

# THE STUDY INVESTIGATES THE ANTI-MICROBIAL PROPERTIES OF THREE DISTINCT SPECIES OF TULSI FOUND IN CHHATTISGARH AGAINST *ALCALIGENES FAECALIS* AND *SALMONELLA ENTERICA*

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## Abstract

The aromatic herb tulsi (*Ocimum spp.*) is a member of the *Lamiaceae* family. Holy basil (*Ocimum sanctum*) and Mediterranean basil (*Ocimum basilicum*) are the two main categories into which tulsi can be divided. Three Tulsi species—Krama Tulsi (*Ocimum sanctum*), Krishna Tulsi (*Ocimum tenuiflorum*), and Mediterranean basil (*Ocimum basilicum*)—were compared for their phytochemical and antibacterial activity in this study. These tulsi species are distributed throughout Chhattisgarh's various agroclimatic zones. Different extractions from all three species were made for their anti-microbial efficacy against bacteria (Petroleum ether extract, Ester extract, methanol extract, chloroform extract and formaldehyde extract). The disc diffusion method and well diffusion method were the two techniques used to test for antimicrobial activity. Findings indicated that *Ocimum tenuiflorum* exhibited the largest zone of inhibition with petroleum ether, ester, and methanol extracts among all tulsi species and two bacterial strains..

**Keywords:** Antimicrobial activity, Solvent extraction, *Salmonella enterica*, *Alcaligenes faecalis*.

## INTRODUCTION

Holy Basil also known as Tulsi (*Ocimum sanctum*), an aromatic herb has healing and curative properties. It is a sacred herb in India and is grown in all houses, temples, gardens, etc. It grows to a height of 1-1.5 meters and has quadrangular branches. Leaves grow opposite to each other with a length 2-4 cm, leaf margins are either entire or toothed, and possesses hair on both the surfaces. Tiny, purple flowers grow on Tulsi and inflorescence is 12-14 cm in length. The fruits which grow on Tulsi are small and smooth nuts. Tulsi is used in treatment of a number of diseases like mental illness, cough and fever, gut diseases, bone and joint problems, eye diseases and other optic problems, ringworm, insect bite, snake bite and scorpion bite and malaria.

Tulsi has antimicrobial activities against many pathogens and can be used as mouth wash agent, for wound healing, and preservation of food stuff. Tulsi is antibacterial, antiviral, antifungal, antiprotozoal, antimalarial, and can be used also for killing mosquitoes. It has anti-oxidants and can be used as anti-cataract agent, anti-inflammatory agent, as well as protects from chemicals and radiations, good for the liver and nerves and heart, anticancerous agent, protects the immune system, central nervous system and memory its anti-asthma and thyroid, and solves fertility issues.

Tulsi is known to help protect vital human organs and cells against various types of chemical strains from the prevalent industrial pollution and fossil fuels emissions and physical strains from extended physical exhaustion and restraint due to various physical problems and noise exposure to excessive and loud ones. The present study involved comparative analysis of antimicrobial activity of three Tulsi species, namely Rama Tulsi (*Ocimum sanctum*), Krishna Tulsi (*Ocimum tenuiflorum*), and mediterranean basil (*Ocimum basilicum*).

## MATERIALS AND METHODS

The different varieties of Tulsi were procured from different agro-climatic zones of Chhattisgarh. The spp. were subjected to different extraction methods viz. petroleum ether, ester, methanol, chloroform and formaldehyde. These extracts were used for anti-microbial activity by using two methods like well diffusion and disc diffusion method. Extracts were tested against two bacterial strains *Salmonella enterica* and *Alcaligenes faecalis*. All plating of microbes were performed using nutrient agar and positive control was used of commercial antibiotic named ampicillin. Zone of inhibition was measured for each extracts of different tulsi species against the two bacterial strains. For disc diffusion Whatmann Filter paper 42 discs was used. For preparation of the extracts, 10 g of *Ocimum* leaves respectively was crushed in 200 ml of the solvents respectively and left for drying at 40 degrees C for the solvent extracts for 24 hours in incubator. The powders thus obtained from respective conditions were dissolved in respective solvents to obtain variable concentrations to be used for ZOI studies. All experiments were carried out in triplicates, and with regard to the initial studies of ZOI done with all the three *Ocimum* studies, further ZOI studies was carried out with three different species of Tulsi.

RESULT AND DISCUSSIONS

1. Well Diffusion Method:

1.1 *Ocimum tenuiflorum*

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, Formaldehyde and Petroleum ether extracts of *Ocimum tenuiflorum* using agar well- diffusion method against *Salmonella enterica*.

