

Studies on effects of different solvent extracted samples of *O. sanctum* (Basil) stem on the growth of *S. typhi*

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ABSTRACT

Typhoid is a problematic fever, caused by *Salmonella typhi*. Present investigation is based upon studies of antibacterial effects of different solvent extracted samples of *O. sanctum* stem on growth of *S. typhi*. The crude extracts of stem of *O. sanctum* were prepared from three different solvents such as methanol, ethyl acetate and hot water. Four different concentrations (25%, 50%, 75% and 100%) were prepared from each one of the solvent extracted sample. Agar well diffusion method was used to test the antibacterial activity of different solvent extracted samples of *O. sanctum* stem. Analysis of data indicates that a metabolic extract of *O. sanctum* stem shows maximum zone of inhibition and it was of 26mm at 100% concentration and minimum zone of inhibition was of 19mm at 50% concentration. Ethyl acetate extract of *O. sanctum* stem shows maximum zone of inhibition and it was of 29mm at 100% concentration and minimum was of 14mm at 25% concentration. Hot water extract of *O. sanctum* stem shows maximum zone of inhibition and it was of 28mm at 100% concentration and minimum zone of inhibition was of 12mm at 25% concentration. This study indicates that ethyl acetate extract of *O. sanctum* stem is more effective against *S. typhi* as compared to methanol and hot water extracted solvent. Contrary to the antibiotics or synthetic medicine associated with many side effects, this plant part can be used as a herbal medicines against *Salmonella typhi* infection.

Figures : 02

References : 10

Table : 00

KEY WORDS : *O. sanctum*, *S. typhi*, Solvent, Zone of inhibition.

Introduction

Plants are the richest source for the development of conventional as well as modern medicines since thousands of years and a large number of drugs are synthesized from medicinal plants³. Medicinal plants are plants which constitute bioactive substances or phytochemicals which are the precursors for the synthesis of useful drugs and treatment of different ailments. The use of plant and plant products or parts as medicine is as old as the beginning of human civilization. Among the 7000, species of medicinal plants recognized all over the world only few of them are used for their medicinal value⁴. The reported data available on medicinal plants are comparatively less and the study of vast majority of plants is still unknown. Therefore there is need to still in search of medicinal plants and plant products. Today drug safety remains a global issue to treat infectious disease. This herbal preparation is lower incidence of adverse drug reaction as compared to modern medicine. The reduced cost of herbal medicine encourage both public and health care institutions to consider plant medicines as alternative to synthetic drug⁵. Thus the aim of our experiment is to study the effect of different solvent extracted samples of *O. sanctum* stem on the growth of *S. typhi*. *S. typhi*, a rod

shaped flagellated gram negative bacteria that causes systemic infection and typhoid fever in human. Typhoid fever is a worldwide public health problem in developing countries to lack of hygiene and polluted drinking water^{6,7}. According to World health organization reports, approximately 21 million cases are reported per year and out of them 222000 people die from this disease.¹⁰ It causes many death in developing countries and spread through contaminated water and food. The plant that is used in our experiment is *O. sanctum* stem. *O. sanctum* belongs to the family Lamiaceae and its vernacular name is Tulsi in Hindi and holy Basil in English. The medicinal use of tulsi is known from thousands of years and also this plant play an important role in maintaining human health⁸. It is found that the different extracts of tulsi and essential oil possess antibacterial activity⁹. The different extracts of *O. sanctum* show antimicrobial properties against gram positive and gram negative bacteria. *O. sanctum* is used for the treatment of infectious diseases caused by bacteria, virus, fungi and insect without showing any side effect². That's why these properties made this plant unique from other medicinal plants. Thus the present study involved to explore the antibacterial activity of medicinal plant *O. sanctum* stem

