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RESEARCH ARTICLE
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Anti Inflammatory Activity of Lemon Grass Mint Herbal Formulation and Its Mediated Zinc Oxide Nanoparticles

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ABSTRACT

Introduction: For thousands of years natural products, especially plants and vegetables, have been used to fight against various diseases such as cancer, microbial infections and even neurodegenerative diseases. It has been shown that consumption of plants and vegetables have a direct influence on the proliferation, angiogenesis and metastasis of cancer cells.

Materials and methods: The anti-inflammatory activity in lemongrass mint herbal formulation was evaluated by Bovine serum albumin denaturation and egg albumin denaturation assays using standardized protocols.

Results: The anti-inflammatory of lemongrass and mint extract in zinc oxide nanoparticles was assessed. It was treated with different concentrations (10-50µl) of lemongrass and mint extract for 24h. Lemon grass and mint ZnO NPs treatment significantly decreased the viability compared to control at 24 h time point.

Conclusion: The present data demonstrate that extracts of lemon grass and mint ZnO NPs may inhibit the proliferation of cancer cells and induce apoptosis and could provide protection from oxidative stress diseases due to their high antioxidant molecules content.

Keywords: *lemon, grass, consumption, time, cancer, proliferation*

INTRODUCTION

In light of recent developments in the scientific and technological world, even today herbs are widely used as remedial agents. India is one of the countries in this artificial world which is rich in large varieties of medicinal plants.(1)

WHO currently encourages and promotes herbal remedies in National health care programs because such drugs are easily available at low cost and safe. Also the people have good faith in such remedies. Use of herbal feed additives is gaining importance due to use of certain

antibiotics, harmful residual effects and cost effectiveness.(2,3) Herbal feed additives play a significant role in health and nutrition. Herbal feed additives include herbs, spices and botanicals. Plants have evolved a wide range of low molecular weight secondary metabolites.(2) Generally these compounds enable the plants to interact with the environment and may act in a defense system against physiological and environmental stress as well as predators or pathogens.

Nanotechnology is one of the advancing fields in biotechnology with a vast array of applications. The introduction of Nanoparticles (NPs) has revolutionized every field including medicine, nutrition and energy.(4) The use of nanotechnology in medicine in particular, specifically drug delivery is shown to have various benefits. Nanoparticles are being used to reduce toxicity and side effects that drugs may impose on the patient. The plant mediated biological synthesis of nanoparticles has been gaining importance due to its simplicity as well as eco friendliness.(4,5)

Lemongrass is an aromatic plant with antioxidant and antimicrobial properties, used for the preparation of medicinal tea and for essential oil production. (6,7)Previous studies have shown that extracts of lemongrass leaves contain phenolic compounds associated with health benefits.(6) Although essential oils have been widely used as flavoring agents, there is no scientific evidence regarding the use of lemongrass essential oils in beverages.

MATERIALS AND METHODS

The anti-inflammatory activity in lemongrass mint herbal formulation was evaluated by Bovine serum albumin denaturation and egg albumin denaturation assays using standardised protocols.

Albumin Denaturation Assay

The anti-inflammatory activity for Solanum tarvum gel was tested by the following convention proposed by Muzushima and Kabayashi with specific alterations (Pratik Das et al.,2019). 0.05 mL of Solanum tarvum gel of various fixation (10µL,20µL,30µL,40µL,50µL)was added to 0.45 mL bovine serum albumin(1% aqueous solution) and the pH of the mixture was acclimated to 6.3 utilizing a modest quantity of 1N hydrochloric acid. These samples were incubated at room temperature for 20 min and then heated at 55 °C in a water bath for 30 min. The samples were cooled and the absorbance was estimated spectrophotometrically at 660 nm. Diclofenac Sodium was used as the standard. DMSO is utilized as a control.

