

Research Article

Green synthesized nanoparticles ZnO Evaluation of Antimicrobial

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Abbreviation: • (TEM) Transmission electron microscop
• (SEM) Scanning electron microscope

Abstract

Introduction:

Introducing a powerful antibacterial agent to control pathogenic bacteria especially strains resistant to antibiotics is of paramount importance. The purpose of this study is ZnO nanoparticles synthesis by using plant extracts ziziphora teniri I and Asteraceae evaluation of its antibacterial properties.

Methods: Zinc oxide nanoparticles were synthesized using plant extracts ziziphora teniri I and Asteraceae. Then physical and chemical properties of nanoparticles were studied. Escherichia coli and Staphylococcus aureus through standard methods such as placing well and disc diffusions, minimum inhibitory concentration (MIC), and minimum bactericidal concentration (MBC). **Results:** Chemical and physical investigation of the synthesized ZnO nanoparticles indicated that from nanoscale particles, spherical forms were produced with no impurities. The MIC for E.coli and Staph.aureus were reported as 0.125 mg/ml, and 0.062 mg/ml respectively. The MBC for E.coli and Staph. aureus was reported to be 0.500 mg/ml, and 0.250 mg/ml respectively. In comparison, for the methods of well and disc diffusions, inhibition zone diameter of the well method was more than disc diffusion.

Conclusion: High purity zinc oxide nanoparticles can be synthesized by plant extracts ziziphora teniri I and Asteraceae have antibacterial properties against Escherichia coli and Staphylococcus bacteria. In contrast to Escherichia coli, Staph. aureus showed greater sensitivity against Zinc Oxide nanoparticles.

Introduction:

Goal: The goal in this research of extraction and effect of zno nano particles synthesized in the thymus extract plant and studying the impact of silver nano particles synthesized in removing germs The use of metal oxide nano particles in order to deal with the alternative method as Amnesty sheets bacterial antibiotics can be effective.

The belief that nanotechnology is an ultramodern combination of: science, chemistry, engineering, biology, and medicine, is accepted between the scientists. Evaluation has shown that whatever the size of the smaller nanoparticles, new and different activities and characteristics of their own. These features make is that now days the speed using the very fast expansion of nano material, So that in all dimensions of life, such as fighting disease diagnosis and treatment with micro references its application. The use of these materials in order to fight against pathogenic microorganisms can be an appropriate choice. Based on researches it is shown the Nano particles such as Ag , Ti ,Zn , Cr and their oxides are antiseptics. Staphylococcus Aureus is one of the nosocomial bacteria , it causes: skin infection, Boils, Impetigo, endocarditic, meningitis and brain abscess. Antibiotic resistant staphylococcus Aurous is one of the most problems in the world. Therefore, nonmaterial as materials suitable for antiseptic and inhibitors these bacteria can be used. Gram Positive bacteria compared to gram negative bacteria are more resistant to metal nano particles; this might be connected to the cell wall structure. Numerous researches,

based on the probable reactions between nano particles and macromolecules of living-things have done. The difference between the negatively charged bacteria and the positively charged nano particles, the nano particles act as an electromagnetic absorbing the germs and Causes Nano particles bind to the cell surface and thus can cause cell death. Finally, a large number of shares resulting the oxidation of the surface molecules and rapid death of microorganisms. Is likely ions released from the nano particles - groups (SH) bacterial cell surface proteins react . Some of the bacterial cell membrane proteins are responsible for the transfer of minerals from the surface. The effects of nonmaterial on these proteins leads to inactivation and are impermeable membrane. Inactivation of the membrane permeability leading to cell death. Also nanomaterial causes adhesion of bacteria and biofilm formation on delay. This action causes some bacteria can not become fixed and proliferate.

Nanotechnology is expected to be the basis of many of the main technological innovations of the 21st century research and development. Plant extracts may act both as reducing agents and stabilizing agents in the synthesis of nano particles . The source of the plant extract is known to influence the characteristics of the nano particles. The number of methods including physical and chemical methods, electrochemical reduction, photochemical reduction and heat evaporation have been used for the synthesis of silver nanoparticles ZnO). In recent years a number of biomimetic processes have been used for the syn-

thesis of zno nanoparticles. This is because different extracts contain different concentrations and combinations of organic reducing agents .Typically, a plant extract-mediated bioreduction involves mixing the aqueous extract with an aqueous solution of the relevant metal salt. The reaction occurs at room temperature and is generally complete within a few minutes. In view of the number of different chemicals involved, the bioreduction process is relatively complex. Nano particles are already used in numerous applications including in vitro diagnostics, but their use in medicine is mostly on an experimental basis. Drugs bound to nano particles have been claimed to have advantages compared with the conventional forms of the drugs.

