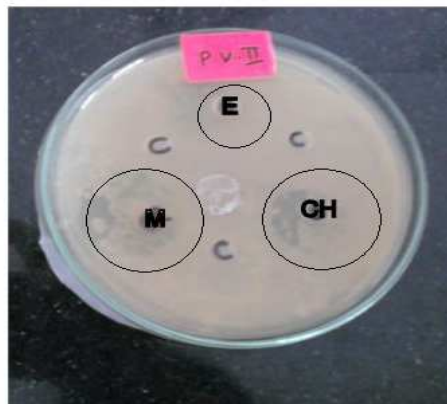


**EMBELIA RIBES**

### PROTEUS VULGARIS

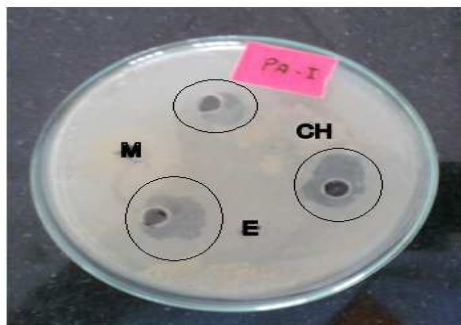


**GYMNEMA SYLVESTRE**

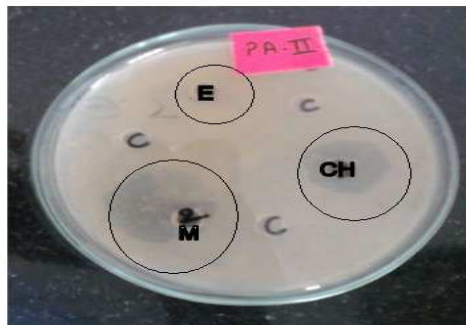


**EMBELIA RIBES**

**PSUEDOMONAS AERUGINOSA**

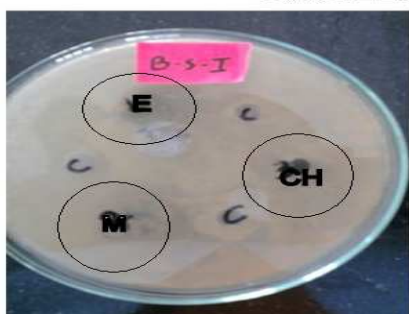


**GYMNEMA SYLVESTRE**

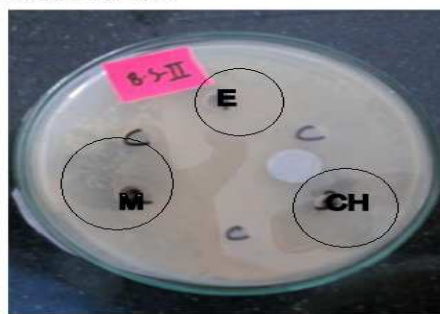


**EMBELIA RIBES**

**BACILLUS SUBTILIS**



**GYMNEMA SYLVESTRE**



**EMBELIA RIBES**

\*E-Ethanolic extract; M- Methanolic extract; CH-Chloroform extract; C-Control(sterile water)  
The encircled areas represent the areas near the zones of inhibition of the respective strains.

**Results:**

The above pictures belong to the pilot trial showing the effect of various extracts in a single petre plate. The comparative study of various extracts on each strain is done after taking the average value of six readings of zones of inhibition.

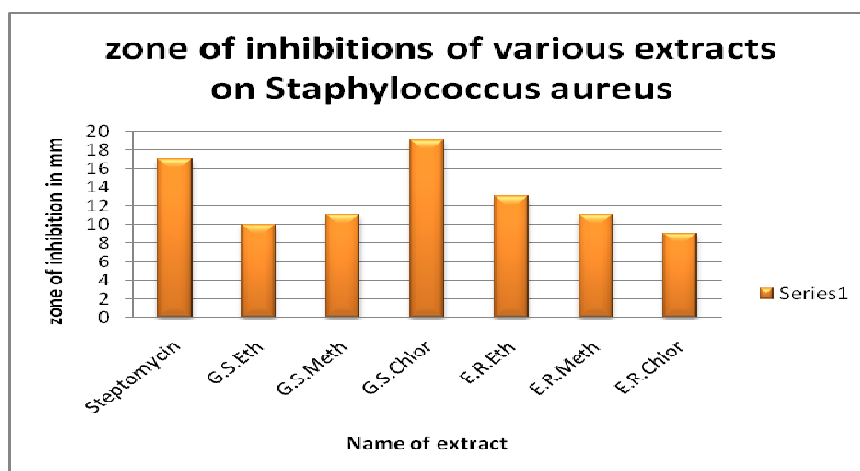
**Table 1: The comparison of percentage yields of various extracts of Gymnema sylvestre(G.S) and Embelia ribes(E.R).**

