

# ANTIDIABETIC ACTIVITY *Symplocos racemosa* (LODHRA) AND *Cinnamon cassia* (CINNAMON BARK) FORMULATION SYNTHESISED SILVER NANOPARTICLES

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## Abstract

**Aim:** The aim of this study is to analyze the anti-diabetic effect of silver nanoparticles using *symplocos racemosa* (lodhra) and *cinnamomum cassia* (cinnamon bark) assisted silver nano particle.

**Introduction:** Lodhra is widely used in various Ayurvedic medicines. Cinnamon is one of the most important spices used daily by people all over the world. Nanoparticles have been used in various practical applications. Silver nanoparticles (AgNPs) are increasingly used in various fields. Recently, AgNPs have been frequently used in many Silver nanoparticles (AgNPs) have been successfully applied in several areas due to their significant antimicrobial activity against several microorganisms. In dentistry, AgNP can be applied in disinfection, prophylaxis, and prevention of infections in the oral cavity.

**Materials and methods:** Fresh lodhra bark and cinnamon powder was collected. 1g of freshly collected Lodhra and cinnamon bark extract is mixed with 100 ml of distilled water thoroughly and boiled for 3-5 mins in a heating mantle then filtered by using filter paper. Silver Nitrate powder is added in 500 ml of distilled water and to this lodhra bark extract has been added. The solution is kept in a shaker and the reading was taken for every 2 hrs for analyzing the synthesis of nanoparticles. The reaction was initiated by the addition of 490, 470, and 450 µl buffer to different volumes (10, 30, and 50 µl) of 30mg/mL of Lodhra and cinnamon bark extract, synthesised silver nanoparticles, stored (at 37°C and 4°C), and calcined (300°C, 500°C and 700°C) AgNPs samples, respectively, to make the total volume of 500 µl reaction solution.

**Results:** Antidiabetic activity of lodhra and cinnamon bark extract mediated AgNPs was assessed using alpha amylase assay. In this silver nanoparticles induced Lodhra and cinnamon bark extract shows more antidiabetic activity than the herbal extract

**Conclusion:** From this it is concluded that Lodhra and cinnamon bark shows significant anti diabetic activity. Also this extract can be used in toothpaste & mouthwash to reduce the inflammation in oral cavity. Further studies can be done on the side effects of Lodhra and cinnamon bark using silver nanoparticles and also on the other activities of Lodhra and cinnamon to know its complete potential

**Keywords:** Cinnamon, nanoparticles, Lodhra bark, silver, anti diabetic.

## Introduction

Numerous real-world uses of nanoparticles have been made. Because of their unique physical and synthetic features, silver nanoparticles (AgNPs) are being employed more and more in a variety of industries, including clinical, food, medical care, buyer, and applications(1). They have been used for a variety of purposes because of their peculiar properties, including antibacterial agents, in industrial, household, and healthcare-related products, in consumer products, medical device coatings, optical sensors, and cosmetics, in the pharmaceutical and food industries, in diagnostics, orthopaedics, drug delivery, as anticancer agents, and ultimately to improve the tumour-killing effects of anticancer medications(2). These include high electrical conductivity, optical, electrical, thermal, and biological characteristics. AgNPs have recently been employed often in a variety of fabrics, keyboards, wound dressings, and biomedical equipment(2,3).

A traditional medicine used by Ayurveda interpreters is called lodhra(4). All components of the lodhra plant, including the roots, bark, and leaves, are utilised for a variety of medicinal conditions, but the stem—which comes from a tree in the genus *Symplocos*—is the most beneficial(5). It is extensively utilised in many Ayurvedic medications(6). There are numerous metabolites in *Symplocos* and its various species that have potential medical benefit against a variety of ailments(6,7). Due to its acidic and haemostatic qualities, it promotes blood thickening and aids in controlling uncontrollable menstrual bleeding. The haemostatic quality is helpful in controlling nose bleeding as well(8,9). One of the most essential and well-known spices used in both traditional and modern cultures around the world is the bark of numerous cinnamon species(8).

Cinnamon (*Cinnamomum zeylanicum*, and *Cinnamomum cassia*), the eternal tree of tropical medicine, belongs to the Lauraceae family (10). Cinnamon is one of the most important spices used daily by people all over the world. Cinnamon primarily contains vital oils and other derivatives, such as cinnamaldehyde, cinnamic acid, and cinnamate(11). In addition to being an antioxidant, anti-inflammatory, antidiabetic, antimicrobial, anticancer, lipid-lowering, and cardiovascular-disease-lowering compound, cinnamon has also been reported to have activities against neurological disorders, such as Parkinson's and Alzheimer's diseases(12)

The study has some limitations where the combined potential of lodhra and cinnamon has not been explored. The aim of the study is to explore the antidiabetic potential of lodhra and cinnamon

## Materials and methods:

### PREPARATION OF PLANT EXTRACT -

Collection of Plants and preparation of plant extract:For extraction and isolation purposes, cinnamon and lodhra bark plant extract were collected, shade-dried, and powdered.The powdered dry plant matter and 100 ml of distilled water was used to dilute 1g of lodhra bark and 1.017g of cinnamon powder before they were incubated for 9 minutes at 60–80°C under vacuum. After that, Whatman's filter paper is used to filter it, and plant extract is made.