(ZnO) nanoparticles:

Such particles can be used in wound sites as antibacterial and antimicrobial properties , according to it As well as drug carriers in targeted drug delivery , particularly in the preparation of cosmetics including sunscreen can be used.

Also can be used in : Electronics , industrial equipment , construction , electrical appliances, radio , wireless fluorescence lamp , image recorder , rheostat, Used in cosmetics , antibacterial , lubricant high temperature gas turbine engine , flame retardant , Adsorption , environmental remediation , gas sensors , photocatalytic decontamination , ultraviolet light attenuation , cosmetics , electrodes for solar cells , the dye.

Lavandulifolia Stachys:

Figure1,2:Plant Lamiaceae



Perennial plant and Wooden in root. Short , woolly , with multiple stems , green or gray , more or less , and also called Hypericum. Warm nature ,and it is considering of mint family (Lamiaceae).

Shoot: multiple, wearing shaggy fur, standing or crouching with a length of 6 to 25 cm, branching with simple branches, some floral and fruitful, leading to the inflorescence. Some short and unproductive and leaves almost in cluster.

Leaf: size 30-15, 8-4 mm, wide, long and linear-spear, at the end of the round, more or less expected to fluff up, A little rough, irregular teeth on the sidelines with a double, opaque and whit-

ish green, narrow at the bottom and up to the petiole, rather tall, with prominent veins parallel , ovoid or elliptical, back and slightly longer than the Calyx.

Flowers: pink or purple, rarely white or yellowish, in clusters , thin and stringy and visible bracts, calyx length of 18 to 14 mm with divisions fledge (covered with long hairs) , dark, low head slim and narrow awlshaped spear above .

Flower season: spring

It has relaxant properties and anti- bacterial. In the treatment of kidney stones , joint pain , rheumatism , headaches , dizziness and neuralgia and gastro-intestinal disorders of psychological origin is useful . It is anti- seizure and anti- migraine and is effective in treating the common cold. It is also in the treatment of insomnia , gout , allergies , intestinal cramps and strengthens the immune system is very effective. The plant that flowers are pink cotton grows in mountainous areas with excellent properties. The best way of taking this herb is infusions. The best time to use is six months after picking it up And after this time is better than it used essential oils. Some of the properties of this plant are as follows :

- It is against intestinal worms. • It is duritic and makes menstruation easily.
- It is mucolanet.
- Used to treat tetanus
- If it leaves form of powder used in deep wounds it will treat them.
- Treatment of diarrhea and dysentery.
- For Coccydynia best medicine

Ziziphora:

Ziziphora plant herbaceous , annual , with a short stem and the mint family that grows wild in most mountainous regions , especially Khorasan . This plant has many health benefits, Including antimicrobial and disinfectant , As incense to relieve symptoms of colds and headache disorders, respiratory tract and is consumed, Ziziphora as antispasmodic also useful in reducing digestive disorders, In addition, the antifungal effects.

Methods:

Synthesis of silver nanoparticles by using the leaf

Extract0.2g of dried extract of Z. tenuior (Zt) leaf is added into 50 ml deionized water and then stirred for 1 h in a magnetic stirrer at room temperature. Coarse filtering is employed prior to centrifuging the extract at 4000 rpm for 30 min to remove the heavy biomaterials in it. Clear Z. tenuior (Zt) leaf extract is mixed immediately into a 0.1 mM zno solution of equal volume . The color change involved in the formation of silver nanoparticles. The purified pellets were then kept into petri plates and left in the oven for drying at 60 C for 24 h. The colorless ZnO solution turned yellow to brown or reddish yellow to deep red, indicated the formation of ZnO. The dried zno were scrapped out for the further study. Characterization of zno nanoparticles ,Nanoparticles are generally characterized by their size, shape, surface area, and dispersity . Homogeneity of these properties is important in many applications. The common techniques of characterizing nanoparticles are as follows: UV-visible spectrophotometry, scanning electron microscopy (SEM), transmission electron microscopy (TEM), Fourier transform infrared spectroscopy (FTIR), and powder X-ray diffraction (XRD). UV-vis