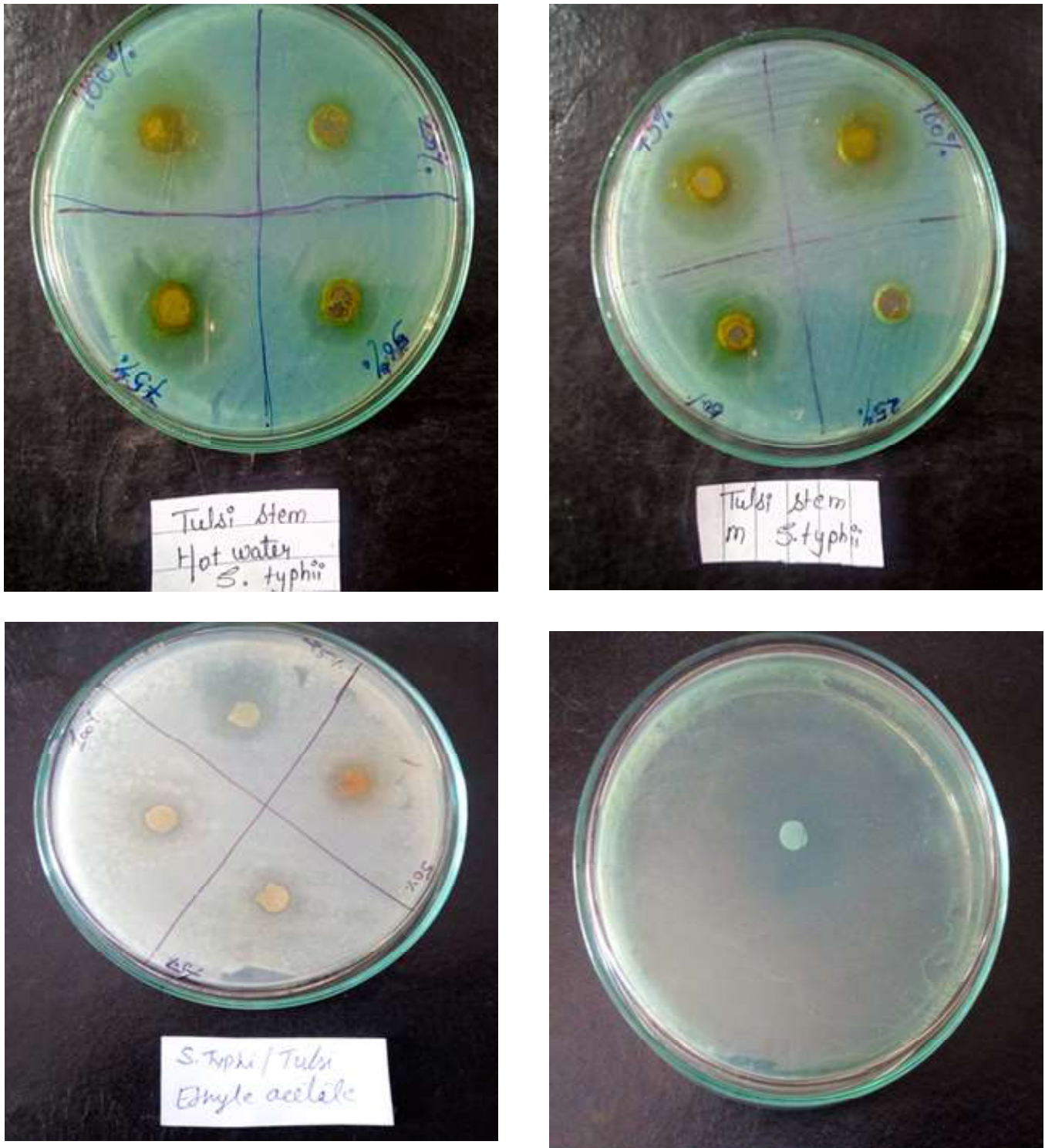


Fig. 1 : Diameter of ZOI of standard antibiotic ciprofloxacin against *S.typhi*

against *S.typhi*.

Materials and Method

Collection of plant material: The medicinal plant used for the experiment was Fresh stem of *O.sanctum*. The plant part was collected from the B.N. College campus, Ashok Raj path, Patna University, Patna. The plant parts were identified according to various literatures.

Microorganism used: The bacterial culture used in present study included *S. typhi* and were received from ATCC. (ATCC No 6539)

Culture maintenance: The bacterial strain was maintained in nutrient agar media at 37°C for 24 hours. The stock culture slants were maintained at 4°C.

