



## Original Research

## Antibacterial activity of some medicinal plants against human pathogens

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## Abstract

**Objective:** To assess the antibacterial goods of unrefined solvent methanol concentrate of *Calligonum polygonoids*, *Asphadalous tenuiflous*, *Pulicaria crispa*, and *Fagonia cretica* against a few human microorganisms. **Method:** Unrefined methanol concentrates of, *Calligonum polygonoids*, *Asphadalous tenuiflous*, *Pulicaria crispa* and *Fagonia cretica* at grouping of 500, 250 and 100µg/ml were considered in contrast to Gram-positive *Staphylococcus carnosus* and Gram -ve *K. pneumoniae*, *S. typhi*, *E. coli* and *P. aurogenosa* by utilizing circle dissemination strategy. Ciprofloxacin (5µg/ml) was utilized as a kind of perspective medication. **Results:** The concentrates of all plants showed expansive range antibacterial exercises in a portion subordinate way. The most noteworthy inhibitory area was seen from methanol concentrate of *Fagonia cretica* against *Klebsiella pneumoniae* (19mm), *S. carnosus* (19mm), *E. coli* (18.67mm) and *S. typhi* (14mm); *Calligonum polygonoids* showed against *E. coli* (15mm), *S. typhi* (16milimeter) and *P. aurogenosa* (16milimeter); *Pulicaria crispa* displayed against *K. pneumoniae* (19milimeter), *E. coli* (17milimeter) *S. typhi* (18milimeter), *S. carnosus* (19milileter) and *P. aurogenosa* (16milimeter) while *Asphadalous tenuiflous* displayed against *K. pneumoniae* (15milimeter), and *E. coli* (15milimeter) *S. typhi* (14.33milimeter), *S. carnosus* (13.67milimeter) and *P. aurogenosa* (13.67milimeter). **Conclusion:** These restorative plants have strong antibacterial action and might be the new hotspot for novel antibacterial compound disclosure for the treatment of medications safe human microorganisms.



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## Introduction

Therapeutic plants are vital for human culture to battle infections from the beginning of development. In agricultural nations, different plant species are investigated by ethnic social orders, taking advantage of them to treat various sicknesses and problems. Irresistible illnesses have kept on crushing most non-industrial countries of the world. Roughly 50% of all deaths are brought about by irresistible infections every year are basically due to three significant sicknesses i.e., tuberculosis, jungle fever, and Helps. These sicknesses cause 300 million diseases and above 5 million deaths every year. Combined with the scourge of irresistible illnesses is the new development of safe medication microorganisms that have diminished the adequacy of antimicrobial specialists. As of late, the World Wellbeing Association (WHO) 2008 revealed that over 80% of the total populace depends on customary medication for their essential medical care needs. Ethnic social orders generally utilized different plants from inaccessible past in the types of concentrates of various plant amounts (for example organic products, stem-bark roots, and leaves) in steaming hot water or liquor, mixtures, decoctions or blends 1. Bioactive mixtures having antibacterial impacts should be investigated from regular assets.

*Fagonia cretica* L. (Family: Zygophyllaceae) is a little sharp bush, generally initiated in waterless calcareous rocks all through Pakistan 2. The plant is harsh and utilized for spewing, diarrhea, asthma, fever, liver problems, typhoid, toothache, stomach inconveniences, thirst & skin illnesses 3. Its glue is remotely smeared on growths & different engorgements of the neck. The vital belongings of plants are ascribed to their assortment of phytochemical elements. Over the most recent 50years, Plant has been explored chiefly for the presence of some glycoside like; flavanol and terpenoid glycosides 4. Different constituents, for example, docosyl docosanoate from hexane extract 5 have been disengaged 6; besides, nahagenin, hederagnin, ursolic corrosive and pinitol from other *Fagonia* species have likewise been isolated and portrayed 7.

*Asphodelus tenuifloius* Plant:(Family of plant Asphodeloideace) generally called piyaz is a typical tidy of fields, especially in Punjab, Pakistan of wheat fields. Seeds of *Asphodelus tenuifloius* plant are, for the most part, utilized for coldness and Piles, additionally utilized as a febrifuge and for rheumatic agony. It has superb antifungal and calming action to utilize in treating irresistible diseases. Seeds have diuretic properties and are applied locally on excited or ulcerated parts 8. The leaf decoction is utilized to treat kidney stones. Glue was applied locally to diminish expansion. The leaf and stems of the plant are utilized as a diuretic and treat ulcers and irritation 9.

