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RESEARCH ARTICLE

FORMULATION OF POLYHERBAL NANOPARTICLES FROM GLOCHIDION ZEYLANICUM PLANT A. JUSS. OF LEAVES EXTRACT

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Abstract

The drug was evaluated by using different in UV, Solubility, pH determination were used for the characterization of leaf extract. Polymeric nanoparticles have demonstrated significant promise in the targeted delivery of pharmaceuticals for many medical conditions. In concluded we go over the most popular techniques for creating and describing polymeric nanoparticles (NPs), the effectiveness of the active compound's binding to the polymeric core, and the in vitro release mechanisms. We also go over the toxicity and ecotoxicology of nanoparticles to humans and the environment because nanoparticle safety is very important.

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Introduction:-

Herbal medicines have been widely used all over the world since ancient times and have been recognized by physicians and patients for their better. Nano-sized drug delivery systems of herbal drugs Have a potential future for enhancing the activity and overcoming problems associated with Plant medicines. Hence, integration of the nanocarriers as a NDSS in the traditional Medicine system is essential to conflict more chronic diseases like asthma, diabetes, Cancer, and others.

Many of the herbal drug's ingredients will be broken down in the stomach's extremely acidic pH before entering the blood, while other ingredients may be processed by the liver. There won't be any way to demonstrate the medication's therapeutic impact if it doesn't reach the affected area in the ideal quantity at the "minimum effective level." Because of their small size, nanocarriers applied to herbal medicines will convey the maximum amount of the drug to its site of action while avoiding all obstacles, including the stomach's acidic pH and the liver's metabolism. This will prolong the drug's circulation into the blood. Drug delivery system yielded an NDSS, a cutting-edge solution to the problems of conventional drug delivery systems. Give the medication in tiny particle form to maximize its surface area and hasten its absorption into the circulation.

Particles of sizes ranging from 1 to 1000 nm are known as polymeric nanoparticles (NPs), and they can contain active substances that are either surface-adsorbed onto the polymeric core or trapped inside it. Both nano capsules and nanospheres, which are identified by their morphological structures, are referred to as "nanoparticles." Polymeric nanoparticles have demonstrated significant promise in the targeted delivery of pharmaceuticals for many medical conditions. Recent years have seen a significant increase in interest in polymeric nanoparticles (NPs) because of their unique features brought about by their small size.

The major problem associated with phytosterols is incapability to pass the lipid membranes of the cells because either their molecular size is to a large extent or the water solubility is poor, and hence suffers from low assimilation and poor bioavailability. Herbal drugs with nanotechnology and nanostructured polymeric systems have proven to strengthen the action of herbal extracts decreasing the necessary dosage and side effects, and improving bioactivity.

The genus *Glochidion* commonly called as cheese Trees or button wood trees consisting of 300 Species. Several triterpenoids, triterpenoid Glycosides and alkaloids are known to be Constituents of the plants belonging to the genus *Glochidion*. According to biological studies on *Phyllanthus* species, several of the genus's Members have properties that prevent the growth of tumors and have action of the antiviral Hepatitis B virus, anti-angiogenic, lipid-lowering, Anti-diabetic, antiherpetic, anti-HIV, and anti-plasmodial properties.

Methodology:-

Collection of Plant Material:-

Fresh leaves of *G. Zeylanicum* (Gaertn) A. Juss were collected month of October from Ahmednagar, Maharashtra. The plant was identified with the help of available literature and authenticated by Dr. G. G. Potdar (Assistance Professor) Department of Botany, Yashwantrao Chavan College of Science, Karad.

Soxhlet Extraction or Hot Continuous Extraction:-

In this method, finely ground sample was placed in thimble chamber of the Soxhlet apparatus. Extraction solvents was heated in the bottom flask, vaporizes into the sample thimble, condenses in the condenser and drip back. When the liquid content reaches the siphon arm, the liquid contents emptied into the bottom flask again and the process is continued. About 100 g of dried sample powder was weighed and extraction process is carried out by using 250 ml of Ethanol in Soxhlet apparatus for 48 h. The extract was concentrated by evaporation at 70 °C for 8 h and then dried. The concentrated extract was made in Powder form and stored at room temperature.