Table.1.1: Antibacterial activity at different extracts of *Ocimum tenuiflorum* concentration of against *Salmonella enterica*

| Petroleum ether extract |          | Ester extract |          | Methanol extract |          | Chloroform extract |          | Formaldehyde extract |          |
|-------------------------|----------|---------------|----------|------------------|----------|--------------------|----------|----------------------|----------|
| Conc. (mg)              | ZOI (mm) | Conc. (mg)    | ZOI (mm) | Conc. (mg)       | ZOI (mm) | Conc. (mg)         | ZOI (mm) | Conc. (mg)           | ZOI (mm) |
| PC                      | 28 mm    | PC            | 28 mm    | PC               | 28 mm    | PC                 | 26 mm    | PC                   | 27 mm    |
| 60                      | 25mm     | 60            | 25 mm    | 60               | 14mm     | 60                 | 13mm     | 60                   | 17 mm    |

PC- Positive control (Ampicillin), ZOI- zone of inhibition

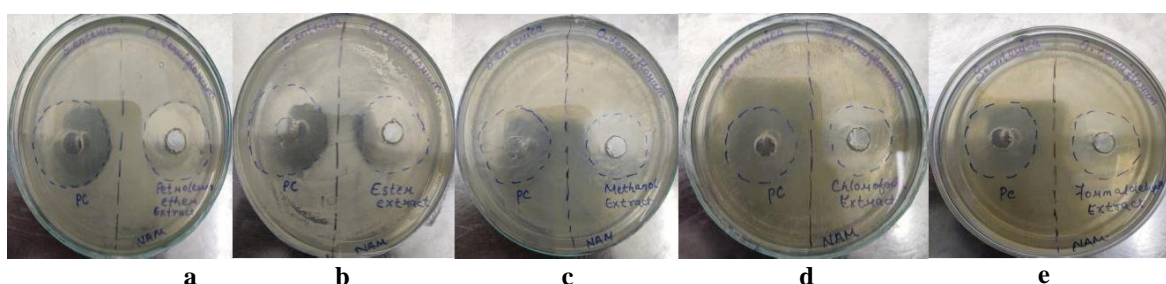


Fig 1.1: Antibacterial activity of different extracts of *Ocimum tenuiflorum* against *Salmonella enterica*(a) Petroleum ether extract, (b) Ester extract, (c) Methanol extract, (d) Chloroform extract and (e) Formaldehyde extract.

The results of in-vitro antimicrobial activity of the Chloroform, Methanol ,ester, formaldehyde and Petroleum ether extracts of leaves of *Ocimum tenuiflorum* using agar well-diffusion method against *Salmonella enterica*.

Methanol extract @ 80 mg of *Ocimum tenuiflorum* showed a maximum zone of inhibition of 20.5 mm against *Alcaligenes faecalis* whereas the minimum was recorded in formaldehyde extract @ 80 mg concentration.

1.2 *Ocimum gratissum*

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, Formaldehyde and Petroleum ether extracts of *Ocimum gratissum* using agar well-diffusion method against *Salmonella enterica*.

Table1.2: Antibacterial activity at different extracts of *Ocimum gratissum* concentration of against *Salmonella enterica*.

| Petroleum ether extract |          | Ester extract |          | Methanol extract |          | Chloroform extract |          | Formaldehyde extract |          |
|-------------------------|----------|---------------|----------|------------------|----------|--------------------|----------|----------------------|----------|
| Conc. (mg)              | ZOI (mm) | Conc. (mg)    | ZOI (mm) | Conc. (mg)       | ZOI (mm) | Conc. (mg)         | ZOI (mm) | Conc. (mg)           | ZOI (mm) |
| PC                      | 26 mm    | PC            | 27 mm    | PC               | 28 mm    | PC                 | 27 mm    | PC                   | 25 mm    |
| 170                     | 14 mm    | 170           | 14.5 mm  | 170              | 16.3 mm  | 170                | 16.5mm   | 170                  | 13.5 mm  |

PC- Positive control (Ampicillin), ZOI- zone of inhibition

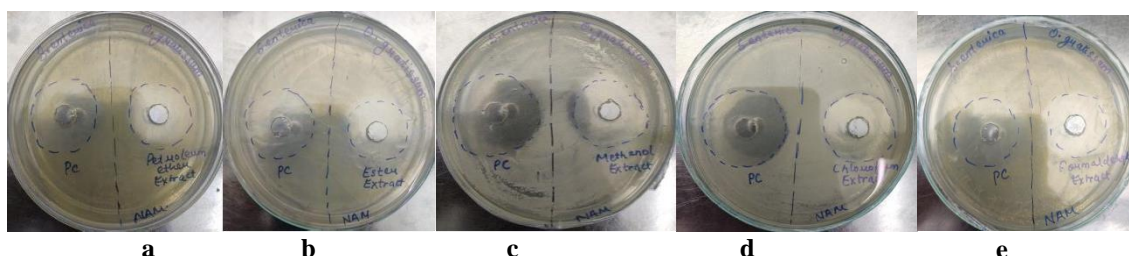


Fig 1.2: Antibacterial activity of different extracts of *Ocimumgratissum*against *Salmonella enterica*(a) Petroleum ether extract, (b) Ester extract, (c) Methanol extract, (d) Chloroform extract and (e) Formaldehyde extract.