## GREEN SYNTHESIS OF NANOPARTICLES -

0.574 grams of silver nitrate was added to 500 ml of distilled water and to this lodhra bark extract has been added. The solution is kept in a shaker and the reading was taken for every 2 hrs for analyzing the synthesis of nanoparticles.



## ALPHA AMYLASE ASSAY

The inhibition of  $\alpha$ -amylase was carried out by the method described by Malik and Singh. Different concentration of nanoparticles 490 $\mu$ l, 470 $\mu$ l, and 450 $\mu$ l buffer was added to different volumes of 10 $\mu$ l, 30 $\mu$ l, and 50  $\mu$ l of 30mg/mL of Lodhra and cinnamon bark extract, synthesised silver nanoparticles, stored at 37°C and 4°C, and calcined at various temperatures 300°C, 500°C and 700°C. Ag nanoparticles samples were added respectively and the total volume of 500  $\mu$ l reaction solution were obtained. Then, 500  $\mu$ l of  $\alpha$ -amylase were added, followed by the addition of 1,000  $\mu$ l of starch to the reaction vessels.

The % inhibition of  $\alpha$ -amylase was calculated by using the formula

$$\% \text{ inhibition} = \frac{A_o - A_i}{A_o} \times 100$$

where:  $A_o$  = absorbance of the standard,  $A_i$  = absorbance of the test samples

## Results

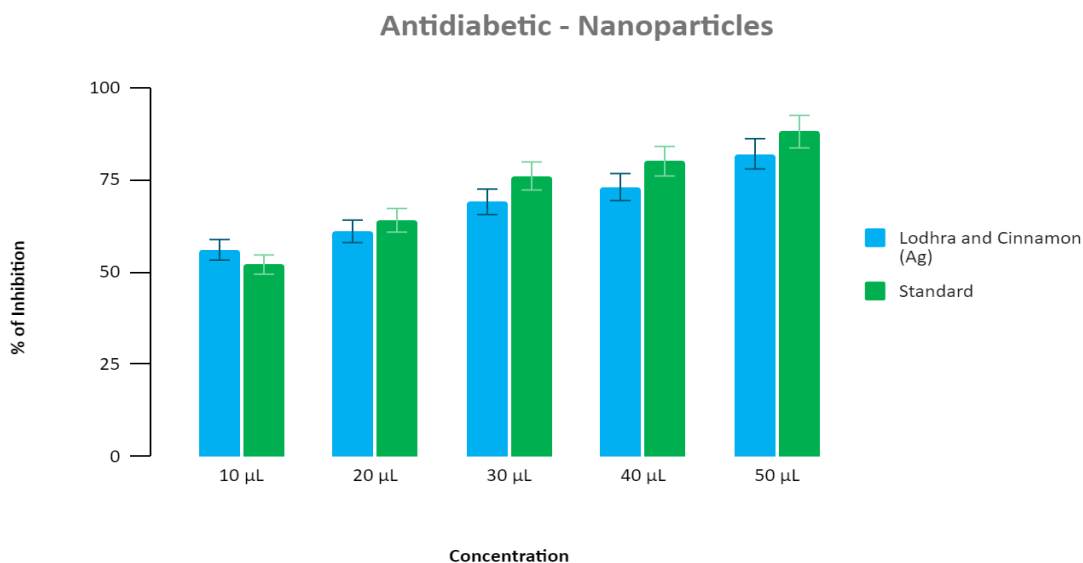
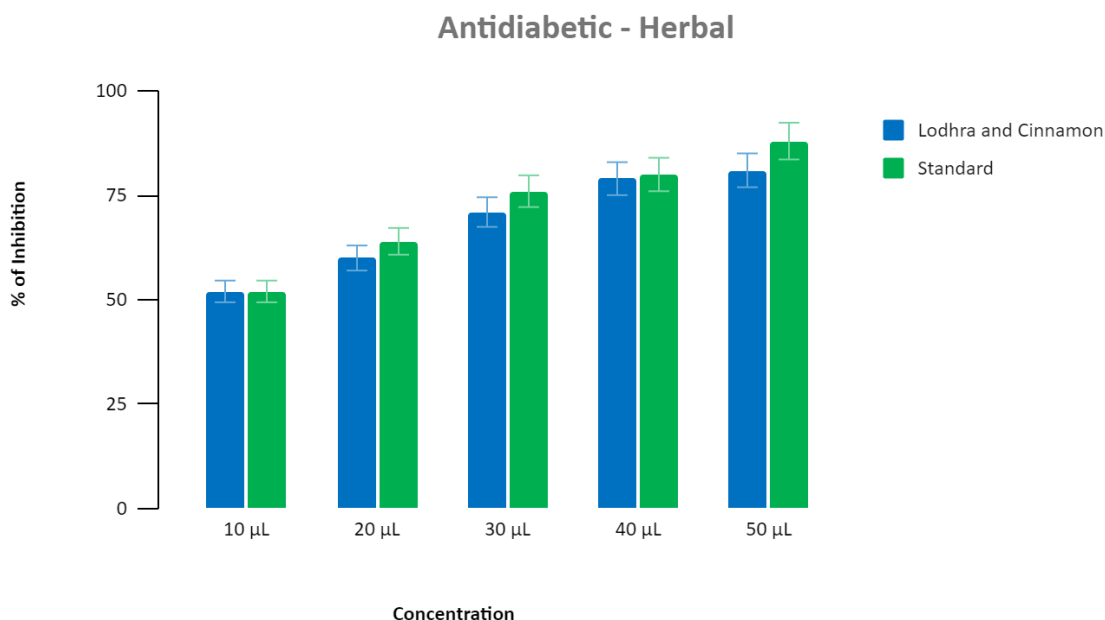