*Pulicaria crispata*: Family: Compositae/Asteraceae are generally dispersed all over the planet. Different natural exercises have been accounted for certain types of *Pulicaria*, like antibacterial, antifungal, and insecticidal properties. It is utilized particularly in loose bowels for the tingle and other skin issues. It is additionally utilized therapeutically to treat agonizing swellings and bubbles 10.

*Calligonum Polygonoides*: having a place with the family of Polygonaceae contains a great measure of protein. Protein, iron, calcium and phosphorus are in high amounts in seeds, so they are particularly utilized as a dietary enhancement in dry spell season 11. Plant are likewise utilized as a remedy for opium 12. The leaf's decoctions are utilized to manage inflammation of tonsils and acrid throat 13.

Researchers are, along these lines, compelled to look for new antimicrobial specialists from different sources, including restorative plants, because of the less accessibility and significant expense of new-age anti-toxins 14. Accordingly, the current review intended to monitor the antibacterial movement of previously mentioned restorative plants compared to safe human microorganisms.

## Methodology and Techniques

### Planning of methanolic extract

250 grams of powdered material of *Calligonum polygonoids*, *Asphadalous tenuifloius*, *Fagonia cretica*, and *Pulicaria crispata* was splashed independently for seven days in methanol with intermittent pulsating and blending. Following Seven days, the dripping wet material of the plant separate was selected from a few layers of muslin fabric for coarse separation. Filtrate solution was sifted from Whatman paper # 1. The sifted separately was resolute under diminished tension at 40°Celsius, utilizing a rotating evaporator. Unrefined concentrate consequently acquired was balanced to compute the income & concentrate was put away in a fridge at (- 8°Celsius), until utilized for investigation.

### Arrangements of Rough plant extract plates

To explore the inhibitory groupings of the chosen plant extract. The plant's dosages were prepared from the groupings of 100 µg/circle, 250 µg/plate, 500 µg/circle. The portions of tests were fused on the plate of filter paper 7millimeter in dimension with the assistance of a micropipette & permit it to be waterless. Comparably plates containing methanol were arranged that filled in by way of regrettable control of the analysis. A standard anti-infection ciprofloxacin five µg circles were utilized as a positive control or standard control of the test.

### Bacterial strains

Through exposition of antibacterial movement, one Gram +ve & four Gram -ve microbes were chosen. *E. coli* (012), *P. aurogenosa* (013), Gram +ve *S. typhi* (042), *K. pneumonia* (014) & Gram -ve *S. carnosus* (294). The areas of whole chosen microbes were bought from the 1<sup>st</sup> parasitic culture series of Pakistan (FCBP), Foundation of Horticultural Sciences, College of The Punjab, Pakistan.

### Media

Supplement stock media and supplement agar media were utilized in this review.

### Vaccination readiness

Supplement stock and Supplement agar culture were utilized for developing & weakening the microbes' deferments. Inoculums through bacterial societies were ready by preference settlements from 24 hours old societies. Settlements were put off in 5 milliliters of an answer having 0.145 molarity of saltwater/liter. Thickness was changed by UV spectrophotometer to that of a 0.5 McFarland ordinary at a frequency of 530

nanometers to yield an ordinary deferment of  $1 \times 10^6 - 5 \times 10^6$  cells for each milliliter. Plates were cleaned in three bearings.

#### Planning of agar plates

Arranged supplement agar was filled with sanitized Petri plates (12 to 15 ml) close to the fire under laminar wind current to keep it away from pollution, permitting it to harden at room temperature. At the time, when we're cemented then utilized for antibacterial test.

#### Planning of test circles

Example circles of around 7 millimeter width were changed by piercing machine through Whatman no. 1 channel paper. Circles were reserved in a Petri plate & cleaned via apparatus like an autoclave. Remove water in broiler at  $180^\circ\text{Celsius}$ .

#### Antibacterial movement

Circle dissemination technique was utilized to assure antibacterial movement of the relative multitude of concentrates of plants. Waterless and sanitized channel paper plates (7-millimeter distance across) were permeated through the known measure of the test solution (separates) (500 250,  $100\mu\text{g}/\text{circle}$ ) on supplement agar culture consistently cultivated from the test microscopic organisms. Standard circle of Ciprofloxacin in a concentration of ( $5 \mu\text{g}/\text{plate}$ ) & clear circles (filled with solvent followed by intemperance) were utilized, employing certain and -ve control separately. These plates were then retained at low temperature ( $4^\circ\text{C}$ ) for 24 h to permit the greatest dispersion of test tests & afterward hatched at  $37^\circ\text{Celsius}$  for 24 h to permit the most extreme development of the microorganisms. The test solution materials containing antibacterial action restrained the development of the microbes & a reasonable, unmistakable area of hindrance was imagined encompassing the plate. The area of hindrance to environmental elements in the circles was estimated utilizing the straightforward monarch, and the width was kept in millimeters. Investigations were completed in multiple times & the normal area of restraint was determined.

