

## CYTOTOXIC EFFECT OF LODHRA AND CINNAMON BARK FORMULATION AND ITS MEDIATED SILVER NANOPARTICLES.

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### ABSTRACT

**Aim:**The aim of this study is to analyze the cytotoxic effect of silver nanoparticles using Lodhra and cinnamon bark extract.

**Introduction:**Nano biomedicine, an emerging field of medicine and the implication of biosynthesis of nanomaterials to be incorporated with naturally available substances is increasing in popularity.They are used for treating various diseases effectively with minimal to zero side effects. The manufacturing cost of these medications are also considerable.

**Materials and method :**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.100 ml of distilled water is mixed with 1 g of lodhra and cinnamon extract and distilled .The filtrate(20 ml) is mixed with 1 milli mole of silver nitrate mixed in 80 ml of distilled water.There were total of 10 shrimps per dilution.The concentration includes 5  $\mu$ l,10 $\mu$ l,20 $\mu$ l,40 $\mu$ l,80 $\mu$ lAnd control group.The artificial sea water up to 10mL per test tube is control. The test tubes were left uncovered under a lamp. The number of surviving shrimps were counted and recorded after 24hrs. The percentage of motility was calculated by dividing the total number of dead nauplii by the total number and then multiplied by 100%.This is to ensure that the death of nauplii is attributed to the compounds present in nanoparticles.

**Results:** Plant extract mediated by silver nanoparticle at 5 $\mu$ L of concentration exhibited a high cytotoxicity of activity of 65%. This shows that Lodhra and cinnamon extract mediated nano particle has better cytotoxic effect even at 5 $\mu$ L which is more than 50%.

**Conclusion:** From this study it is clear that silver nanoparticles incorporated lodhra and cinnamon showed effective cytotoxic activity even at low concentration.

**Keywords:** Cinnamon, nanoparticles, Lodhra bark, silver, Cytotoxic effect.

## INTRODUCTION

Nano biomedicine, an emerging field of medicine and the implication of biosynthesis of nanomaterials to be incorporated with naturally available substances is increasing in popularity. Of all metal nanoparticles, Silver nanoparticles (1)(AgNPs) are progressively utilized in different fields, including clinical, food, medical care and modern purposes, because of their one of a kind physical and compound properties. This includes their antibacterial, antiviral, cytotoxic properties as well (2,3). The cytotoxic ability of the AGNPs play an imperative role in their anti cancer activity, anti bacterial activity and antiviral activity. AGNPs also have minimal to no side effects (4).

The Lodhra comes under the genus *Symplocos* (5,6). It is broadly utilized in different Ayurvedic prescriptions for its large number of metabolites which likely has high medicinal worth against a wide range of infections. These medicinal properties include antibacterial property, antioxidant property, Anti-ulcer properties, anticancer properties, anti-inflammatory properties, anti-diabetic properties, anti-androgenic activity (7). The above all properties are mainly due to its chemical constituents which include loturine, loturidine, colloturine, flavonoids, tannins, salireposide, symplocoside, symploveroside. (8)

Cinnamon (9–11), a spice from the inward bark of a variety from the family *Cinnamomum*. Cinnamon is utilized principally as aromatics and enhancing added substance in a wide assortment of cooking styles. Cinnamon additionally builds the blood flow in the uterus and advances tissue recovery (12,13). Moreover it has better antibacterial property, anti-inflammatory property and anti-cancer property due to its cytotoxic effect. (14,15).

Though many researches have explored the beneficial properties of Lodhra or cinnamon individually, our study explores the cytotoxic activity of the combination of Lodhra and cinnamon formulation incorporated with silver nanoparticles.

