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The Comparative Study of Albendazole and Euphorbia thymifolia for Anthelmintic Activity

Pratiksha S. Dhembare*, Pratiksha K. Dange, Rohan A. Dhamane, Sanket B. Chopade, Sandeep R.Kane,Shrinivas K. Mohite
Rajarambapu College of Pharmacy, Kasegaon, Maharashtra, India

Abstract:- Nanoparticles are defined as particles with one or more dimensions and sizes between one and one hundred nanometers (nm) by ISO and ASTM standards. Due to their special qualities, silver nanoparticles have a wide range of uses, including antibacterial, anticancer, larvicidal, catalytic, and wound healing processes. Any medication that treats parasitic worm-related infections is known as an anthelmintic (helminthes). An established anthelmintic medication is Albendazole. Certain tapeworm infections are treated with the drug Albendazole (such as neurocysticercosis and hydatid disease). The centrifugation method wasused for 3 hours and 34 hours, respectively, to manufacture silver nanoparticles from Albendazole and Euphorbia thymifolia. Pheretima posthuma, an Indian earthworm, was tested for anthelmintic activity using Albendazole and Euphorbia thymifolia nanoparticles in ethanol. The results were stated for paralysis and bacterial death time after monitoring various concentrations of both Albendazole and Euphorbia thymifolia. Both plants' dose-dependent activity was seen. However, the synthetic medicine Albendazole exhibits greater activity than the herbal drug Euphorbia thymifolia. It was determined thatboth the synthetic and natural medicines had anthelmintic activity, with Albendazole having more of aneffect than Euphorbia thymifolia.

Keywords:- *Nanoparticle Synthesis, Silver Nanoparticles, Albendazole, Euphorbia Thymifolia, and Anthelmintic Activity.*

I. INTRODUCTION

Nanotechnology is an important area of modern research dealing with the synthesis, planning, and manipulation of particle formation from 1 to 100 nm in size. [1,2,3] Special properties such as chemical stability, excellent conductivity, catalytic activity and most importantly antibacterial, antiviral and antifungal activity make it suitable for incorporation into composite fibers, materials for cryogenic superconducting technology, cosmetics, food industry, etc. can do. Electronic devices,silver nanoparticles are typical products in the field of nanotechnology. [4, 5]

Silver "acts" as an antiseptic and exhibits broad biocidal efficacy against microorganisms in biomedical applications, including wound dressings, topical creams, antiseptic sprays, and added to fabrics. This is accomplished by disrupting their unicellular membrane, which in turn interferes with their enzymatic activities. The detection and therapy of cancer also employ these silver nanoparticles with success.

Antiparasitic medications known as anthelmintics, sometimes known as anthelmintics, are used to eliminate internal parasites like helminthes and other parasitic worms from the body without causing serious harm to the host. [6, 7] .They are sometimes called insecticides or anthelmintics (stunning) or as "Insecticide" (insecticide). Helminthiasis, an infection caused by helminthes, is treated with anthelmintics.

Many worm infestations can be treated with albendazole, commonly referred to as albendazolum. Giardiasis, whipworm, filariasis, neurocysticercosis, cysticercosis, pinworm, ascariasis, etc. conditions, can all be effectively treated with it. Threadworms, roundworms, whipworms, tapeworms, and hookworms can all be successfully treated with albendazole. [8, 9]

Broad-spectrum anthelmintics like albendazole and Euphorbia thymifolia suppress tubulin polymerization, which leads to the loss of cytoplasmic microtubules in the intestines of nematode worms, which in turn affects the worm's nervous system and causes energy exhaustion. The parasite becomes immobilized as a result and eventually dies. [10, 11]

II. MATERIAL AND METHODS

❖ *Anthelmintic Assay*

A. Preparation of plant extract:

A synthetic medicine called albendazole was broken down into a powder, which was then incubated with AgNO3 in alcohol for three hours. The medication powder was further dilutedin distilled water to 0.01, 0.02, and 0.03 mg/mL.

Euphorbia thymifolia plant extract was treated with AgNO3 in alcohol for 24 hours. The plant extract was further diluted in distilled water to 0.01, 0.02, and 0.03 mg/ml.

B. Worms' collection:

In Rajarambapu Vermicomposting Project, Rajaramnagar, Islampur, Sangli, Maharashtra, India, and from Dr. S. U. Patil, Pheretima posthuma (Indian earthworm) was collected. This earthworm was verified by Smt. Kusumtai Rajarambapu Patil, Head of the Zoology Department at Kanya Mahavidyalaya in Islampur, Sangli, and Maharashtra.

C. Anthelmintic Assay:

P. posthuma, an earthworm, was split into seven groups, each containing two earthworms of the same size (in triplicates) and was then released into 30 ml of the experimental formulation kept in the petri dish. The first

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group served as the control and was just given regular distilledwater treatment. The second, third, and fourth groups consisted of various concentrations of the synthetic medication albendazole (0.01, 0.02, and 0.03 mg/mL). The herbal medication extracts of Euphorbia thymifolia were used in the fifth, sixth, and seventh groups in varying concentrations (0.01, 0.02, and 0.03). Before beginning the experiment, each test solution was freshly made. [12, 13, 14, 15]

After estimating the mean paralysis duration, the time of death was measured in seconds to make sure that the earthworms did not move when shaken or when an external stimulus was applied by submerging the immobile worms in 500°C hot water. The death of the worms was indicated by their immobility, the appearance of a white secretion, the fading of the colour surrounding their bodies. The length of death andparalysis were specified in minutes.