#### Factual examination

The investigation was accomplished utilizing Microsoft Dominate 2007. The 1-way ANOVA test was utilized to decide any genuinely huge distinction in the area of hindrance of the concentrates & the anti-microbials. ( $p < 0.05$ ) were thought of as huge.

#### Results

The methanol concentrates of *Pulicaria crispa*, *Calligonum polygonoids*, *Asphadalous tenuiflous* and *Fagonia cretica* tried for antibacterial action on 5 human microorganisms were introduced in Table 1. Outcome showed that antibacterial exercises of plants remove were expanded from expanding grouping of unrefined concentrates. The solvent like methanol concentrates of *Calligonum polygonoids*, *Asphadalous tenuiflous*, *Pulicaria crispa*, and *Fagonia cretica* showed critical zone of restraint against *S. carnosus*, *S. typhi*, *E. coli* and *K. pneumonia*.

*C. polygonoids* at convergence of around ( $500 \mu\text{g}/\text{milliliter}$ ) give most noteworthy inhibitory area against *S. typhi* in the range of ( $16 \pm 0.58 \text{ mm}$ ), *P. aurogenosa* in the range of ( $16 \pm 0.58 \text{ mm}$ ) and *E. coli* in the range of ( $15.67 \pm 0.33 \text{ mm}$ ) Table 1 and Figure 1.

Table 1 and Figure 2. The most elevated inhibitory area was seen through methanol concentrate of *F. cretica* at centralization with ( $500 \mu\text{g}/\text{milliliter}$ ). In contrast, against *P. aurogenosa* in the range of ( $11 \pm 0.58 \text{ millimeter}$ ), opposite to *K. pneumoniae* ( $19 \pm 0.58 \text{ millimeter}$ ), *E. coli* in the range of ( $18.67 \pm 0.67 \text{ millimeter}$ ), *S. typhi* in the range of ( $14 \pm 0.58 \text{ millimeter}$ ) and *S. carnosus* in the range of ( $19 \pm 0.58 \text{ millimeter}$ ), showed moderate action when contrasted with different microorganisms.

In the event of the solvent like methanol concentrate of *P. crispa* at centralization of ( $500 \mu\text{g}/\text{milliliter}$ ) the most noteworthy inhibitory area was seen opposite to *K. pneumoniae* in the range of ( $19.67 \pm 0.88 \text{ millimeter}$ ), *E. coli* in the range of ( $17 \pm 0.58 \text{ millimeter}$ ), *P. aeruginosa* in the range of ( $16.33 \pm 0.67 \text{ millimeter}$ ) *S. carnosus* in the range of ( $19 \pm 0.33 \text{ millimeter}$ ) and *S. typhi* in the range of ( $18 \pm 0.58 \text{ millimeter}$ ). Table 1 and Figure 3.

*A. tenuiflous* methanol extricate exposed most extreme inhibitory area against *K. pneumoniae* in the range of ( $15 \pm 0.58 \text{ millimeter}$ ), and *E. coli* in the range of ( $15 \pm 0.00 \text{ millimeter}$ ) *S. typhi* in the range of ( $14.33 \pm 0.67 \text{ millimeter}$ ), *S. carnosus* in the range of ( $13.67 \pm 0.67 \text{ millimeter}$ ) and *P. aeruginosa* in the range of ( $13.67 \pm 0.67 \text{ millimeter}$ ) Table 1 and Figure 4.