Figure 1: represents the antidiabetic activity of herbal extract with synthesised silver nanoparticles compared with standard. X axis represents the concentration of herbal extract with synthesised silver nanoparticles and standard. Y axis represents the percentage of inhibition of herbal extract with synthesised silver nanoparticles and standard

Figure 2: represents the antidiabetic activity of herbal extract compared with standard. X axis represents the concentration of herbal extract and standard. Y axis represents the percentage of inhibition of herbal extract and standard



The results obtained from the study were plotted in the form of graphs. Antidiabetic activity of lodhra and cinnamon bark extract and lodhra and cinnamon bark with Agnp extract was assessed using alpha amylase assay. In this silver nanoparticles induced Lodha and cinnamon bark extract shows more antidiabetic activity than the herbal extract

## Discussion:

The result from our study shows that anti-diabetic activity of Lodhra and cinnamon bark, assisted by silver nanoparticles. As the concentration increases the activity of the lodhra and cinnamon bark also keeps on increasing.

Many studies have been conducted to check the anti-diabetic activity of silver nanoparticles, it was said that Silver nanoparticles have many advantages in different fields particularly in medical care.

The antibacterial characteristics of silver nanoparticles (AgNPs), which have received substantial study, have a wide range of applications in dentistry. The objective of the study was to review AgNPs' use in nanocomposites, implant coatings, pre-formulations with antimicrobial activity against cariogenic pathogens, periodontal biofilm, fungal pathogens, and endodontic bacteria, as well as other applications like the treatment of oral cancer and local anaesthesia. This was done because of the growing interest in AgNPs. The most significant toxicological features as well as recent developments in the investigation of the mechanism of action are also discussed in this study. Silver nanoparticles have been shown to exhibit anti-inflammatory, antimicrobial and antibacterial properties, they are very quick and minimal expense(2).

In present study the extract of lodhra has potential anti- diabetic activity. In previous studies done by Durkar et,al it was reported that Lodhra has a potential mechanism of action and it shows a experimental support to treat diabetes and obesity. Based on the scientific evidences of previous studies and comprehending the mechanisms of action of Lodhra in terms of modern scientific terminology it has a potential anti - diabetic activity (13). In Previous studies it is reported that it has a significant anti-diabetic, anti-inflammatory and anti fungal effect (14)).

The study done by Ahmed et,al it was reported that the bark of this tree is employed in many Ayurvedic formulations for the therapy of numerous illnesses, particularly gynaecological disorders, and possesses astringent, styptic, cooling, anti-inflammatory, and antimicrobial effects. The bark of this tree has astringent, styptic, cooling, anti-inflammatory & anti- microbial properties & is used in various Ayurvedic formulations meant for the management of many disorders especially in gynaecological disorders(14,15).

The positive finding about our study is that, unlike other articles, we have used a combination of lodhra and cinnamon bark and then analyzed the anti-diabetic properties of the combination. When compared with other studies our study has comparatively better results . The study was done on a small concentration of the sample, furthermore research has to be done in a wider range so that we can check the combination effect of lodhra and cinnamon bark assisted nanoparticle. In future, invivo study should be carried out and commercially available )products should be formulated.

Our team has extensive knowledge and research experience that has translate into high quality publications Our team has extensive knowledge and research experience that has translated into high quality publications(16–30).

## Conclusion:

From this it is concluded that Lodhra and cinnamon bark shows significant anti diabetic activity. Also this extract can be used in toothpaste & mouthwash to prevent bad breath. Further studies can be done on the side effects of Lodha and cinnamon bark using silver nanoparticles and also on the other activities of Lodhra and cinnamon to know it's complete potential

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## Conflict of interest:

None to declare.

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