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, formaldehyde and Petroleum ether extracts of leaves of *Ocimum gratissimum* using agar well- diffusion method against *Salmonella enterica*. Chloroform extract of this species showed maximum ZOI whereas the minimum was recorded in 13.5 mm with formaldehyde extract.

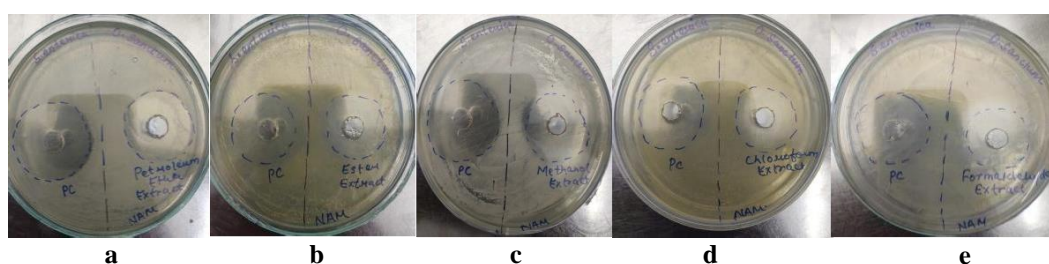
**1.3 *Ocimum sanctum***

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, Formaldehyde and Petroleum ether extracts of *Ocimum sanctum* using agar well- diffusion method against *Salmonella enterica*.

**Table1.3: Antibacterial activity at different extracts of *Ocimum sanctum* concentration of against *Salmonella enterica*.**

| Petroleum ether extract |          | Ester extract |          | Methanol extract |          | Chloroform extract |          | Formaldehyde extract |          |
|-------------------------|----------|---------------|----------|------------------|----------|--------------------|----------|----------------------|----------|
| Conc. (mg)              | ZOI (mm) | Conc. (mg)    | ZOI (mm) | Conc. (mg)       | ZOI (mm) | Conc. (mg)         | ZOI (mm) | Conc. (mg)           | ZOI (mm) |
| PC                      | 25 mm    | PC            | 24 mm    | PC               | 24 mm    | PC                 | 24 mm    | PC                   | 25 mm    |
| 80                      | 17mm     | 80            | 13mm     | 80               | 16mm     | 80                 | 14 mm    | 80                   | 12.5 mm  |

PC- Positive control (Ampicillin), ZOI- zone of inhibition



**Fig 1.3 :- Antibacterial activity of different extracts of *Ocimumsanctum* against *Salmonella enterica*(a) Petroleum ether extract, (b) Ester extract, (c) Methanol extract, (d) Chloroform extract and (e) Formaldehyde extract.**

The results of in-vitro antimicrobial activity of the Chloroform, Methanol ,ester, formaldehyde and Petroleum ether extracts of leaves of *Ocimum sanctum* using agar well- diffusion method against *Salmonella enterica*. Petroleum ether extract of this species showed maximum ZOI of 17 mm whereas the minimum was recorded in 12 mm with formaldehyde extract.

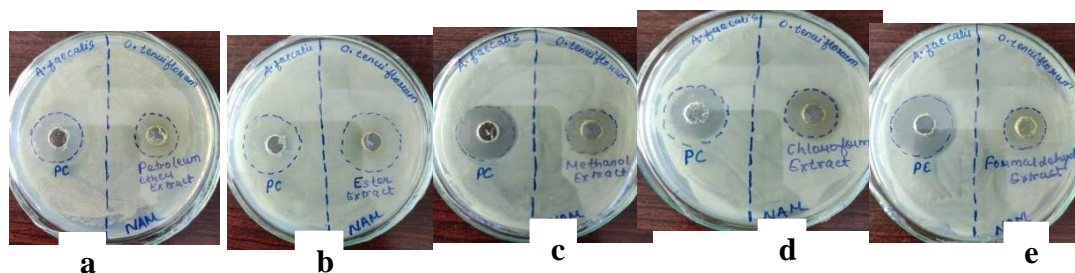
**1.4 *Ocimum tenuiflorum***

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, Formaldehyde and Petroleum ether extracts of *Ocimum tenuiflorum* using agar well- diffusion method against *Alcaligenes faecalis*.