**Keywords:** Cinnamon, nanoparticles, Lodhra bark, silver, Cytotoxic effect.

## 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.

## 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.

100 ml of distilled water is mixed with 1 g of lodhra and cinnamon extract and distilled. The filtrate (20 ml) is mixed with 1 milli mole of silver nitrate mixed in 80 ml of distilled water. There were total of 10 shrimps per dilution. The concentration includes 5  $\mu$ l, 10 $\mu$ l, 20 $\mu$ l, 40 $\mu$ l, 80 $\mu$ l and control group. The artificial sea water up to 10mL per test tube is control. The test tubes were left uncovered under a lamp. The number of surviving shrimps were counted and recorded after 24hrs. The percentage of motility was calculated by dividing the total number of dead nauplii by the total number and then multiplied by 100%. This is to ensure that the death of nauplii is attributed to the compounds present in nanoparticles.

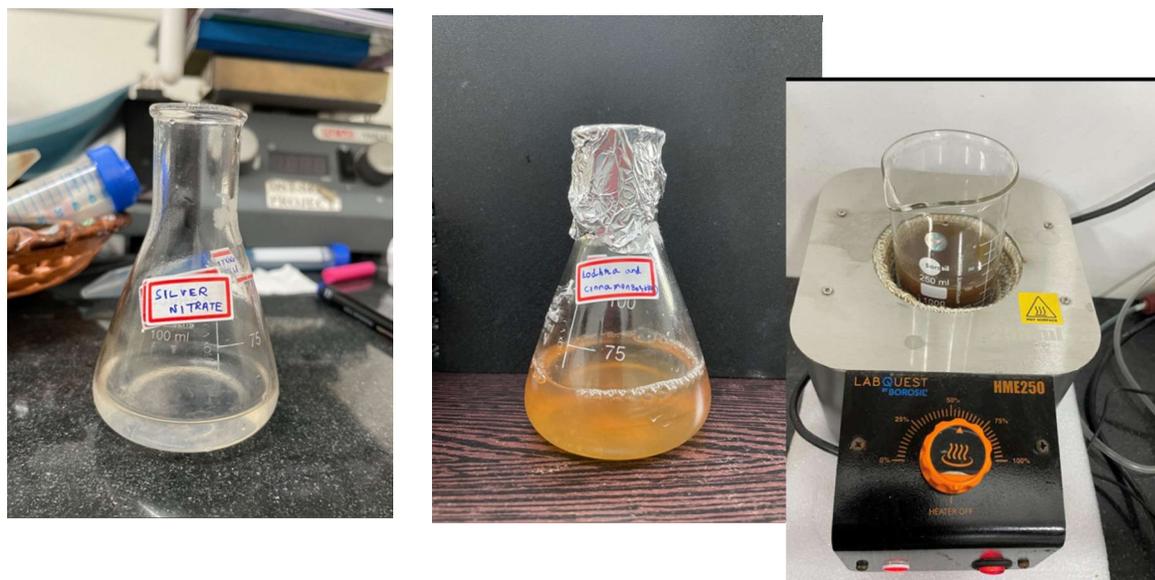
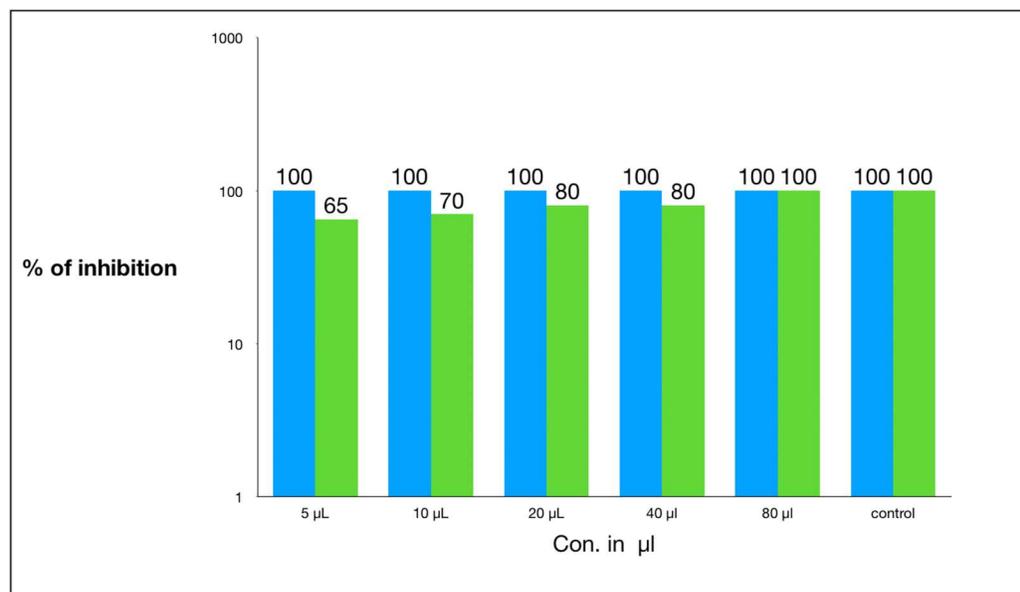