spectra were recorded as a function of the reaction time on a Shimadzu, model UV-1800, Kyoto, Japan (from 300 to 800 nm) spectrophotometer operated at a resolution of 1 nm. The purified silver particles were freeze-dried, and their structure and composition were analyzed by transmission electron microscopy (TEM; Zeiss-EM10C80KV), scanning electron microscopy (SEM; Philips-XL30ESEM), X-ray diffraction spectroscopy (XRD; PANalytical, XPert Pro MPD), and Fourier transform infrared spectroscopy (FTIR; Bomem MB100).

Plant materials

The dried leaf of the *Z. tenuior* (Zt) Bertoni was purchased from Loba Chemie, India and used as received. Thirty grams of each plant powder was extracted in 500 ml of methanol by Soxhlet.

The solvent was removed under the vacuum at temperature below 45 C and the extracts were freeze-dried. For this experiment, nanoparticles have concentrations ranging from 0.0976 to 100 µg/mL.

Results:

It is hoped that in the future using the nanoparticles to form net positions or may be combined, against pathogenic bacteria or in the event of an outbreak of epidemic in certain cases, emerging easily cope emerging and dangerous conditions to behind.

To check the diameter of the nanoparticles and the nanoparticles surface to volume ratio, nanoparticles TEM images were shown in Figure 3. In photos taken of proof that the nanoparticle has a diameter of 60-40 nm.

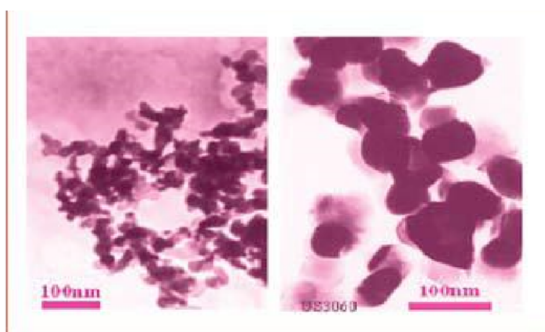


Figure3:TEM

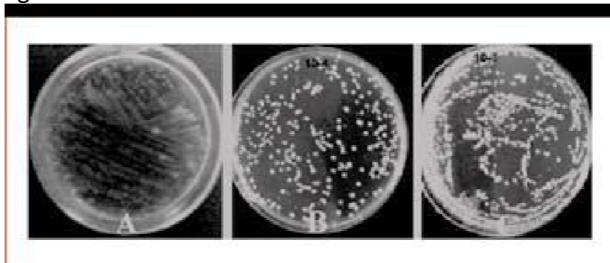


Figure4: The growth of bacteria on agar

The number of colonies grown in 200 control samples for *Staphylococcus aureus* and *Escherichia coli* colonies were 500 colonies. In all cases, the growth of *E. coli* was more than *Staphylococcus aureus*.

Percent antibacterial power	Concentration of applied nano) ppm	Number of samples
100%	200	1
94%		2
60%		3
94%		4
92%		5
33%		6
100%	400	7
96%		8
96%		9
94%		10
92%		11
80%		12

Table 1: The power antibacterial nanoparticles samples in different concentrations of *E. coli*

درصد قدرت ضد باکتری	غلظت نانو ی بکار گرفته شده (ppm)	شماره ی نمونه
90%	200	1
84%		2
60%		3
84%		4
72%		5
33%		6
92%	400	7
90%		8
76%		9
64%		10
52%		11
30%		12

Table 2: The power antibacterial nanoparticles in different concentrations in samples of *Staphylococcus aureus*

Discussion:

Several methods have been used to create anti-bacterial properties of these materials one of those are nano particles, In this study, like other studies, the researchers showed that the nanoparticles have antibacterial properties, The antibacterial properties of zinc oxide nanoparticles have been applied to the power and the number of rounds Corona, The same result was observed in this study that determines the absorption of zinc oxide nano particles for each of the Samples. The study of Khani and colleagues have shown that nano particles can be

virulence bacteria such as Shebelle, *E. coli* and *Staphylococcus aureus* inhibited. So using these nanoparticles can be used to combat pathogenic microbes.

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