Synthesis of Polyherbal Nanoparticles:-

Nanoparticles were prepared according to the Nan-precipitation method. 200mg of polymer such as HPMC K4 dissolved in 25ml of acetone separately. Then 100mg Extract dissolved in 2ml of Dimethyl sulphoxide (DMSO) separately. After both solutions was mixed together and add 50ml of water and stirred the solution for 30min. Then this solution was added to rotary flash evaporator for evaporation of Acetone under reduced pressure. Finally, volume of suspension was adjusted to 10ml. Then this final 10ml volume of suspension was centrifuge at 15000 rpm at 4°C for 30 min. After centrifugation the supernatant was discard and precipitate was wash with water for 3 times. Then finally nanoparticle was dried in hot air oven at 60°C for 1 to 2 hr

Table 1:- Composition of Leaves extract Polyherbal NPs.

Sr. No.	Composition of Polyherbal NPs	Quantity
1.	HPMC K4	200mg
2.	Acetone	25ml
3.	Extract	100mg
4.	DMSO	2ml
5.	Purified Water	50ml

Preformulation Study: -

UV Spectroscopy: -

UV-Vis spectrophotometer analysis, the extract were prepared containing 10mg of leaves extract in 100mL of volumetric flask, the volume adjusted up to 100mL with the ethanol, respectively to get final concentration of 100µg ml⁻¹ for GZ leaves extract. Suitable aliquots of 100 µg ml⁻¹ solutions were diluted up to the mark with ethanol to get the concentration range 1,2,3,4 and 5 µg ml⁻¹ for GZ leaves extract the absorbance was recorded for leaves extract respectively by using UV-visible spectroscopy (PC Based Double Beam Spectrophotometer 2202).

Solubility: -

About 5-50 mg of extract, Liquid dispersion were weighed and dissolved in each 1 mL of different solvent respectively. All the samples were sonicated at 45° C, frequency of 60 kHz for a while to ensure complete dissolution. Then, the samples were filtered into whatman filter paper.

Results:-

The qualitative UV-VIS spectrum profile of *G. Zeylanicum* (Gaertn) A. Juss. methanolic extract was selected at wavelength from 300 to 800 nm due to sharpness of the peaks and proper baseline. The profile showed the peaks at 212.8 nm with the absorption of 0.809 respectively. The calibration curve for *Glochidion Zeylanicum* A.Juss extract in methanol was plotted by using following results of absorbance at various concentrations was analysed at 202.4 nm for the leaf extract. The calibration curve was followed the Beer's-lambert law from three different of surfactants.

Figure 1. and Table 2. shows the solubility test of leaves extract from different type of Solvent



Solvent	Solubility
Methanol	+
Acetone	-
Butanol	+
Ethanol	+
Toluene	+
Ethyl acetate	+
Distilled water	-
Acetic acid	+

Discussion:-

During formulation of polymeric nanoparticle thus the polymer is most important. These results demonstrate that a good match between the mixing times of the extract and NP material is critical for formulating drug-loaded polymeric NPs for drug delivery.

Summary:-

Synthesized polymeric nanoparticles have noteworthy aspects of nanotechnology through unmatched applications and synthesis of nanoparticles using plants can be beneficial over other other biological methods because plant products are easier and safer to handle, widely distributed and easily available.

Future Perspective:-

Polymeric NPs is the part of advance drug delivery. It is a specific aiding system for targeted drug delivery of both kind of drugs either it is lipophilic or hydrophilic in a controlled manner. The Polymeric NPs is the modified nanomaterial which contains herbal extracted drug, it is useful for vesicular drug delivery to overcome some drawback of herbal dosage forms. Bioactive molecules can be enclosed within nano sponges for a potentiated pharmacological effect. The synergistic action of 2 or more phytochemicals can be utilized for this nano delivery systems. The outcome of the present study has opened a number of avenues for future research. Some of them, which can be pursued for future active research, are given below.

Authors Contributions:-

All authors are contributing UV-Spectroscopy. All authors have read and agreed to the published version of the manuscript.

Abbreviations:-

PNPs; Polymeric Nanoparticles, G; Gram, mg; Milligram, nm; Nanometre, HPMC K4; Hydroxypropyl Methylcellulose, DMSO; Dimethyl Sulphoxide,

Competing Interests:-

The authors declare that they have no competing interests.

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