#### Discussion

Restorative plants have been a significant hotspot for drugs over hundreds of years in both the created and creating world. Customary therapeutic items are not authoritatively perceived in numerous nations, yet presently, the European Association has planned administrative regulations for quality conventional drugs<sup>15</sup>. As of late, it is assessed that something like 25% of all cutting-edge meds are determined either straightforwardly or in a roundabout way from therapeutic plants. Conventional meds assume significant part in relieving assortment of infections. The remedial properties of spices are because of the presence of compound substance as auxiliary metabolites, which are only collected in various pieces of the plants<sup>16</sup>. The plant removes contain an enormous number of auxiliary metabolites, such as terpenoids, alkaloids, tannins, glycosides, and flavonoids. These normal metabolites are liable against microbial impact of rough medication and hotspot for regular mixtures as new enemy of contamination specialists. Event of bacterial sicknesses is becoming normal in south Asia, due to advancement of antibacterial medication safe microbes. The impact of different plant removes on microscopic organisms has been contemplated by various scientists in various areas of the planet viz. the concentrate *Argyrenia argentea*<sup>17</sup>, *Ecbolium linneanum*<sup>18</sup>, *Leucas clakei*, *Centella asiatica* have been assessed for antibacterial movement.

To beat the issue and recognize helpful elective specialists, the quest for novel compounds from more up-to-date sources is worldwide difficulties<sup>19</sup>. Our current examinations for the new antibacterial bioactive mixtures designated on the society restorative plants, being utilized for a long time in treating nearby populace. In this review, methanol concentrates of *Pulicaria crispa*, *Asphadalous tenuiflous*, *Calligonum polygonoids* and *Fagonia cretica* have been tried for antimicrobial action on 5 different human experimental microorganisms

including *K. pneumoniae*, *S. typhi*, *E. coli* and *S. carnosus*. Midst the four concentrates *P. crispa* methanol removed indicated the most elevated antibacterial action against *E. coli*, *K. pneumoniae*, *S. typhi* & *S. carnosus*. The impact was practically equivalent to ciprofloxacin, which is standard. A past explosion on phytochemical screening of *P. crispa* plant remove utilized in the current work uncovered the manifestation of wide assortment of optional metabolites, like alkaloids, terpenoids, flavonoids, Coumarin, tannins, and unstable oil, which have been seen in vitro to have antimicrobial properties. The current review announced that methanol concentrates of *F. cretica* showed extensive inhibitory action opposite to intestinal segregates of *K. pneumoniae*, *E. coli*, and *S. carnosus*. Then again, the micobe *P. aurogenosa* was practically impervious to Plant separate *F. cretica*. It is proposed that this bacterial culture might have a safe component and convergence of compound utilized might be lesser to incapacitate the bacterial action. Methanol concentrates of *C. polygonoids* revealed strong antimicrobial action opposite to clinical pathogenic *P. aurogenosa* and *S. typhi*. The methanol concentrates of *A. tenuiflous* revealed most extreme inhibitory area against and *E. coli*, *K. pneumoniae*, while against *S. carnosus*, *P. aurogenosa*, *S. typhi*, showed the least inhibitory action. The aftereffects of the current concentrate alongside early reports reasoned that the solvent methanol concentrates of customary wild plants *A. tenuiflou*, *Pulicaria crispa*, *C. polygonoids* and *F. cretica*, have intense antibacterial exercises aopposite to the clinical human microorganisms. The current examination information on antibacterial intensity of above plants assists with planning further investigations for blend of novel anti-microbials.

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**Table 1 Antibacterial activity of methanol extract of medicinal plants against human pathogens**\*The mean difference is significant at the .05 level ( $p < 0.05$ ). The diameter of Disk was 7mm.