S.NO	EXTRACT	% YIELD OF G.S	% YIELD OF E.R
1	Ethanolic	29.64%	29.36%
2	Methanolic	27.8%	11.4%
3	Chloroform	7.1%	14.4%
4	Petroleum ether	6.6%	15.12%

**Table 2: The comparative data of various extracts of Gymnema sylvestre(G.S) and Embelia ribes(E.R) and**

streptomycin on Staphylococcus aureus(SA).

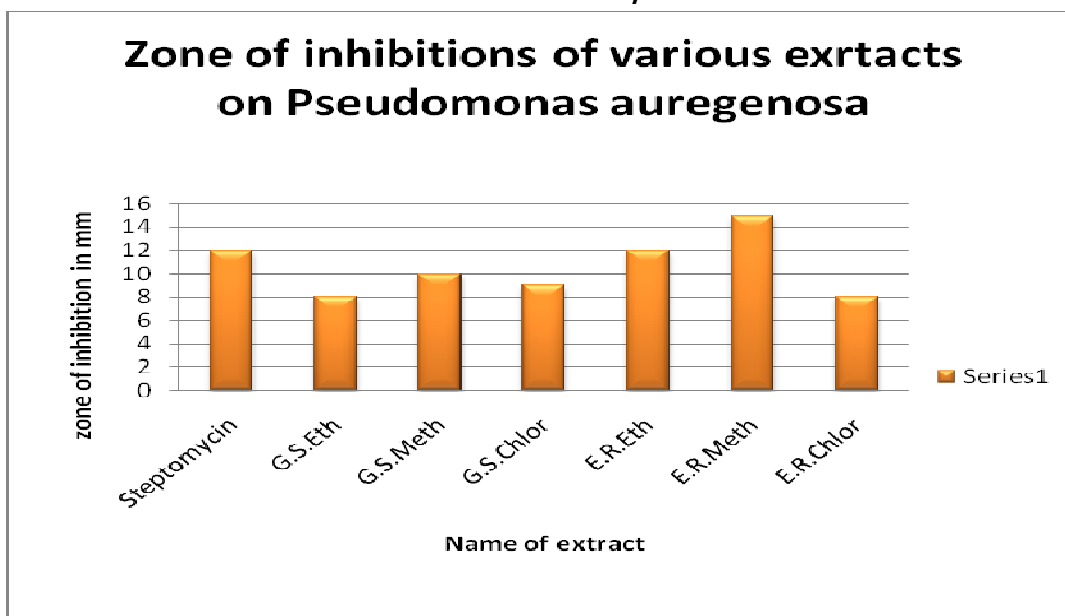
Extract	Zone of inhibition on SA(in mm)
Streptomycin	17
G.S.Ethanolic	10
G.S.Methanolic	11
G.S.Chloroform	19
E.R.Ethanolic	13
E.R.Methanolic	11
E.R.Chloroform	9



Graph 1: A comparative representation of the zones of inhibitions of various extracts of *Gymnema sylvestre*(G.S) and *Embelia ribes*(E.R) and streptomycin on *Staphylococcus aureus*(SA). All groups of are significant when compared with Streptomycin \*(p<0.05).

Table 3: The comparative data of various extracts of *Gymnema sylvestre*(G.S) and *Embelia ribes*(E.R) and streptomycin on *Pseudomonas auregenosa*(PA).

Extract	Zone of inhibition on PA(in mm)
Streptomycin	12
G.S.Ethanolic	8
G.S.Methanolic	10
G.S.Chloroform	9
E.R.Ethanolic	12
E.R.Methanolic	15
E.R.Chloroform	8