Plant extract preparation:, Three different

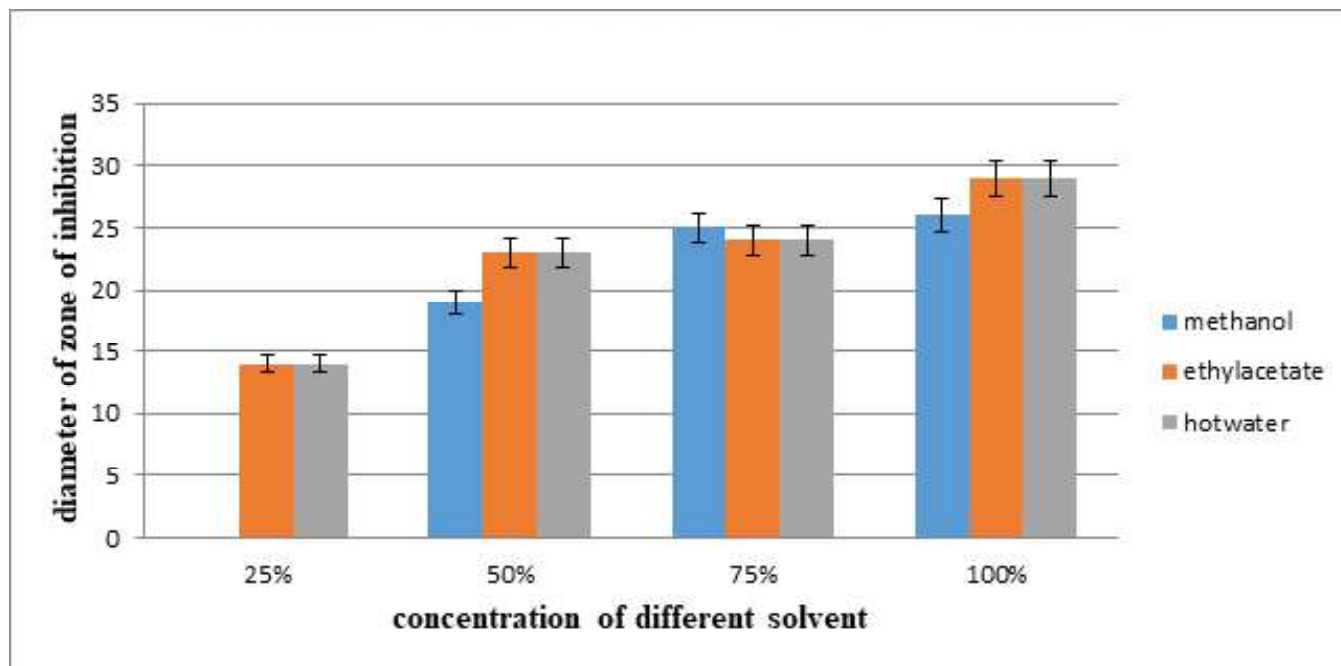


Fig. 2 : Effect of different solvent extracted sample on a growth of *S. typhi*

solvents viz., methanol, ethyl acetate and hot water were used for the preparation of crude extract of *O. sanctum* stem.

Different size of previously cut stem part of *O. sanctum* was loaded in the thimble of Soxhlet apparatus. It was fitted with appropriate size round bottle flask with 250 ml of each solvent and upper part was fitted with condenser. Constant heat was provided by Mantox heater for recycling of the solvent. After complete extraction, the extract in round bottle flask was transferred into clean and preweighed universal tubes. Universal tubes containing extract were weighted and noted down and finally, the percentage yield was calculated. Percentage yield was as dividing initial weight of raw material taken by final weight of extract.

Kirby Bauer disc diffusion technique was used to test the antimicrobials effect of different solvent extracted sample *O. sanctum* stem. Disc were impregnated with different solvent extracts at different concentration ranging from 25- 100%. Nutrient agar was prepared and autoclaved at 15 lbs pressure for 20 minutes and cooled at 45°C. The cooled media was poured on to sterile petriplate and allowed for solidification. The plate with media was seeded with *S. typhi* suspension using sterile swabber. Discs were placed on the four corner of each petriplate. Standard antibiotics ciprofloxacin were placed on the other petridish. Petri dishes were incubated at 37°C for 24 hours. After incubation diameter of zone of inhibition around the petridish were measured and expressed in mm.

Result and Discussion

Analysis of data indicates that a methanolic extract

of *O. sanctum* stem shows maximum zone of inhibition. It was of 26 mm at 100 % concentration and minimum zone inhibition was of 14 mm at 25% concentration. Ethyl acetate extract of *O. sanctum* stem shows maximum zone of inhibition. It was of 29 mm at 100% concentration and minimum zone of inhibition was of 14 mm at 25% concentration. Hot water extract of *O. sanctum* stem shows maximum zone of inhibition. It was of 29 mm at 100% concentration. Minimum zone of inhibition was of 14 mm at 25% concentration. The standard antibiotics ciprofloxacin was used against *S. typhi* growth. This antibiotics shows zone of inhibition diameter 29mm.

This study indicates that ethyl acetate and hot water extracted sample of *O. sanctum* stem is more effective against *S. typhi* infection as compared to methanolic extracted solvent of *O. sanctum* stem. Contrary to the antibiotics or antibacterial medicine associated with many side effects, this plant part can be used as a herbal medicine against *S. typhi* infections. In conclusion, the effect of different solvent extracted samples of *O. sanctum* stem on the growth of *S. typhi* warrants the exploration of an alternative natural antimicrobials agent. Medicinal plants have become the focus of intense study in terms of validation of their traditional uses and the determination of their authentic pharmacological effects. Therefore there is need to search for new infections fighting strategies to control these microbial infection.

The present study suggests using this plant part to stop the growth of *S. typhi* infection. Thus there is a scope for using ethyl acetate and hot water extract of *O. sanctum* stem against *S. typhi* infection.

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