AgNPs	Dose/Concentration (mg/ml)	Paralysis Time (Sec)	Death time (Sec)
Albendazole	0.01 mg/ml	a)58 sec b)58 sec	a)82 sec b)83 sec
	0.02 mg/ml	a)55 sec b)55 sec	a)77 sec b)77 sec
	0.03 mg/ml	a)52 sec b)52 sec	a)72 sec b)72 sec
Euphorbia thymifolia	0.01 mg/ml	a)55 sec b)55 sec	a)100 sec b)100 sec
	0.02 mg/ml	a)52 sec b)52 sec	a)83 sec b)83 sec
	0.03 mg/ml	a)48 sec b)48 sec	a)77 sec b)77 sec

Table 1:- Comparative study of Albendazole and Euphorbia for Antihelmintic activity

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III. RESULTS

Fig 1. CONTROL

Fig 2. ALBENDAZOLE (0.01ML)

Fig 3 .ALBENDAZOLE (0.02 ML)

Fig 4. ALBENDAZOLE (0.03 ML)

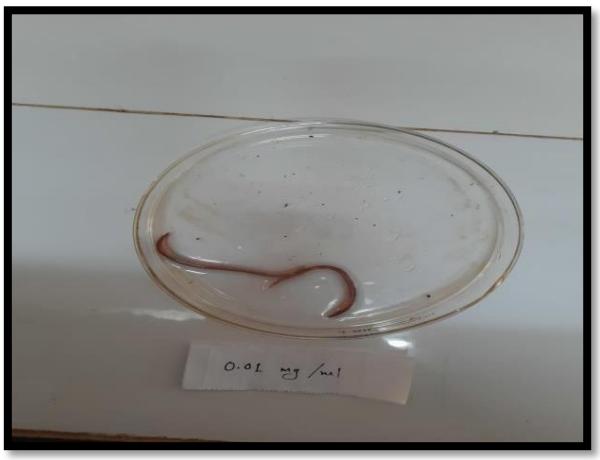

Fig 5. EUPHORBIA THYMIFOLIA (0.01 ML)

Fig 6. EUPHORBIA THYMIFOLIA (0.02 ML)

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Fig 7. EUPHORBIA THYMIFOLIA (0.03 ML)

The ethanolic extract contains saponins, steroids, alkaloids, tannins, and flavonoids, according to preliminary phytochemical screening. It is observed that standard albendazole shows potent anthelmintic activity while Euphorbia thymifolia takes a long time to kill worms. Albendazole causes paralysis within 2–3 minutes, while the death of worms takes place in 3–4 minutes. Paralysis occurs in 2-2.5 minutes in Euphorbia thymifolia, while worm death occurs in 4-4.5 minutes. [16, 17]

IV. DISCUSSION

The chemical makeup of each plant is unique, and even within the same plant, the chemical makeup changes from one area of the plant to another. Depending on their solubility, the plant's phytochemicals can be dissolved in ethanol. As a result, ethanolic extracts of the herbal plant Euphorbia thymifolia were chosen to manufacture with the common synthetic medicine Albendazole. The results of the current study indicate that the ethanolic solvent extract of Euphorbia thymifolia include a variety of phytochemicals, including alkaloids, glycosides, coumarin, saponins, sterols, polyphenols, flavonoids, and tannins. The ethanolic extract of the common medicine Albendazole had more phytochemicals and bioactive components as a result of which it shown the highest anthelmintic activity. Secondary metabolites or phytochemicals typically exist in complicated combinations that vary depending on the organs and stages of development of the plant. For Euphorbia thymifolia to be used as effectively as possible in medicine, knowledge of the photochemical components present and albendazole will be very helpful. According to reports, phytochemicals found in plants are important sources of anti- inflammatory, antiviral, anti-tumor, antibacterial, and anthelmintic compounds. As a result, they are used as components in both allopathic and alternative medical systems. [18]

The adult Indian earthworm Pheretima posthuma responds similarly to intestinal parasites in response to anthelmintic drugs and is readily available, which was used in this study to compare the anthelmintic activity of the synthetic drug Albendazole and the herbal drug Euphorbia thymifolia. Comparing the anthelmintic activity of the herbal medication Euphorbia thymifolia extract to that of the synthetic drug Albendazole, the former showed less. The highest anthelmintic activity in ethanolic extract is caused by the presence of alkaloids and tannins. As concentrations were raised, ethanolic extracts became more effective as an anthelmintic. When compared to the usual reference medicine albendazole, Bendgude et al. found that ethanol extracts significantly shortened nematode paralysis and death time in a dose-dependent manner Alkaloids, tannins, phenols, and other phytochemicalsare said to have strong anthelmintic properties, while alkaloids are said to operate on the earthworm's nervous system to paralyze it. Tannins have been found to uncouple oxidative phosphorylation, which interferes with worm energy production, or they can attach to the free protein of the GIT and kill worms. Inhibition of tubulin polymerization, prevention of glucose uptake, and damage to nematode mucopolysaccharide membranes are three ways phytochemicals may act collectively or singly.

V. CONCLUSION

The silver nanoparticles of the common synthetic medicine Albendazole exhibit powerful anthelmintic activity when compared to the silver nanoparticles of the herbal Euphorbia thymifolia, according to a comparative research of the two substances. Alkaloids, glycosides, tannins, sterols, flavonoids, and polyphenols are some examples of the phytochemical componentsthat contribute to albendazole's effectiveness as an anthelmintic.

We can see that normal albendazole induces paralysis in 2-3 minutes and death in 3–4 minutes when we examine the paralysis and death times of worms against both of these medications. Euphorbia thymifolia experiences paralysis in 2-2.5 minutes and worm death in 4-4.5 minutes. As a result, we draw the conclusion that the active phytochemical components, such as tannins and glycosides, which inhibit tubulin polymerization, obstruct glucose uptake, and harm the worms' mucopolysaccharide membrane, exposing the outer layer and restricting movement, potentially leading to paralysis and eventual death.[19, 20]

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