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Evaluation of Antibacterial Activity of Volatile Oil and Crude Alkaloids Extracted from *Murraya koenigii* (Rutaceae)

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pharmaceuticals MDPI

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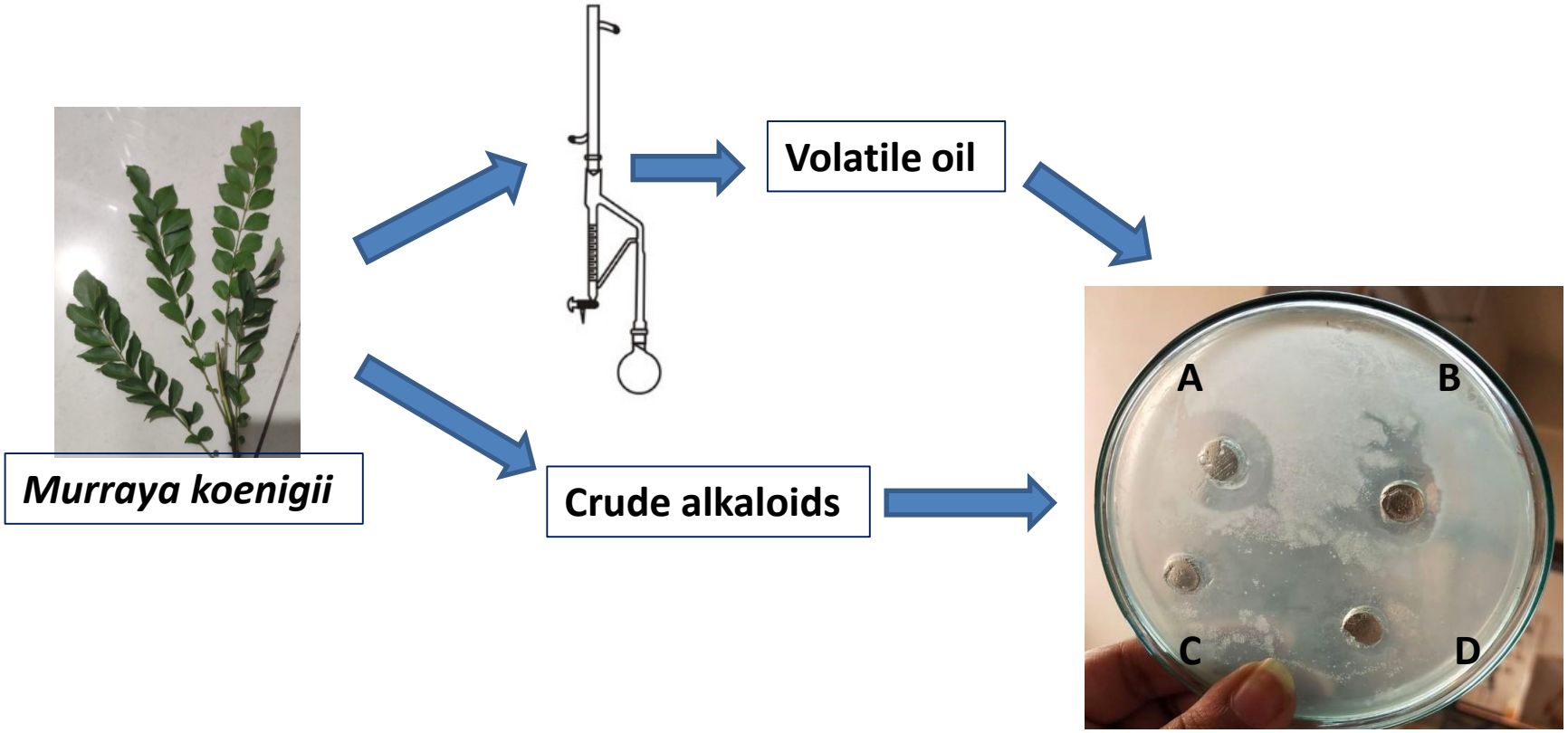
"Evaluation of Antibacterial Activity of Volatile Oil and Crude Alkaloids Extracted from *Murraya koenigii* (Rutaceae)"

Graphical Abstract:



Abstract:
Over the past few decades, many commonly used antibiotics have become less effective against certain illnesses because many of them produce toxic reactions and drug-resistant. It is essential to investigate new drugs with less resistance and less side effects. Drugs derived from natural sources are cheaper, safe and play a significant role in the prevention and treatment of many human diseases. Thus the present study focus on comparative evaluation of antibacterial activity of volatile oil and crude alkaloids extracted from leaves of *Murraya koenigii* (Family: Rutaceae) by agar cup method. Volatile oil and crude alkaloids of *M. koenigii,* both showed dose dependent antibacterial activity against gram positive bacterial strains *Staphylococcus aureus*, *Bacillus subtilis*, and gram negative bacterial strains *Escherichia coli*, *Proteus vulgaris.* Volatile oil (1%v/v) showed comparable antibacterial activity to the standard drug streptomycin (10mcg/ml) against *Staphylococcus aureus* and *Escherichia coli.* Volatile oil (10%v/v) showed significant antibacterial activity to the standard drug streptomycin (10 mcg/ml) against *Proteus vulgaris.* Crude alkaloids (50 mcg/ml) showed comparable antibacterial activity to the standard drug streptomycin (10 mcg/ml) against *Bacillus subtilis.* This study reveals that volatile oil have more antibacterial potential compare to alkaloids of *M. koenigii* leaves. Thus the present study will help to find out active phytoconstituents as well as helps to develop a potent antibacterial herbal formulation using the *M. koenigii*.

Keywords: *Murraya koenigii*, antibacterial activity, alkaloids, volatile oil, Rutaceae

Introduction:

Murraya koenigii (Rutaceae) is a highly valued plant for its characteristic aroma and medicinal properties. It is widely used in Indian cookery for centuries and has a versatile role to play in traditional medicine. Leaves and roots are also used traditionally as anthelmintic, analgesic, curing piles, inflammation, itching and are useful in leucoderma and blood disorders[1,2]. Leaves contain proteins, carbohydrates, fiber, minerals, carotene, nicotinic acid, vitamin C, high amount of oxalic acid, crystalline glycosides, carbazole alkaloids, resin carbazole alkaloids[3]. Fresh leaves contain yellow colored volatile oil conversely also rich in vitamin A and calcium[3].

Medicinal plants contain numerous biologically active compounds which are helpful in improving the life and treatment of disease. The pharmacological activity of a plant depends on its phytoconstituents either as a single molecule or combinations. Thus the present study focus on evaluation of antibacterial activity of volatile oil and crude alkaloids extracted from leaves of *M. koenigii.*

Materials and Method:

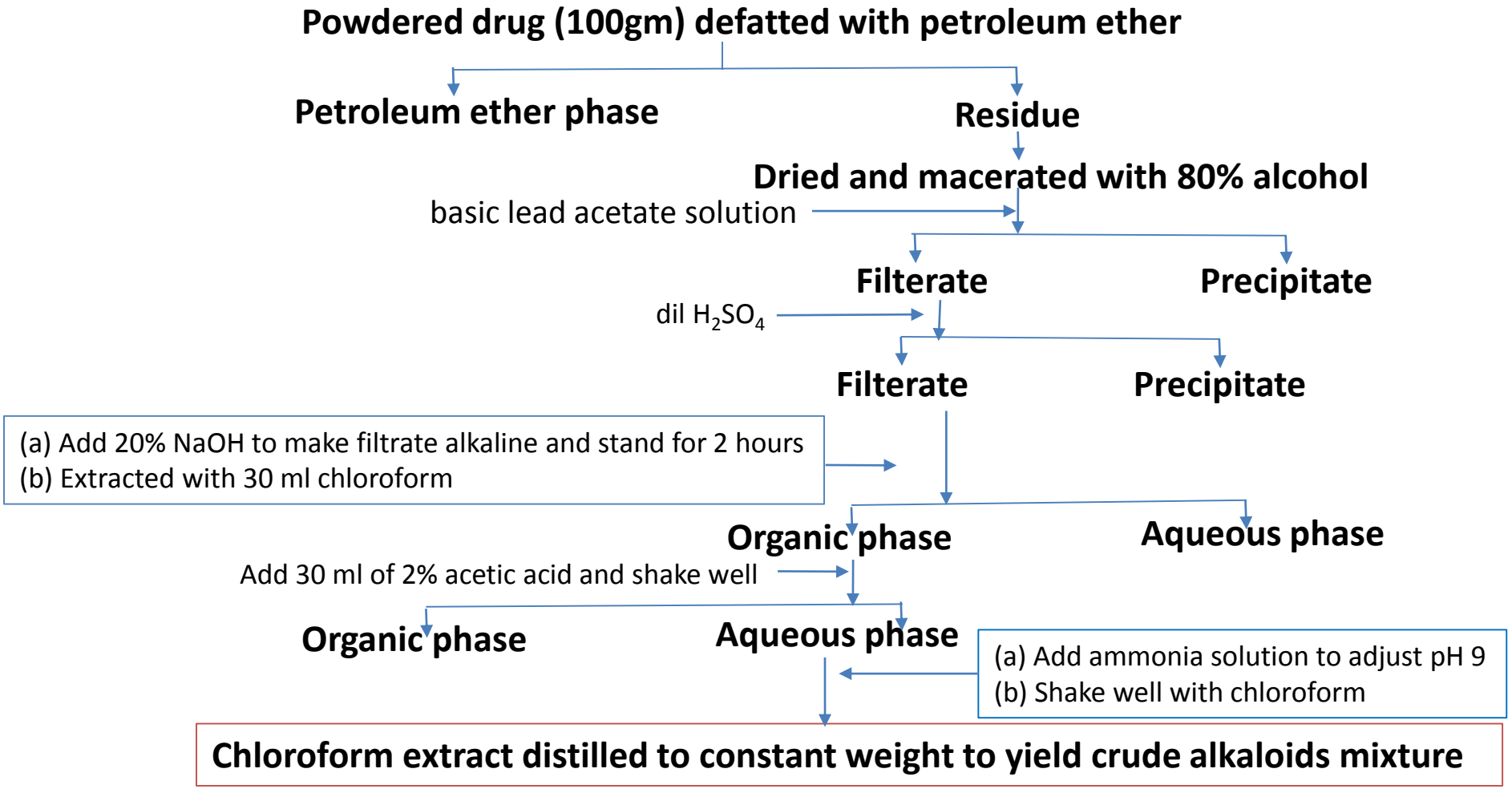
Plant material:

- The leaves of the plant *M. koenigii* were collected from Rajkot district of Gujarat, India.
- Fresh leaves of the plant utilized for extraction of volatile oil.
- The dried powder material of leaves was used for extraction of crude alkaloid.

Extraction of volatile oil:

- Volatile oil extracted from fresh leaves of *M. koenigii* by hydro-distillation method using Clevenger apparatus.

Extraction of crude alkaloids:

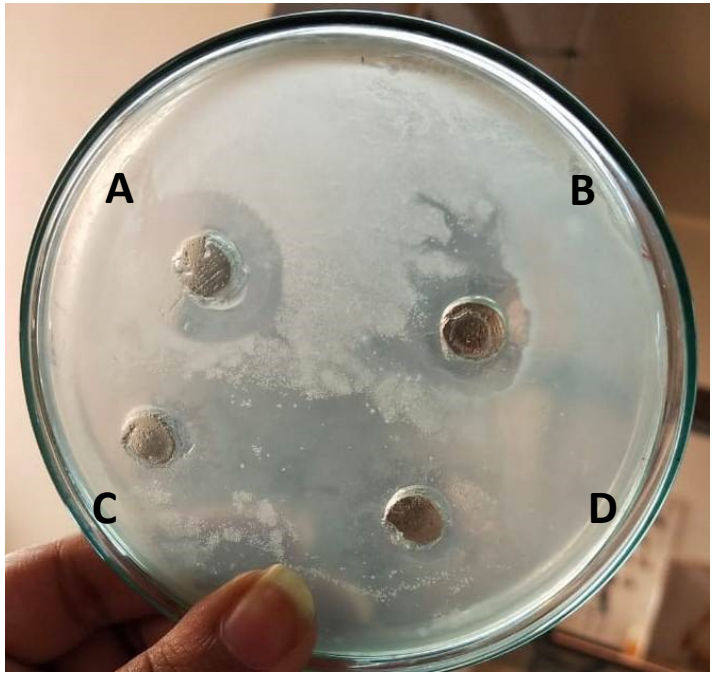


Antibacterial activity:

- **Method:** agar cup method[4]
- **Bacteria used:**
  - gram positive bacteria: *Staphylococcus aureus*, *Bacillus subtilis*
  - gram negative bacteria: *Escherichia coli*, *Proteus vulgaris*
- **Concentrations of volatile oil:** 1% v/v, 5%v/v and 10%v/v in ethyl acetate.
- **Concentrations of crude alkaloids:** 50 mcg/ml, 100mcg/ml, 150 mcg/ml in ethyl acetate
- **Standard:** Streptomycin (10 mcg/ml)

