

## Antimicrobial Properties of *Rosa Indica* (A New Start with Nature)

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<http://dx.doi.org/10.13005/bbra/2755>

(Received: 30 April 2019; accepted: 25 May 2019)

Plants have been played an important role as a resource of natural medicines for human health, from the long period of time. Some plants show antimicrobial properties. The most important merit of using plant derived medicines is that they are low priced, readily available and showing minor side effect. The present study deals with the antibacterial potential of crude extracts of petals of *Rosa indica*. Through agar disk diffusion method the antimicrobial potential of *Rosa indica* was examined. Petals were collected, dried and its crude extract was obtained. Methanol and acetone were used as the extraction solvent. These extract were examined against two gram-positive (*Staphylococcus aureus*, *Bacillus cereus*) and two gram-negative (*E-coli*, *Salmonella typhi*) bacteria. Extracts prepared by all solvents showed antimicrobial action and established zone(s) of inhibition. By performing phytochemical tests we have observed positive results for flavanoid, tannin and alkaloid. These phytochemical have capability to inhibit the growth of microorganism or can fight against microorganism. Rich source of compounds have been obtained in this particular plant. For inhibition of multiple drug resistant microorganisms, this extract can be tested. For making herbal drugs, extract of *Rosa indica* may prove to be useful as an advance step in future.

**Keyword:** Rosa indica, antimicrobial potential, crude extract, zone of inhibition, phytochemical test.

In developing countries to cover basic health needs Plant materials is widely used for the treatment of diseases. Diseases in human can be caused by many types of Pathogens<sup>1</sup>. Bacterial contamination especially members of Gram-negative bacteria like *Escherichia coli*, *Salmonella typhi* and *Pseudomonas aeruginosa* are associated with food poisoning reports<sup>2</sup>. Also other causal agents of food borne disease are Gram-positive bacteria including *Bacillus cereus* and *Staphylococcus aureus*<sup>3</sup>. *B. cereus* is can cause serious and potentially fatal non-gastrointestinal-tract infection<sup>4</sup>. *S.aureus* can cause a range of illnesses, from minor skin

infections, such as carbuncle, pimple folliculitis, abscesses, and etigogo skin syndrome to life-threatening diseases such as sepsis, bacteremia, toxic shock syndrome, pneumonia, meningitis, endocarditis and osteomyelitis. It is still one of the five most common causes of hospital-acquired infections and is often the cause of wound infections following surgery. This diseases may be treated with antibiotics, but there is concern that widespread use of antibiotic might lead to antibiotic resistance<sup>5</sup>. Because of the appearance of bacterial resistance to antimicrobial agents more effort is being made to find alternative antimicrobial components, so rather than synthetic

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products natural products are more preferred<sup>6</sup>. Antimicrobial substances are those which kill or inhibit the growth of microorganism such as protozoa, fungi, bacteria. All species of life including bacteria can produce antimicrobial substance which contains antimicrobial protein; they enhance the immunity by stimulating adaptive immune system<sup>7</sup>

Antimicrobial activity is shown by a variety of plant materials and phytochemicals<sup>8</sup>.<sup>9</sup> Plants produce phytochemicals which help microorganisms generally to thrive or thwart competitors, predators, or pathogens. The name phytochemical has been arrived from the Greek word phyton, meaning plant. In traditional medicines phytochemicals has been used. For maintaining human health plants are playing a major role. Plants containing antimicrobial compounds have been found to possess antimicrobial activity. To develop drugs India has rich traditionally using medicinal plants. According to world health organization [WHO] any plant having substances that can be used for therapeutic healing of chemo pharmaceutical semisynthetic new drug is reoffered as medicinal plant<sup>10</sup>. Plants provide us natural products as a new agents for antimicrobial use. Secondary Metabolites are special feature of higher plants having capacity to produce a large number of organic chemicals of high structural diversity. Because of fewer side effects; we use herbal antimicrobial agents.