**Table1.4: Antibacterial activity at different extracts of *Ocimum tenuiflorum* concentration of against *Alcaligenes faecalis*.**

| Petroleum ether extract |          | Ester extract |          | Methanol extract |          | Chloroform extract |          | Formaldehyde extract |          |
|-------------------------|----------|---------------|----------|------------------|----------|--------------------|----------|----------------------|----------|
| Conc. (mg)              | ZOI (mm) | Conc. (mg)    | ZOI (mm) | Conc. (mg)       | ZOI (mm) | Conc. (mg)         | ZOI (mm) | Conc. (mg)           | ZOI (mm) |
| PC                      | 28 mm    | PC            | 27 mm    | PC               | 26 mm    | PC                 | 28 mm    | PC                   | 26 mm    |
| 80                      | 14.5mm   | 80            | 18.1mm   | 80               | 20.5mm   | 80                 | 13.2 mm  | 80                   | 13 mm    |

PC- Positive control (Ampicillin), ZOI- zone of inhibition



**Fig 1.4: Antibacterial activity of different extracts of *Ocimum tenuiflorum* against *Alcaligenes faecalis* (a) Petroleum ether extract, (b) Ester extract, (c) Methanol extract, (d) Chloroform extract and (e) Formaldehyde extract.**

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, formaldehyde and Petroleum ether extracts of leaves of *Ocimum tenuiflorum* using agar well-diffusion method against *Alcaligenes faecalis*. Methanol extract of this species showed maximum ZOI of 20.5 mm whereas the minimum was recorded in 13 mm with formaldehyde extract.

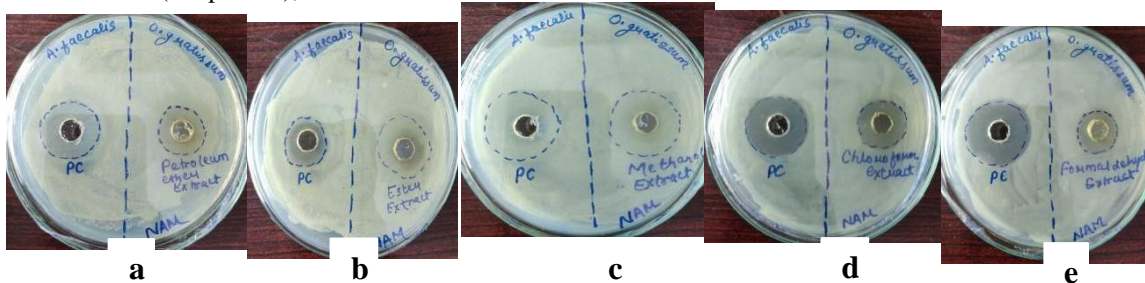
**1.5 *Ocimum gratissimum***

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, Formaldehyde and Petroleum ether extracts of *Ocimum gratissimum* using agar well-diffusion method against *Alcaligenes faecalis* .

**Table1.5: Antibacterial activity at different extracts of *Ocimum gratissimum* concentration of against *Alcaligenes faecalis*.**

| Petroleum ether extract |          | Ester extract |          | Methanol extract |          | Chloroform extract |          | Formaldehyde extract |          |
|-------------------------|----------|---------------|----------|------------------|----------|--------------------|----------|----------------------|----------|
| Conc. (mg)              | ZOI (mm) | Conc. (mg)    | ZOI (mm) | Conc. (mg)       | ZOI (mm) | Conc. (mg)         | ZOI (mm) | Conc. (mg)           | ZOI (mm) |
| PC                      | 28 mm    | PC            | 28 mm    | PC               | 26 mm    | PC                 | 27 mm    | PC                   | 27 mm    |
| 150                     | 14.2mm   | 150           | 16.2mm   | 150              | 17.5mm   | 150                | 15mm     | 150                  | 13.2 mm  |

PC- Positive control (Ampicillin), ZOI- zone of inhibition



**Fig 1.5: Antibacterial activity of different extracts of *Ocimum gratissimum* against *Alcaligenes faecalis* (a) Petroleum ether extract, (b) Ester extract, (c) Methanol extract, (d) Chloroform extract and (e) Formaldehyde extract.**

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, formaldehyde and Petroleum ether extracts of leaves of *Ocimum gratissimum* using agar well- diffusion method against *Alcaligenes faecalis*. Methanol extract of this species showed maximum ZOI of 17.5 mm whereas the minimum was recorded in 13.2 mm with formaldehyde extract.