Fig- 1. synthesis of Lodhra and cinnamon bark mediated silver nanoparticles.

## RESULTS :

### Cytotoxic activity



**Fig-2.**Graph showing the cytotoxic activity of Lodhra and cinnamon bark mediated silver nanoparticles. The blue bar represents % of nauplii present at start of the day and green bar represents the % of inhibition after 24 hrs.

In this study the cytotoxic activity of Lodhra and cinnamon bark mediated silver nanoparticles. was assessed in five different concentrations of reaction mixture from 10 $\mu\text{L}$ , 20  $\mu\text{L}$ , 30  $\mu\text{L}$ , 40  $\mu\text{L}$  and 50  $\mu\text{L}$ . Cytotoxic activity of different percentage of inhibition were 65%, 70%, 80%, 80% and 100% respectively. Plant extract mediated by silver nanoparticle at 5 $\mu\text{L}$  of concentration exhibited a high cytotoxicity of activity of 65%. This shows that Lodhra and cinnamon extract mediated nano particle has better cytotoxic effect even at 5 $\mu\text{L}$  which is more than 50%.

## DISCUSSION

Numerous studies have been conducted to analyze the cytotoxic effect of silver nanoparticles and its effects on humans. AgNPs have been widely used as antimicrobial materials in foods, medical products, and coatings for industrial products. Factors like size, surface chemistry, methods of exposure, and exposure times are critical to determining their pathways of tissue distribution. Its importance in cytotoxic activity is crucial. Fatah(16) in his study has explained extensively about the benefits of the cytotoxic activity of silver in the recent medicine field. He also explains about the cytotoxic effects of silver nanoparticles in in vivo and vitro study.

Cinnamon as an individual has high cytotoxic activity. Nystoriak(17) in his study has explained about the cytotoxic effect of cinnamon in aqueous form taken from cinnamon zeylanicum bark.

aqueous cinnamon extract (ACE) proved to be more cytotoxic to cancerous cells at concentrations just above 0.16 mg/mL (containing 1.28  $\mu$ M cinnamaldehyde) around which the commercial cinnamaldehyde (1.6  $\mu$ M) had no cytotoxic effect. At a critical concentration of 1.28 mg/mL (containing 10.24  $\mu$ M cinnamaldehyde), ACE treatment resulted in 35-85% growth inhibition of the majority of the cancerous cells, whereas at a similar concentration (10  $\mu$ M) commercial cinnamaldehyde treatment resulted in 30% growth inhibition .

Lodhra though it has cytotoxic properties, it is less effective than cinnamon which is compensated by its synergistic effect. Shukla(18) in his study has explained the use of lodhra and its cytotoxic effect when incorporated into gold nanoparticles and its use in human cells. He also explained the influence of lodhra in female reproductive life.

From the above aspects we can find that our study has its own uniqueness of combination of Lodhra and cinnamon with silver nanoparticles. When compared with other other studies this is a new aspect where more than one compound is involved and the formulation is analysed for the cytotoxic activity..At the same time, the results were on par with the compared articles.

## CONCLUSION

Developments in nanotechnology and nanomedicine are happening very rapidly. The cytotoxic property of combination of silver nanoparticles, Lodhra and cinnamon can provide various products which offer increasingly simple arrangements and are more cost efficient. Thus this combination will provide a better medication in near future to its competitors with minimal to no side effects.

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## CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest in the present study.

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