The Present investigation deals with the study of antimicrobial activity of *Rosa indica*, having genus *Rosa* within the family *Rosaceae* has perennial flower shrub or vine, that contains over 100 species and comes in a variety of colors. From a long period of time roses have been one of the world's most popular ornamental plants. The size, shape and color of the flower varies<sup>11</sup>. *Rosaceae* contains an extensive range of phytochemicals<sup>12, 13</sup>

In the Indian system of medicine, As a vehicle for other medicines various rose preparations are used as an mild laxative, astringent, tonic, antibacterial agents, enlarged tonsils, treatment of sore throat and gall stones, for cooling effect<sup>14</sup>. For digestive tract disorders, impact of rose oil has been found positive<sup>15</sup>. In a previous study, levoglucosan (5.69%), pyrogallol (21.92%), 5-hydroxymethylfurfural (11.52%), quinic acid (43.12%) and 4H-pyran-4-one, 2,3-

dihydro-3,5-dihydroxy-6-methyl (8.31%) were the major identified components in methanolic extract of *rosa indica* petals<sup>16</sup>. Intention of this study was to evaluate the antimicrobial activities and phytochemical screening of *rosa indica* against *staphylococcus aureus*, *bacillus cereus* and *salmonella typhi*.

## MATERIALS AND METHOD

### Microorganism

There are three microorganisms were used to assess the antibacterial properties two of three organisms are gram-positive *bacillus cereus*, *staphylococcus aureus* and one is gram-negative *Salmonella typhi*.

### Plant materials

#### Petals of *Rosa indica*

#### Solvent system for Extraction

In this study two solvent systems were used for plant extraction these are methanol and acetone.

#### Preparation of plant extracts

To study antimicrobial potential of medicinal plants, it is very necessary to extract chemical components of our interest. The step includes preliminary washing, drying, and crushing of petals in the process for obtaining equivalent sample. Maximum contact should be maintained between the surface of sample and solvent to enhance the kinetics of extraction. During the extraction procedure, all the potentially active components must be maintained.

The plant material i.e. petals of *rosa indica* were brought, then dried it under shade and by using mortar and pestle dried petals were crushed to form powder and stored in an air tight plastic container until used. For testing the potential of medicinal plants sample were prepared in methanol and acetone solvents. Extracts were prepared by dissolving 20gm of fine powder in 100ml methanol and acetone. The contents were incubated for 48 hours. Using soxhlet extraction method respective extracts were obtained. Then concentrated to dryness, residues obtained were preserved at 4°C. For further in-vitro studies of antimicrobial activity these extract were used<sup>17</sup>.

#### Antibacterial activity

For primary selection of the therapeutic agent disk diffusion method is used. The test

microorganisms were inoculated and media was poured in to plate. 1 gm of crude extract were dissolved in 50 ml of DMSO<sup>18</sup>. Then after saturate disk with plant extract, and it was placed on Petri plate containing Media. For the maximum growth of the microorganism these plates were incubated at 37°C for one to two days. surrounding the disc clear, distinct zone of inhibition was observed. The diameter of zone of inhibition was measured, which was expressed in millimeter (mm) and compared with the standard<sup>19</sup>.

#### Phytochemical Analysis

Extract and powdered specimens were screened for the presence of phytochemicals. And respective phytochemicals were identified.

#### Test for Tannins

About 1ml of extract was dissolved in 3ml of water and were placed on water bath for 5 minutes and then filtered. 1ml ferric chloride mixed to the filtrate. Dark green color and blue- black color if formed that will indicates that the presence of tannins<sup>20</sup>.

#### Test for Flavonoids

To remove the fatty materials i.e. lipid layer, 0.5 gm of extract was mixed with petroleum ether and shaken. The obtained residue was added in 20ml of alcohol and filtered. 3 ml of the filtrate was dissolved with 4 ml of 1 % potassium

hydroxide. A dark yellow color observed which indicates the positive result for flavonoid.

#### Test for Alkaloids

0.5 to 0.6 gm. of various extract was added in 8 ml of 1 % HCL, heated and filtered. 2 ml of the filtrate were mixed separately with both reagent (Mayer and Wagner's). Presence of alkaloid can be detected from its turbidity or precipitate formation.

(Mayer's reagent: - Add 1.36 gm of HgCl<sub>2</sub> in 60 ml water and 5 gm of KI in 10 ml of water mix both and add sufficient water to make 100 ml. this will give cream or -pale yellow precipitate indicating the positive result<sup>21</sup>.