Result and Discussion:

Antibacterial activity of volatile oil of *M. koenigi* leaves against bacterial strain *Staphylococcus aureus*



A Streptomycin (10mcg/ml)

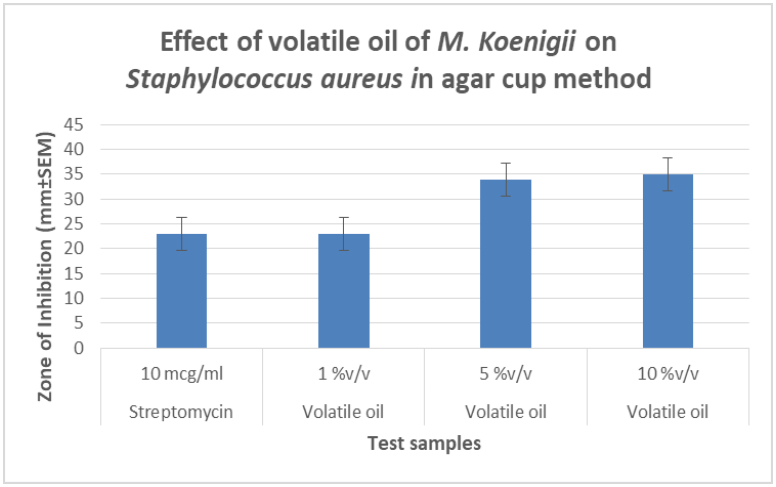
B Volatile oil (1%v/v)

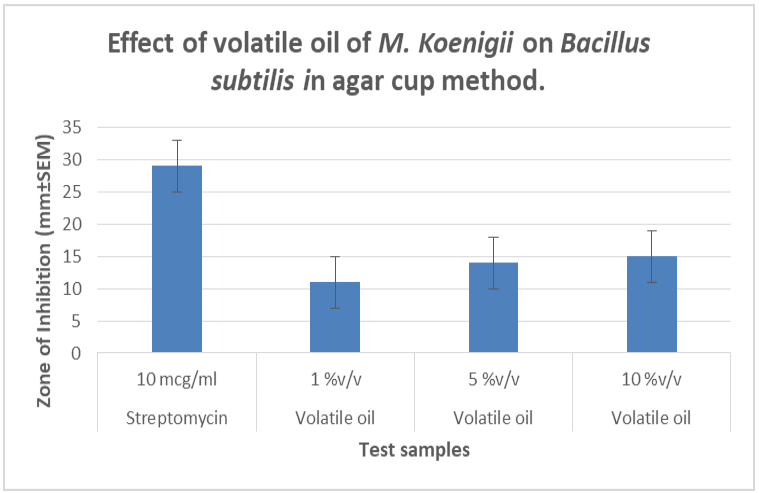
C Volatile oil (5%v/v)

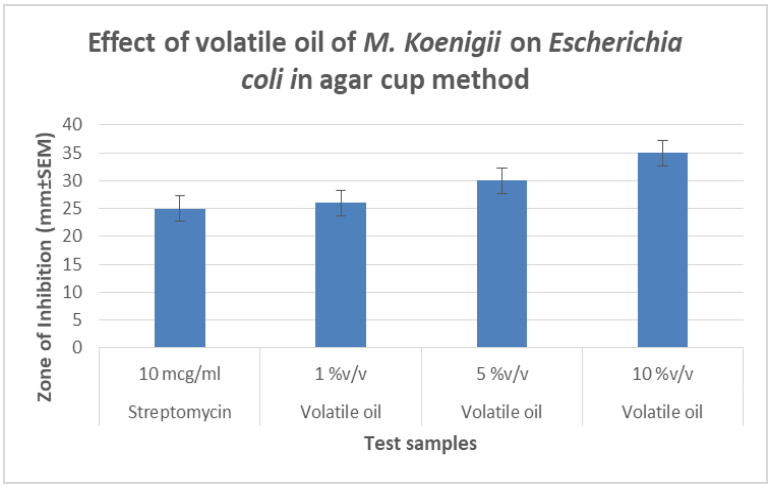
D Volatile oil (10%v/v)