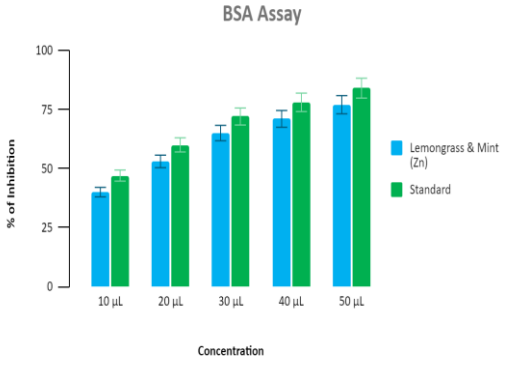
Percentage of protein denaturation was determined utilizing following equation,

$$\% \text{ inhibition} = \frac{\text{Absorbance of control} - \text{Absorbance of sample}}{\text{Absorbance of control}} \times 100$$

Egg Albumin Denaturation Assay

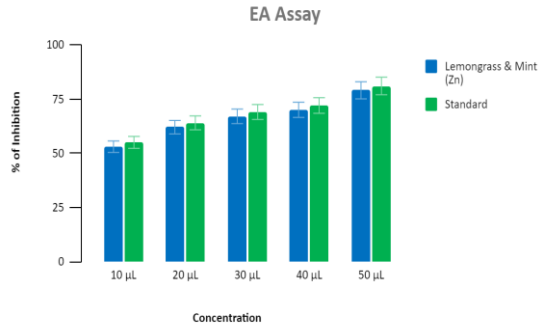
A 5ml solution was made which was comprised of 2.8ml of freshly prepared phosphate buffered saline of pH - 6.3, 0.2 ml of egg albumin extracted from hens egg. Specific concentrations were prepared separately for Syzygium caryophyllatum as (10µL,20µL,30µL,40µL,50µL). Diclofenac sodium was used as the positive control.. Then the mixtures were heated in a water bath at 37ºC for 15 minutes. After which the samples were allowed to cool down to room temperature and absorption was measured at 660 nm.

RESULTS



The percentage inhibition was only 35% when the concentration was 10 µl, at 20 µl it was 50%, at 30 µl it was 60%, at 40 µl it was 65% and at 50 µl it was 75%. It was observed from the spectra that the extract at 660 nm had highest radical

scavenging activity at a concentration of 50 µl (75%), which is indicative of significant antioxidant activity as potent as BSA ASSAY



The percentage inhibition was 50% when the concentration was 10 µl, at 20 µl it was 65%, at 30 µl it was 70%, at 40 µl it was 72% and at 50 µl it was 75%. It was observed from the spectra that the extract at 660 nm had highest radical scavenging activity at a concentration of 50 µl (75%), which is indicative of significant antioxidant activity as potent as EA ASSAY

DISCUSSION

Plant extracts have now been increasingly used to combat multidrug resistance. However, there is now a new dimension to tackling microbial invasion in the form of green nanotechnology.(4) These green-synthesized silver nanoparticles, which were synthesized with plant extracts, can be used in drug delivery, proteomic studies, cancer therapy, and medicine. (8)A facile approach to synthesizing silver nanoparticles from plant extracts is cost-effective as well as non-hazardous(9,10). The results show that the mean particle size of the synthesized nanoparticles was reduced with the addition of their good absorbance properties as well as their crystallinity. In the future, these nanoparticles can be used in proteomic studies and drug delivery applications.(9)

Environmentally acceptable Zn-NP synthesis methods using plant extracts are far better candidates to produce Zn-NPs than physical, chemical, or microbiological techniques.(11) Plants are more helpful than other biological agents, such as bacteria, as there is no requirement for plant culture upkeep(12). Plants provide a wealth of medicinally significant metabolites that can also function as capping and reducing agents in the production of Zn-NPs(12,13)

However, numerous investigations have shown that Zn--NPs have the potential to be cytotoxic due to their impact on the excessive generation of reactive oxygen species (ROS) in various cells and pathological conditions like cancer. (14,15)Zn-NPs have strong antimicrobial properties against many fungi, viruses, and bacteria due to their activity as photocatalysts and their ability to produce reactive oxygen species.(14-27)

CONCLUSION

Zn-NPs are used in many different industries in modern civilization, due to which their dissemination and absorption into the ecosystem is unavoidable. Therefore, understanding the transfer of Zn-NPs throughout the ecosystem and their impacts on plants is of crucial importance. The present investigation showed that Zn-NPs possess strong anti-inflammatory activity. Most of the studies conducted so far have reported positive effects of Zn-NPs on plant growth and progress. However, some studies have also shown harmful effects of Zn-NPs on plants in different aspects. These contradictory results indicate the complexity of the responses in plants to Zn-NPs; responses which are dependent on the properties of Zn-NPs, the plant used, and the mode of exposure.

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