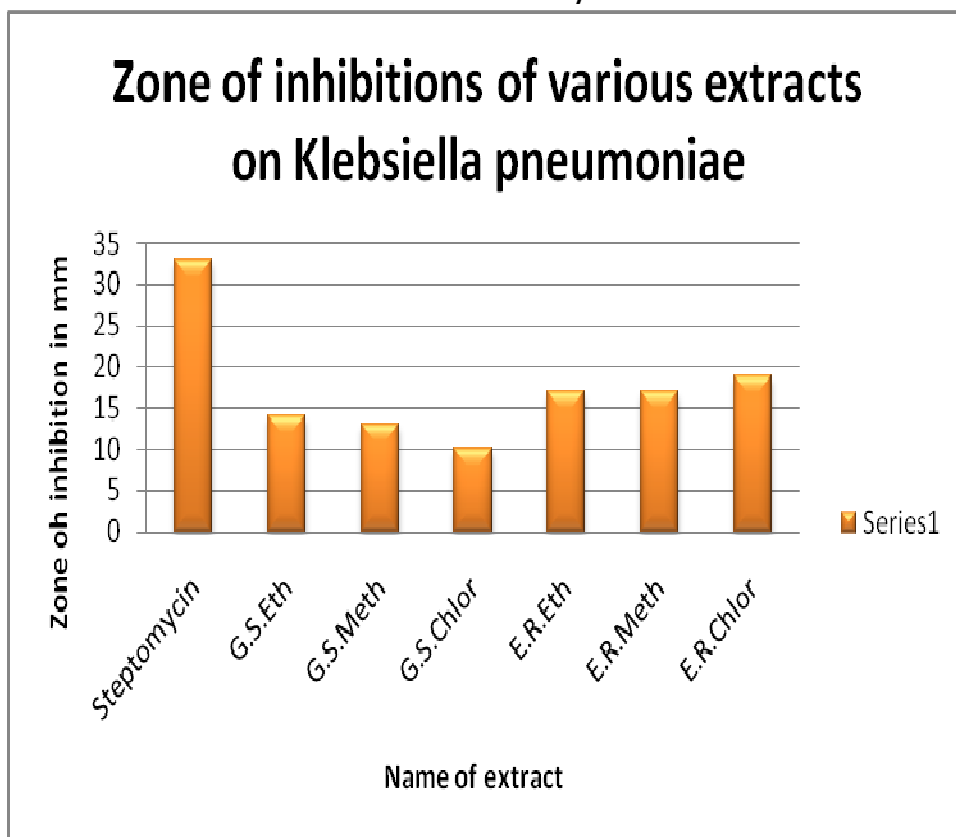


Graph 2: A comparative representation of the zones of inhibitions of various extracts of *Gymnema sylvestre*(G.S) and *Embelia ribes*(E.R) and streptomycin on *Pseudomonas auregenosa*(PA).

For *Embelia ribes*, the Methanolic and chloroform extracts are significant when compared with Streptomycin  $(p < 0.05)$ . For *Gymnema sylvestre*, all groups are significant when compared with Streptomycin  $(p < 0.05)$ .

Table 4: The comparative data of various extracts of *Gymnema sylvestre*(G.S) and *Embelia ribes*(E.R) and streptomycin on *Klebsiella pneumonia*(KP).

Extract	Zone of inhibition on KP(in mm)
Streptomycin	33
G.S.Ethanollic	14
G.S.Methanollic	13
G.S.Chloroform	10
E.R.Ethanollic	17
E.R.Methanollic	17
E.R.Chloroform	19