Wagner's reagent: - Mix 2 gm of iodine and 6 gm of KI in 100 ml water. That give brown or reddish brown precipitate indicate the desirable result<sup>22</sup>)

## RESULTS

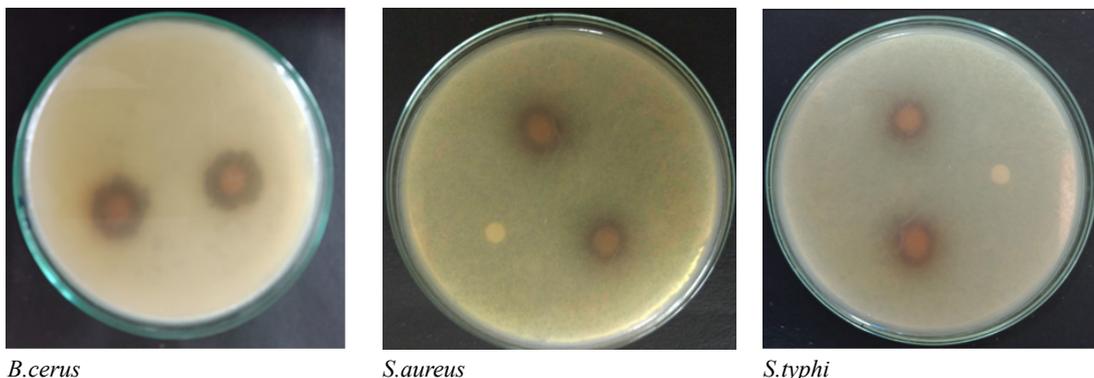
The results showed that the extracts screened against two gram-positive bacteria *Bacillus cereus* and *Staphylococcus aureus*, and gram-negative *Salmonella typhi* showed petals of *Rosa indica* using agar disk diffusion method shows that *Rosa indica* possessed bactericidal properties. Table 1 shows zone of inhibition against pathogens and table 2 shows presence of phytochemicals. While figure 1 shows photographs of antibiogram of *Rosa indica*.

**Table 1.** Zone of inhibition of different extract of *Rosa indica* in millimeter

Extract	<i>B.cerus</i>	<i>S.aureus</i>	<i>S.typhi</i>
Methanol	20mm	15mm	6mm
Acetone	14mm	11mm	3mm

## DISCUSSION

Considering that the globe is facing a growing variety of multidrug-resistant microorganisms, varied studies are conducted so



**Fig. 1.** Zone of inhibition of different extract of *Rosa indica*

as to pick out new compounds, like those from natural resources that area unit of very importance<sup>23</sup>. Natural product (secondary metabolites) from medicative plants might doubtless management microbic growth and area unit a supply of the many potent and powerful medicine. The remedies supported these plants typically have stripped-down facet result<sup>24</sup>.

Antimicrobial activity of *Rosa* was performed against Bacilli caryophylloid dicot genus, staphylococci aureus, and *Salmonella typhi*. The pathogenicity of *B. cereus*, whether or not enteric or nonintestinal, is intimately related to tissue-destructive/reactive exoenzyme production. Among these secreted toxins: four

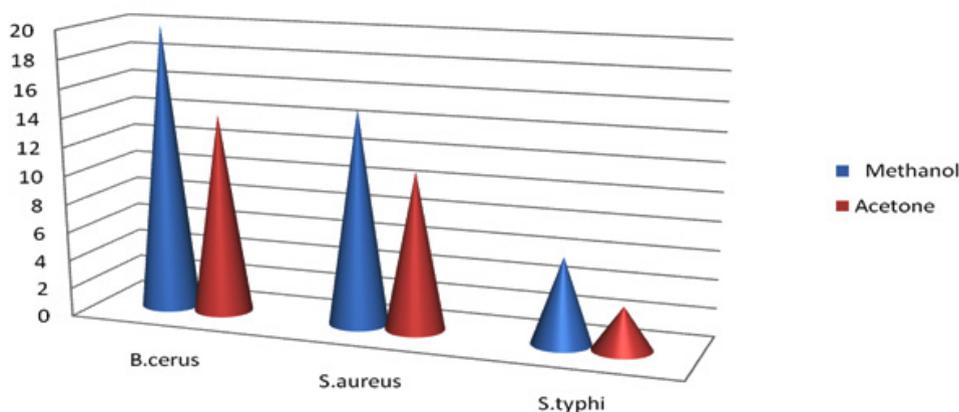
hemolysins<sup>25</sup>, three distinct phospholipases, AN emesis-inducing poisonous substance, and 3 pore-forming enterotoxins: haemolysin BL (HBL), nonhemolytic cytotoxin (NHE), and toxin K<sup>26, 27, 28</sup> diarrheagenic within the duct may be a nonhemolytic three-component cytotoxin, selected NHE<sup>29</sup>. Also *S. aureus* produces many molecules that additionally contribute to the formation of abscesses. Such molecules embrace those who recruit neutrophils, cause host cell lysis, and are concerned within the formation of the protein capsule close the symptom<sup>30</sup>. Whereas, infective salmonellae eaten in food survive passage through the internal organ acid barrier and invade the mucous membrane of the little and huge viscus and turn out toxins<sup>31</sup>.