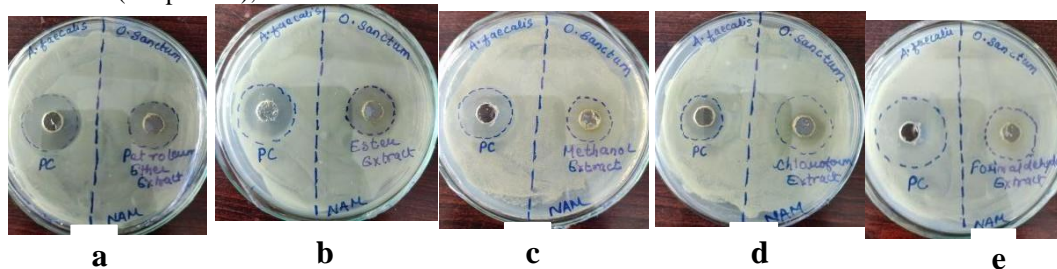
**1.6 *Ocimum sanctum***

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, Formaldehyde and Petroleum ether extracts of *Ocimum sanctum* using agar well-diffusion method against *Alcaligenes faecalis*.

**Table1.6 :- Antibacterial activity at different extracts of *Ocimum sanctum* concentration of against *Alcaligenes faecalis*.**

| Petroleum ether extract |          | Ester extract |          | Methanol extract |          | Chloroform extract |          | Formaldehyde extract |          |
|-------------------------|----------|---------------|----------|------------------|----------|--------------------|----------|----------------------|----------|
| Conc. (mg)              | ZOI (mm) | Conc. (mg)    | ZOI (mm) | Conc. (mg)       | ZOI (mm) | Conc. (mg)         | ZOI (mm) | Conc. (mg)           | ZOI (mm) |
| PC                      | 26 mm    | PC            | 25 mm    | PC               | 24 mm    | PC                 | 24 mm    | PC                   | 26 mm    |
| 100                     | 15mm     | 100           | 17.5mm   | 100              | 13mm     | 100                | 17.5mm   | 100                  | 16.5 mm  |

PC- Positive control (Ampicillin), ZOI- zone of inhibition



**Fig 1.6: Antibacterial activity of different extracts of *Ocimum sanctum* against *Alcaligenes faecalis* (a) Petroleum ether extract, (b) Ester extract, (c) Methanol extract, (d) Chloroform extract and (e) Formaldehyde extract.**

The results of in-vitro antimicrobial activity of the Chloroform, Methanol ,ester, formaldehyde and Petroleum ether extracts of leaves of *Ocimum sanctum* using agar well- diffusion method against *Alcaligenes faecalis*. Ester and Chloroform extract of this species showed maximum ZOI of 17.5 mmeach whereas the minimum was recorded in 15 mm with petroleum ether extract.

**2. Disc Diffusion Method**

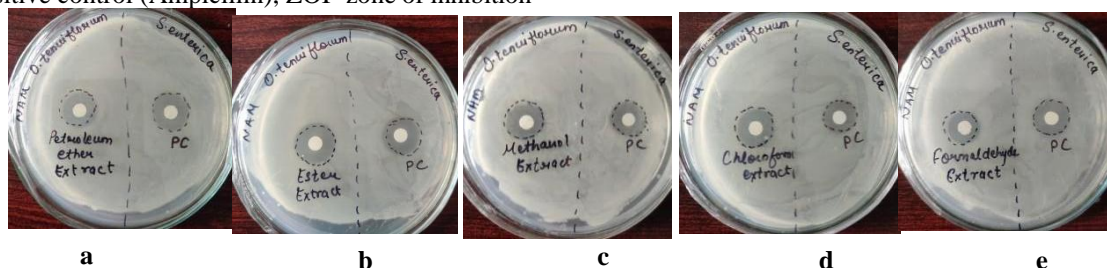
**2.1 *Ocimum tenuiflorum***

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, Formaldehyde and Petroleum ether extracts of *Ocimum tenuiflorum* using disc diffusion method against *Salmonella enterica*.

**Table 2.1:- Antibacterial activity at different extracts of *Ocimum tenuiflorum* concentration of against *Salmonella enterica*.**

| Petroleum ether extract |          | Ester extract |          | Methanol extract |          | Chloroform extract |          | Formaldehyde extract |          |
|-------------------------|----------|---------------|----------|------------------|----------|--------------------|----------|----------------------|----------|
| Conc. (mg)              | ZOI (mm) | Conc. (mg)    | ZOI (mm) | Conc. (mg)       | ZOI (mm) | Conc. (mg)         | ZOI (mm) | Conc. (mg)           | ZOI (mm) |
| PC                      | 20 mm    | PC            | 20 mm    | PC               | 20 mm    | PC                 | 20 mm    | PC                   | 20 mm    |
| 60                      | 15 mm    | 60            | 20.2mm   | 60               | 20mm     | 60                 | 21mm     | 60                   | 14.8 mm  |

PC- Positive control (Ampicillin), ZOI- zone of inhibition



**Fig 2.1 :- Antibacterial activity of different extracts of *Ocimum tenuiflorum* against *Salmonella enterica*(a) Petroleum ether extract, (b) Ester extract, (c) Methanol extract, (d) Chloroform extract and (e) Formaldehyde extract.**

The results of in-vitro antimicrobial activity of the Chloroform, Methanol ,ester, formaldehyde and Petroleum ether extracts of leaves of *Ocimum tenuiflorum* using disc- diffusion method against *Salmonella enterica*.