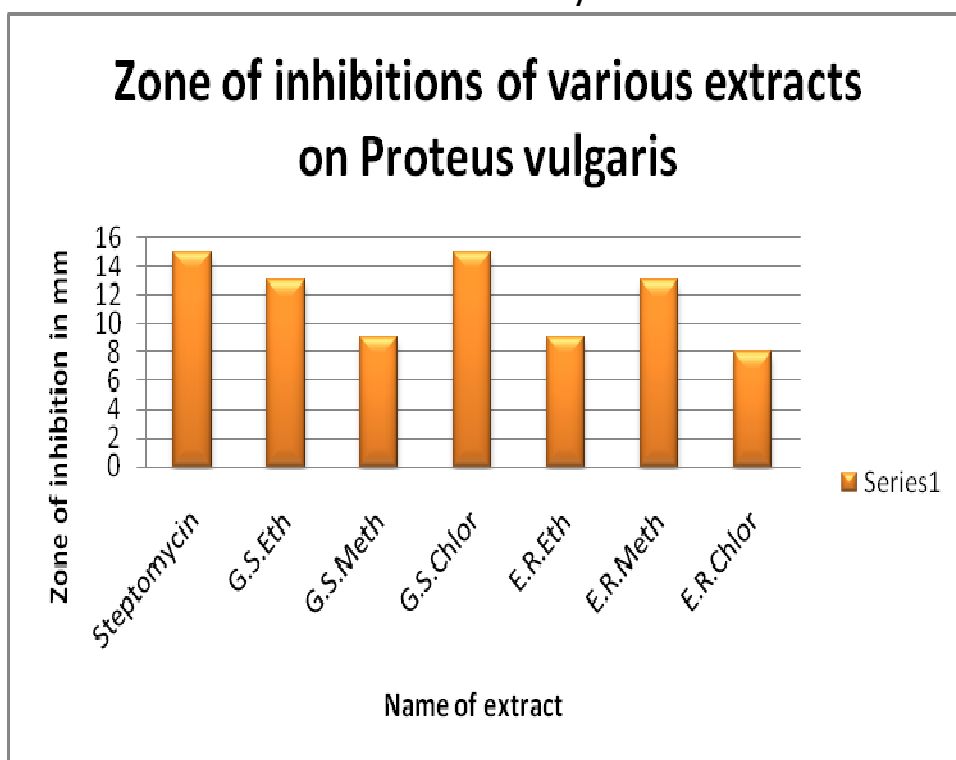


Graph 3: A comparative representation of the zones of inhibitions of various extracts of *Gymnema sylvestre*(G.S) and *Embelia ribes*(E.R) and streptomycin on *Klebsiella pneumonia*(KP). All groups are significant when compared with Streptomycin \*(p<0.05).

**Table 5: The comparative data of various extracts of *Gymnema sylvestre*(G.S) and *Embelia ribes*(E.R) and streptomycin on *Proteus vulgaris*(PV). All groups are significant when compared with Streptomycin \*(p<0.05).**

Extract	Zone of inhibition on PV(in mm)
Streptomycin	15
G.S.Ethanolic	13
G.S.Methanolic	9
G.S.Chloroform	15
E.R.Ethanolic	9
E.R.Methanolic	13
E.R.Chloroform	8





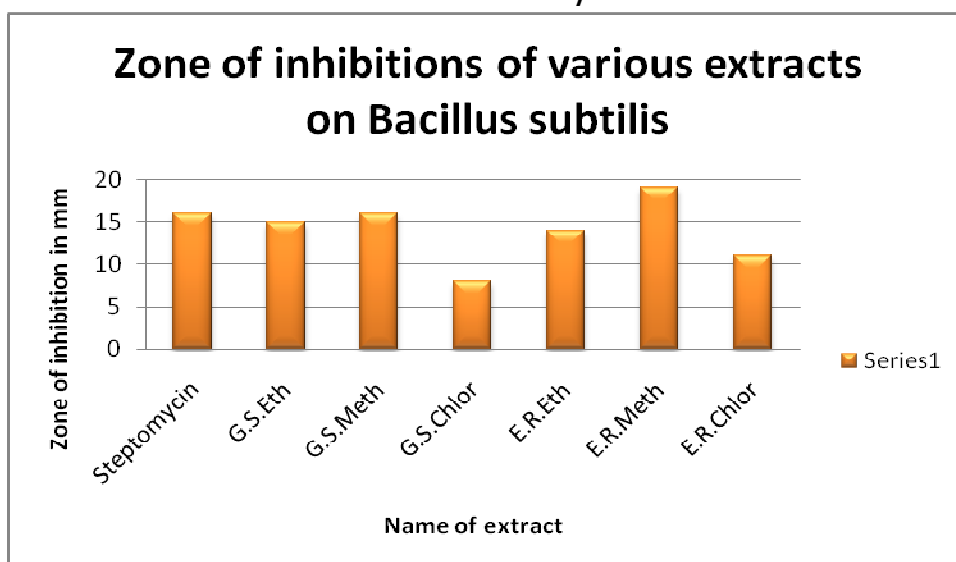
Graph 4: A comparative representation of the zones of inhibitions of various extracts of *Gymnema sylvestre* (G.S) and *Embelia ribes*(E.R) and streptomycin on *Proteus vulgaris*(PV).

For *Gymnema sylvestre* ethanolic and methanolic extracts are significant when compared with Streptomycin \*(p<0.05).

For *Embelia ribes* all groups are significant when compared with Streptomycin \*(p<0.05).