Plants are full with range of secondary metabolites, such as, terpenoids, tannins, flavonoids and alkaloids which is found to have good antimicrobial potential. Flower extract holds phenolics mixtures like tannins that are actually good antimicrobial compounds<sup>32</sup>. The activity is attributed to their ability to complicated with additional cellular and soluble proteins and with microorganism semipermeable membrane<sup>33</sup>. The restrictive impact conjointly is also attributable to the presence of phenol through manufacturing chemical element bonds with proteins, that converts its structure and blocks supermolecule synthesis<sup>34</sup>.

Literature survey reveals that many studies were printed on anti-fungal, antibacterial drug and anti-oxidant activities of roses<sup>35</sup>. The physiological functions of acne rosacea is also partly as a result

**Table 2.** Phytochemical constituent analysis of methanol and acetone extracts of *R. indica*. Where (+) = Present and (-) = absent; High amount = (+++); Relatively high = (++), Trace amount = (+)

Phyto-constituent	Solvent system	Plant extract
Phenolic compounds	Methanol	+++
	Acetone	++
Alkaloids	Methanol	+++
	Acetone	++
Tannins	Methanol	+++
	Acetone	++
Flavonoids	Methanol	++
	Acetone	+
Xantho proteins	Methanol	-
	Acetone	-
Saponins	Methanol	-
	Acetone	-



**Fig. 2.** Comparison of methanolic and acetonic extract of *R. indica* against bacterial pathogens

of the abundance of flavonoids and synthetic resin compounds, additionally called bioactive agents<sup>36</sup>. synthetic resin compounds retain a good vary of bio-chemical activities, like freeradical scavengers, anti-bacterial, antioxidants<sup>37,38,39</sup>, anti-inflammatory<sup>40</sup>, antimutagenic<sup>41</sup> and anticancer<sup>42</sup>. Like synthetic resin compounds, flavonoids additionally show inhibitor activities, they were ascertained to guard deoxyribonucleic acid against aerophilous damages<sup>43, 44</sup>. Beside that they possess sturdy resistance against ultraviolet radiation having wavelength of 254 nm and probably it's believed that they may be employed in anti-solar creams<sup>45</sup>. in a very shell medicative plants square measure the foremost vital supply for sorts of medication as a result of phytochemicals gift in these plants square measure a lot of precise, atmosphere friendly, simply analyzable. The hydrophobic nature of plant extracts allows them to partition lipids of the microorganism cytomembrane and mitochondria, troubling cell structures and rendering them a lot of semipermeable. intensive run from microorganism cells or the exit of important molecules and ions ends up in death<sup>46</sup>.

The current study exposes the antimicrobial result of methanol and acetone extracts of hibiscus rosa against different microorganisms. The plant exhibits antibacterial potential and produced zone(s) of inhibition. Because of the variety and complexity of the usual mixtures of bioactive mixtures in the crude plant extract, it is somewhat difficult to define every compound present and explain its structure in a solitary study.

Thus phytochemical offer high-class platform for biological purposes and structural variation which are important for drugs finding, their biological possessions support in dropping the risk of various long-lasting disease<sup>47,48</sup> Further investigations is necessary for separation and description of active elements of the extracts and also to explicate the mechanism of their achievement.

#### ACKNOWLEDGEMENT

This work would have not been possible without the support of Dr. Amit Parikh, Principal, MUIS. ,Dr Priti Patel, HOD of Biotechnology and Mr Nehal Rami, HOD of Microbiology. I am

grateful to all of those with whom I have had the pleasure to work during this research project.

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