Chloroform extract of this species showed maximum ZOI of 21 mm whereas the minimum was recorded in 14.8 mm with formaldehyde extract.

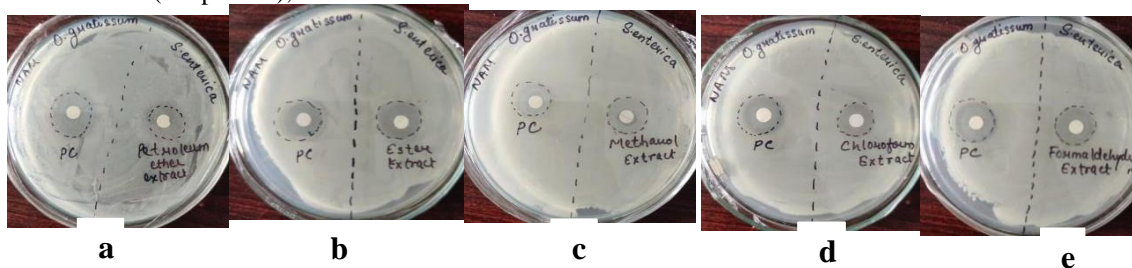
**2.2 *Ocimum gratissimum***

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, Formaldehyde and Petroleum ether extracts of *Ocimum gratissimum* using disc-diffusion method against *Salmonella enterica*.

**Table 2.2 :- Antibacterial activity at different extracts of *Ocimum gratissimum* concentration of against *Salmonella enterica*.**

| Petroleum ether extract |          | Ester extract |          | Methanol extract |          | Chloroform extract |          | Formaldehyde extract |          |
|-------------------------|----------|---------------|----------|------------------|----------|--------------------|----------|----------------------|----------|
| Conc. (mg)              | ZOI (mm) | Conc. (mg)    | ZOI (mm) | Conc. (mg)       | ZOI (mm) | Conc. (mg)         | ZOI (mm) | Conc. (mg)           | ZOI (mm) |
| PC                      | 20 mm    | PC            | 20 mm    | PC               | 20 mm    | PC                 | 20 mm    | PC                   | 20 mm    |
| 180                     | 13.8mm   | 180           | 18mm     | 180              | 18mm     | 170                | 15mm     | 170                  | 18 mm    |

PC- Positive control (Ampicillin), ZOI- zone of inhibition



**Fig 2.2 :- Antibacterial activity of different extracts of *Ocimum gratissimum* against *Salmonella enterica*(a) Petroleum ether extract, (b) Ester extract, (c) Methanol extract, (d) Chloroform extract and (e) Formaldehyde extract.**

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, formaldehyde and Petroleum ether extracts of leaves of *Ocimum gratissimum* using disc- diffusion method against *Salmonella enterica*. Methanol and formaldehyde extract of this species showed maximum ZOI of 18 mm whereas the minimum was recorded in 13.8 mm with petroleum ether extract.

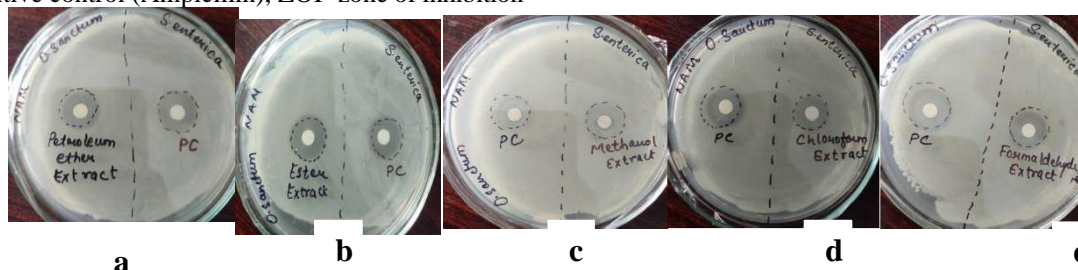
**2.3 Ocimum sanctum**

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, Formaldehyde and Petroleum ether extracts of *Ocimum sanctum* using disc-diffusion method against *Salmonella enterica*.