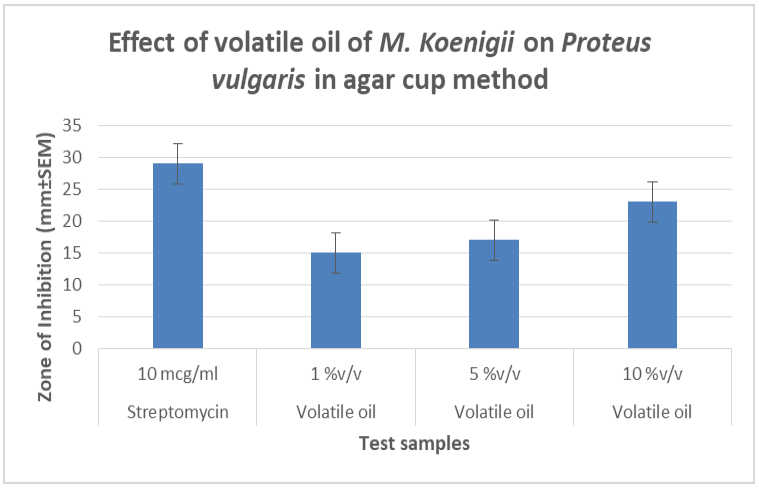
Result and Discussion:

Effect of volatile oil of *M. koenigii* in agar cup method









Values are expressed as Mean ±SEM, n = 3

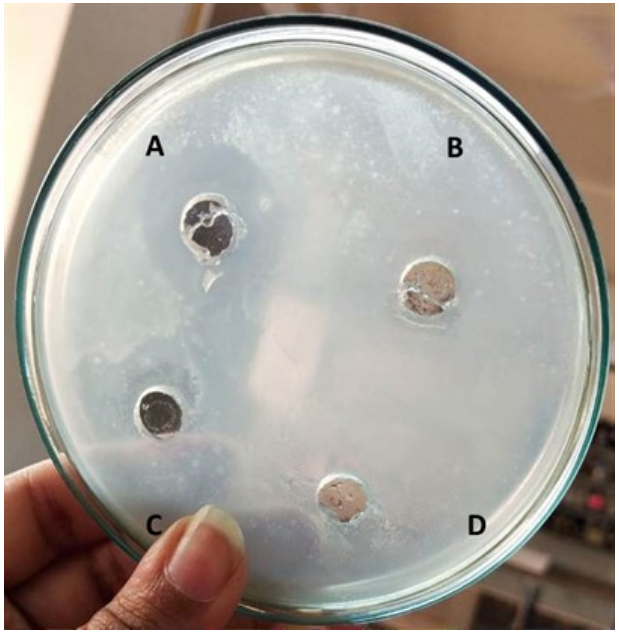
Result and Discussion:

- Volatile oil of *M. koenigii* showed dose dependent antibacterial activity against all the selected bacteria strains.

- Volatile oil (1%v/v) showed comparable antibacterial activity to the standard drug (10mcg/ml) against *Staphylococcus aureus* and *Escherichia coli.*

Result and Discussion:

Antibacterial activity of crude alkaloids of *M. koenigi* leaves against bacterial strain *Bacillus subtilis*



A Streptomycin (10mcg/ml)

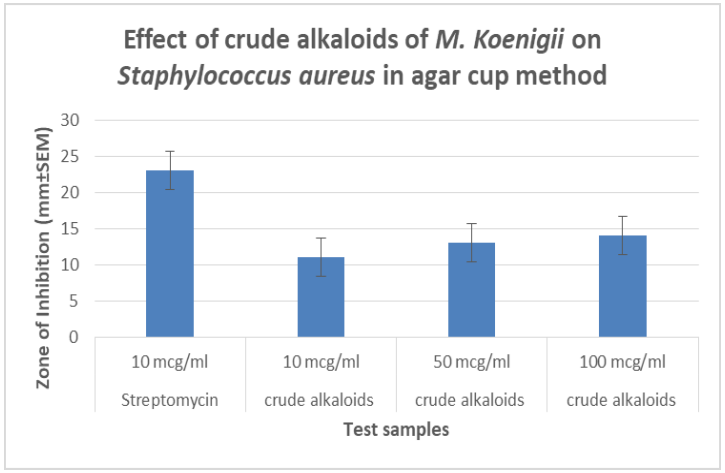
B Crude alkaloids (50mcg/ml)