**Table 6: The comparative data of various extracts of *Gymnema sylvestre* (G.S) and *Embelia ribes*(E.R) and streptomycin on *Bacillus subtilis*(BS).**

Extract	Zone of inhibition on BS(in mm)
Streptomycin	16
G.S.Ethanolic	15
G.S.Methanolic	16
G.S.Chloroform	8
E.R.Ethanolic	14
E.R.Methanolic	19
E.R.Chloroform	11



Graph 5: A comparative representation of the zones of inhibitions of various extracts of *Gymnema sylvestre*(G.S) and *Embelia ribes*(E.R) and streptomycin on *Bacillus subtilis*(BS). All groups are significant when compared with Streptomycin \*( $p < 0.05$ ).

#### Discussion:

To evaluate the anti bacterial activity, the standard drug taken was Streptomycin due to its broad spectrum of activity. Effect of various extracts on *Staphylococcus aureus*, a gram positive coccus in comparison with Streptomycin as the standard drug showed that chloroform extract of *Gymnema sylvestre* has greater effect on *Staphylococcus aureus* than Streptomycin. Later followed by the responses of ethanolic and methanolic extracts. The profiles of responses show that the non polar fractions of the constituents of *Gymnema sylvestre* are responsible for the anti bacterial activity. While the effect of various extract of *Embelia ribes* on the strain *Staphylococcus aureus* have shown that ethanolic extract of *Embelia ribes* has greater activity when compared to methanolic and chloroform extracts, though the zone of inhibition was found to be less than that of the standard drug .So the potency of *Embelia ribes* is less than standard drug Streptomycin on *Staphylococcus aureus*.

The second strain selected for anti bacterial study was *Pseudomonas auregenosa*, a gram negative bacillus. Effect of various extracts of *Gymnema sylvestre* on *Pseudomonas auregenosa* in comparison with Streptomycin is such that the methanolic extract of *Gymnema sylvestre* has shown activity nearly equal to standard drug. This shows that the methanolic extract is more effective on the gram negative bacilli. The methanolic extract of *Embelia ribes* has shown

a significant effect on the bacterial strain of *Pseudomonas auregenosa* when compared to its other extracts and also the effect produced was greater than the standard drug Streptomycin with a greater zone of inhibition than the standard. This effect might be as a result of polar constituents of *Embelia ribes* in methanolic extract.

The effect of various extracts of *Gymnema sylvestre* on the bacterial strain of *Klebsiella pneumonia*, a gram negative bacillus were far less compared to the standard drug Streptomycin. The activity was found to be significant among the ethanolic extract followed by the methanolic and chloroform extracts. The chloroform extract of *Embelia ribes* was found to have a comparatively better activity compared to the methanolic and ethanolic extracts. However, the zone of inhibition of extracts of *Embelia ribes* was found to be less compared to that of the standard drug Streptomycin.

The activity of chloroform extract of *Gymnema sylvestre* was found to be equal to that of the standard drug Streptomycin on the bacterial strain *Proteus vulgaris*, a gram negative bacillus. The activity of the ethanolic extract follows that of the chloroform extract. The methanolic extract showed the least significance of the three extracts taken. The various extracts of *Embelia ribes* on *Proteus vulgaris* showed lesser activity when compared to the standard drug streptomycin. However the methanolic extract was found to possess significant activity when compared to the ethanolic and the chloroform extracts. The methanolic extract of *Embelia ribes* was found to have a significant activity on the gram negative bacilli.

The fifth strain taken for the purpose of study was *Bacillus subtilis*, a gram positive bacillus. The methanolic extract was found to have an equal activity compared to that of the standard drug Streptomycin. The activity of ethanolic extract precedes the methanolic extract followed by the chloroform extract. The methanolic extract of *Embelia ribes* possessed significant activity against *Bacillus subtilis* in comparison with the standard drug Streptomycin. The zone of inhibition by the methanolic extract was found to be greater than that of the standard drug Streptomycin. The ethanolic extract and the chloroform extract were found to have less significance compared to Streptomycin.

### **Conclusion:**

*Gymnema sylvestre* and *Embelia ribes* were found to have good antibacterial activity on the gram positive and

gram negative bacteria. The potency of antibacterial action varied based on the strain used and the solvent used to extract them.

**References:**

1. Keshavamurthy KR; Yoganarasimhan S.N; "Flora of Coorg - Karnataka"; Vimsat publishers, Bangalore; 1990, 282.
2. www.wikipedia.com. [http://en.wikipedia.org/wiki/Embelia\\_ribes](http://en.wikipedia.org/wiki/Embelia_ribes).
3. Indian Pharmacopoeia, Appendix 9.1, 1996 page no-A105-106.

**Corresponding Author:**

**A.Pradeep kumar\***,