**Table2.3 :- Antibacterial activity at different extracts of *Ocimum sanctum* concentration of against *Salmonella enterica*.**

| Petroleum ether extract |          | Ester extract |          | Methanol extract |          | Chloroform extract |          | Formaldehyde extract |          |
|-------------------------|----------|---------------|----------|------------------|----------|--------------------|----------|----------------------|----------|
| Conc. (mg)              | ZOI (mm) | Conc. (mg)    | ZOI (mm) | Conc. (mg)       | ZOI (mm) | Conc. (mg)         | ZOI (mm) | Conc. (mg)           | ZOI (mm) |
| PC                      | 20 mm    | PC            | 20 mm    | PC               | 20 mm    | PC                 | 20 mm    | PC                   | 20 mm    |
| 90                      | 13.1 mm  | 90            | 16.5mm   | 90               | 16 mm    | 90                 | 14mm     | 90                   | 13.5 mm  |

PC- Positive control (Ampicillin), ZOI- zone of inhibition



**Fig 2.3 :- Antibacterial activity of different extracts of *Ocimum sanctum* against *Salmonella enterica*(a) Petroleum ether extract, (b) Ester extract, (c) Methanol extract, (d) Chloroform extract and (e) Formaldehyde extract.**

The results of in-vitro antimicrobial activity of the Chloroform, Methanol ,ester, formaldehyde and Petroleum ether extracts of leaves of *Ocimum sanctum* using disc- diffusion method against *Salmonella enterica*. Ester extract of this species showed maximum ZOI of 16.5 mm whereas the minimum was recorded in 13.1 mm with petroleum ether extract.

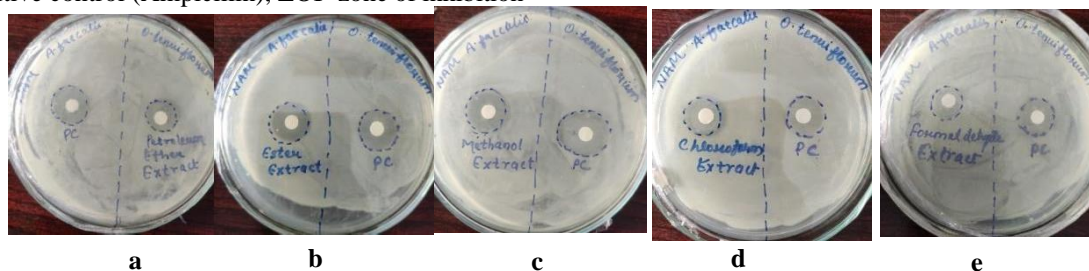
**2.4 Ocimum tenuiflorum**

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, Formaldehyde and Petroleum ether extracts of *Ocimum tenuiflorum* using disc-diffusion method against *Alcaligenes faecalis*.

**Table2.4 :- Antibacterial activity at different extracts of *Ocimum tenuiflorum* concentration of against *Alcaligenes faecalis*.**

| Petroleum ether extract |          | Ester extract |          | Methanol extract |          | Chloroform extract |          | Formaldehyde extract |          |
|-------------------------|----------|---------------|----------|------------------|----------|--------------------|----------|----------------------|----------|
| Conc. (mg)              | ZOI (mm) | Conc. (mg)    | ZOI (mm) | Conc. (mg)       | ZOI (mm) | Conc. (mg)         | ZOI (mm) | Conc. (mg)           | ZOI (mm) |
| PC                      | 20 mm    | PC            | 20mm     | PC               | 20 mm    | PC                 | 20 mm    | PC                   | 20 mm    |
| 70                      | 13 mm    | 70            | 18mm     | 70               | 20 mm    | 70                 | 13mm     | 70                   | 12.8 mm  |

PC- Positive control (Ampicillin), ZOI- zone of inhibition



**Fig 2.4 :- Antibacterial activity of different extracts of *Ocimum tenuiflorum* against *Alcaligenes faecalis*(a) Petroleum ether extract, (b) Ester extract, (c) Methanol extract, (d) Chloroform extract and (e) Formaldehyde extract.**

The results of in-vitro antimicrobial activity of the Chloroform, Methanol ,ester, formaldehyde and Petroleum ether extracts of leaves of *Ocimum tenuiflorum* using disc- diffusion method against *Alcaligenes faecalis*. Methanol extract of this species showed maximum ZOI of 20 mm whereas the minimum was recorded in 12.8 mm with formaldehyde extract.

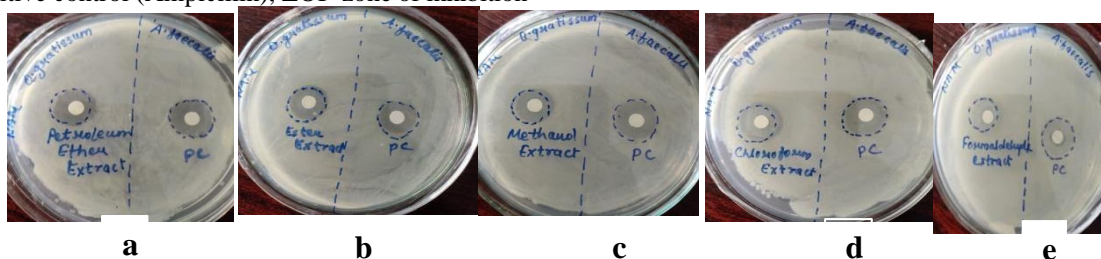
**2.5 Ocimum gratissimum**

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, Formaldehyde and Petroleum ether extracts of *Ocimum gratissimum* using disc-diffusion method against *Alcaligenes faecalis*.