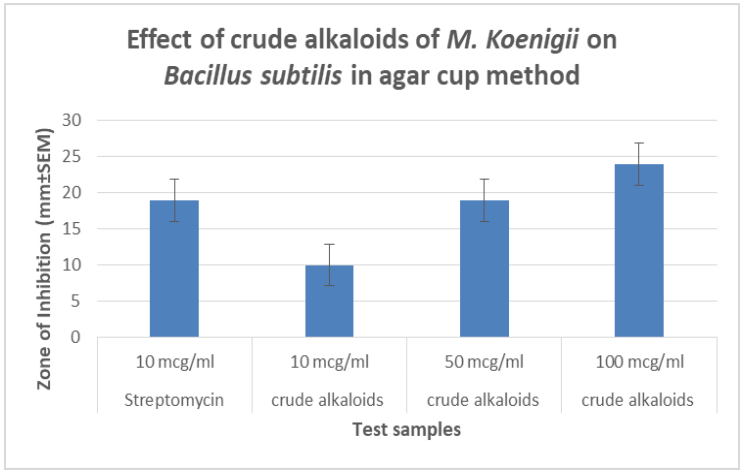
C Crude alkaloids (10mcg/ml)

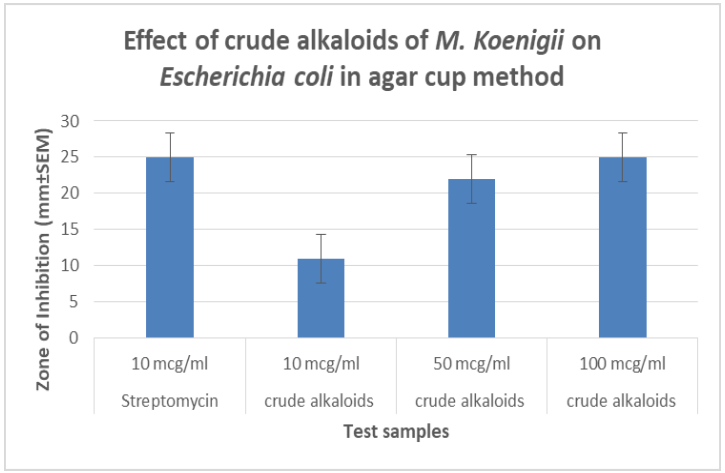
D Crude alkaloids (100mcg/ml)

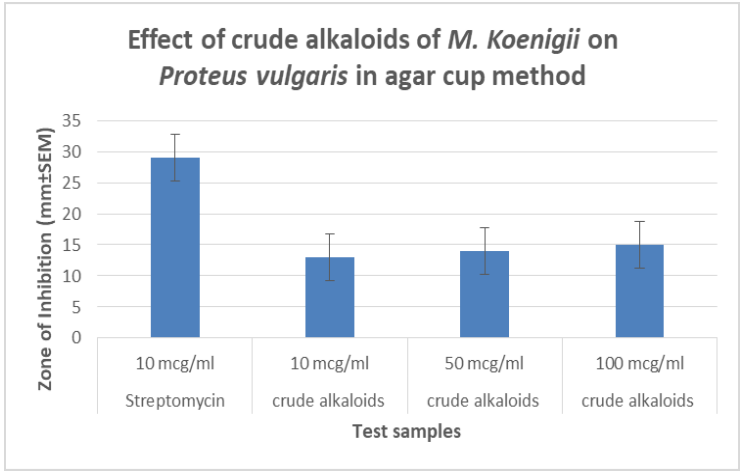
Result and Discussion:

Effect of crude alkaloids of *M. koenigii* in agar cup method









Values are expressed as Mean ±SEM, n = 3

Result and Discussion:

- Crude alkaloids of *M. koenigii* showed dose dependent antibacterial activity against all the selected bacteria strains.
- Crude alkaloids (50 mcg/ml) showed comparable antibacterial activity to the standard drugs (10 mcg/ml) against *Bacillus subtilis.*
- Crude alkaloids (100 mcg/ml) showed comparable antibacterial activity to the standard drugs (10 mcg/ml) against *Escherichia coli.*
- Crude alkaloids showed more activity against *B. subtilis* compare to volatile oil.

Conclusions:

- Volatile oil and alkaloids of leaves of *M. koenigi* showed considerable antibacterial activity on gram positive and gram negative bacterial strains.

- Volatile oil is more effective compare to alkaloids of the *M. koenigi* leaves.

- The further study is under progress to find out minimum inhibitory concentration (MIC) of the volatile oil and alkaloids obtained from *M. koenigii* against different bacterial strains.

- This study will help to find out active phytoconstituents as well as to develop a potent antibacterial herbal formulation.

References:

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Thank You