Extracts	Concentration ( $\mu\text{g/ml}$ )	Mean $\pm$ SEM Zone of inhibition(n=3)mm				
		<i>Staphylococcus Carnosus</i> (Gram+ve)	<i>Salmonella Typhi</i> (Gram-ve)	<i>Escherichia Coli</i> (Gram-ve)	<i>Pseudomonas Aurogenosa</i> (Gram-ve)	<i>Klebsiella Pneumonia</i> (Gram-ve)
<i>Calligonum polygonoids</i> Methanol extract	100	2.33 $\pm$ 0.33	3 $\pm$ 0.58	5 $\pm$ 0.58	7 $\pm$ 0.58	7 $\pm$ 0.58
	250	5 $\pm$ 0.58	7.33 $\pm$ 0.33	7 $\pm$ 0.58	9 $\pm$ 0.58	2 $\pm$ 0.58
	500	9 $\pm$ 0.58	16 $\pm$ 0.58	15.67 $\pm$ 0.33	16.67 $\pm$ 0.33	5.33 $\pm$ 0.66
<i>Fagonia cretica</i> methanol extract	100	5 $\pm$ 0.58	4 $\pm$ 0.58	5.67 $\pm$ 0.88	5 $\pm$ 0.58	3 $\pm$ 0.58
	250	9.33 $\pm$ 0.33	9 $\pm$ 0.58	9.67 $\pm$ 0.67	8 $\pm$ 0.58	8.67 $\pm$ 0.58
	500	19 $\pm$ 0.58	14 $\pm$ 0.58	18.67 $\pm$ 0.67	11 $\pm$ 0.58	19 $\pm$ 0.58
<i>Pulicaria crista</i> methanol extract	100	4 $\pm$ 0.58	5 $\pm$ 0.58	5 $\pm$ 0.58	2 $\pm$ 0.58	4 $\pm$ 0.58
	250	9 $\pm$ 0.58	9 $\pm$ 0.58	8 $\pm$ 0.58	6.33 $\pm$ 1.20	9 $\pm$ 0.58
	500	19.33 $\pm$ 0.33	18 $\pm$ 0.58	17 $\pm$ 0.58	16.33 $\pm$ 0.67	19.67 $\pm$ 0.88
<i>Asphadalous tenuiflous</i> methanol extract	100	3 $\pm$ 0.58	3 $\pm$ 0.58	2 $\pm$ 0.58	2 $\pm$ 1.15	6 $\pm$ 0.58
	250	7 $\pm$ 0.58	7 $\pm$ 0.58	6 $\pm$ 0.58	5 $\pm$ 0.58	9 $\pm$ 0.58
	500	13.67 $\pm$ 0.67	14.33 $\pm$ 0.67	15 $\pm$ 0.00	13.67 $\pm$ 0.67	15 $\pm$ 0.58

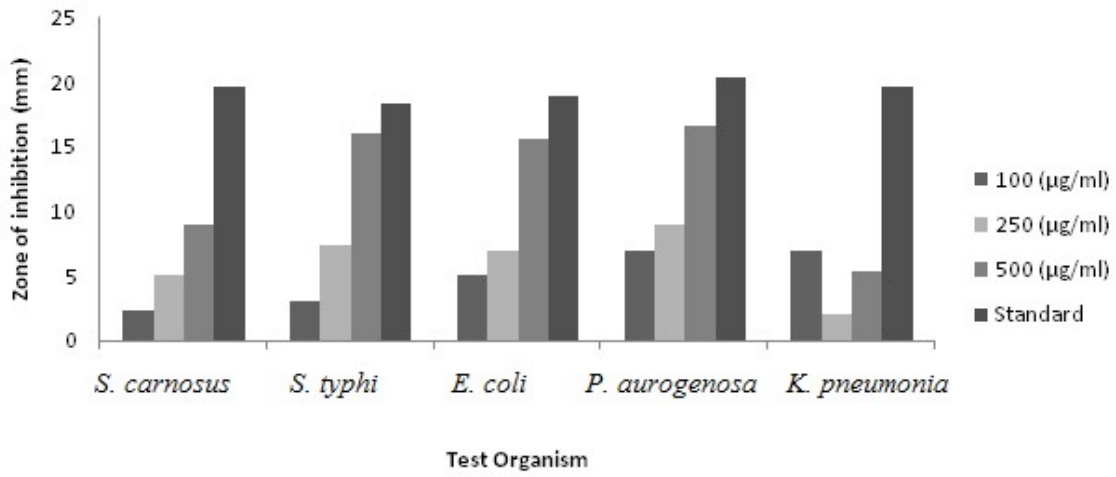


Figure 1: Antibacterial activity of various fixations (g/ml) of *Calligonum polygonoids* methanol concentrate versus distinct pathogenic bacteria