**Table2.5 :- Antibacterial activity at different extracts of *Ocimum gratissimum* concentration of against *Alcaligenes faecalis*.**

| Petroleum ether extract |          | Ester extract |          | Methanol extract |          | Chloroform extract |          | Formaldehyde extract |          |
|-------------------------|----------|---------------|----------|------------------|----------|--------------------|----------|----------------------|----------|
| Conc. (mg)              | ZOI (mm) | Conc. (mg)    | ZOI (mm) | Conc. (mg)       | ZOI (mm) | Conc. (mg)         | ZOI (mm) | Conc. (mg)           | ZOI (mm) |
| PC                      | 20 mm    | PC            | 20 mm    | PC               | 20 mm    | PC                 | 20 mm    | PC                   | 20 mm    |
| 150                     | 18 mm    | 150           | 17mm     | 150              | 17.2m    | 150                | 18 mm    | 150                  | 13 mm    |

PC- Positive control (Ampicillin), ZOI- zone of inhibition



**Fig 2.5 :- Antibacterial activity of different extracts of *Ocimum gratissimum* against *Alcaligenes faecalis*(a) Petroleum ether extract, (b) Ester extract, (c) Methanol extract, (d) Chloroform extract and (e) Formaldehyde extract.**

The results of in-vitro antimicrobial activity of the Chloroform, Methanol ,ester, formaldehyde and Petroleum ether extracts of leaves of *Ocimum gratissimum* using disc- diffusion method against *Alcaligenes faecalis*. Petroleum ether and chloroform extract of this species showed maximum ZOI of 18.0 mm whereas the minimum was recorded in 13 mm with formaldehyde extract.

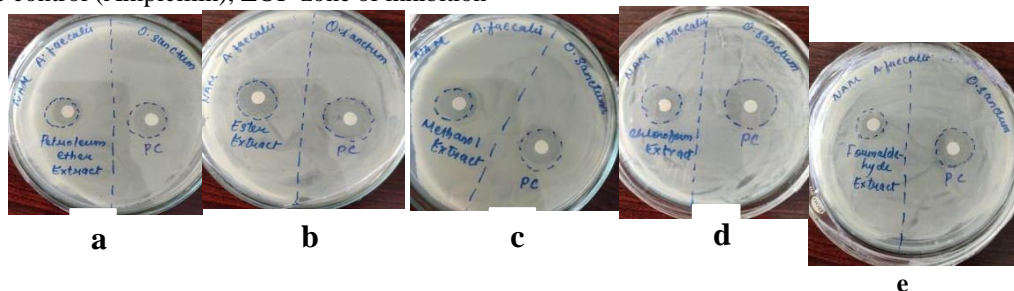
**2.6 Ocimum sanctum**

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, Formaldehyde and Petroleum ether extracts of *Ocimum sanctum* using disc-diffusion method against *Alcaligenes faecalis*.

**Table2.6 :- Antibacterial activity at different extracts of *Ocimum sanctum* concentration of against *Alcaligenes faecalis*.**

| Petroleum ether extract |          | Ester extract |          | Methanol extract |          | Chloroform extract |          | Formaldehyde extract |          |
|-------------------------|----------|---------------|----------|------------------|----------|--------------------|----------|----------------------|----------|
| Conc. (mg)              | ZOI (mm) | Conc. (mg)    | ZOI (mm) | Conc. (mg)       | ZOI (mm) | Conc. (mg)         | ZOI (mm) | Conc. (mg)           | ZOI (mm) |
| PC                      | 20 mm    | PC            | 20 mm    | PC               | 20 mm    | PC                 | 20 mm    | PC                   | 20 mm    |
| 100                     | 16mm     | 100           | 18.2mm   | 100              | 17mm     | 110                | 17.5mm   | 100                  | 12.5 mm  |

PC- Positive control (Ampicillin), ZOI- zone of inhibition



**Fig 2.6 :- Antibacterial activity of different extracts of *Ocimum sanctum* against *Alcaligenes faecalis*(a) Petroleum ether extract, (b) Ester extract, (c) Methanol extract, (d) Chloroform extract and (e) Formaldehyde extract.**

The results of in-vitro antimicrobial activity of the Chloroform, Methanol, ester, formaldehyde and Petroleum ether extracts of leaves of *Ocimum sanctum* using disc-diffusion method against *Alcaligenes faecalis*. Ester extract of this species showed maximum ZOI of 18.2 mm whereas the minimum was recorded in 12.5 mm with formaldehyde extract.

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