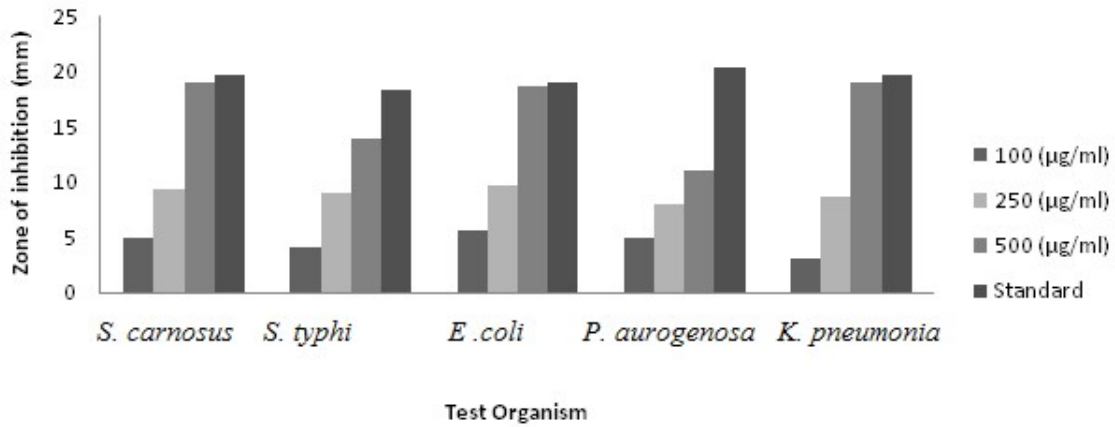


Figure 2: Antimicrobial properties of various doses (g/ml) of *Fagonia cretica* methanol extract against various strains of bacteria

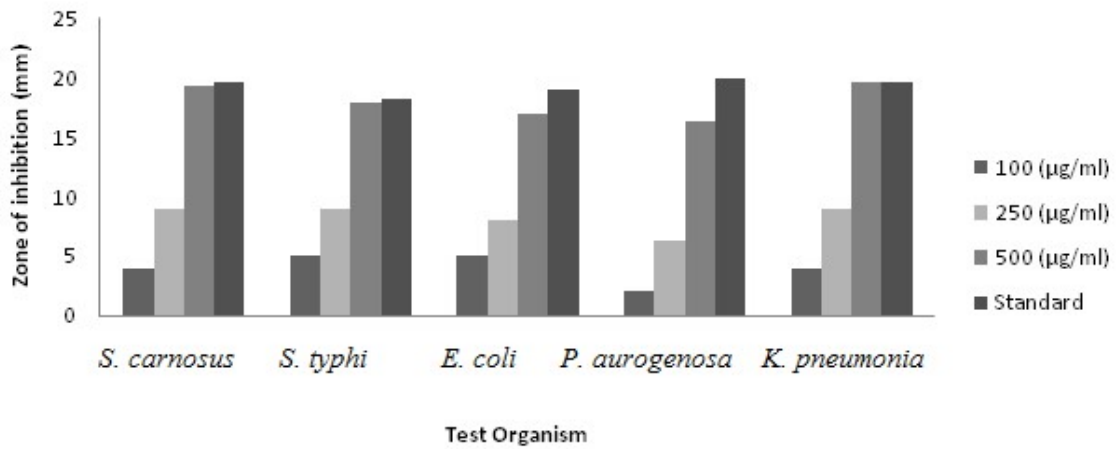


Figure 3: Antibacterial activity of *Pulicaria crispa* methanol extract at various doses (g/ml) against several bacterial strains

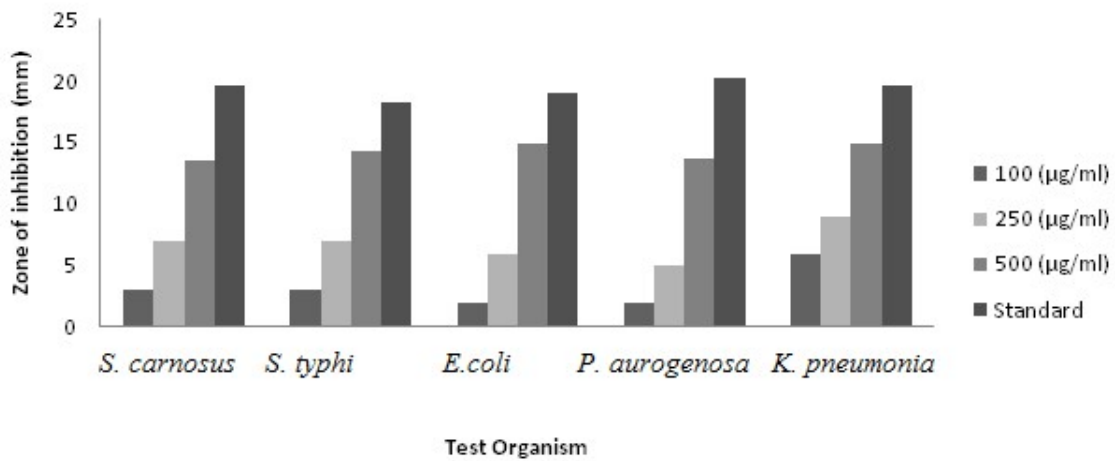


Figure 4; Description Antibacterial activity of *Asphadalous tenuiflous* methanolic extracts at various doses (g/ml) against various strains of bacteria