PASSIFLORA EDULIS, A VITAL AGENT FOR THE PRODUCTION OF NANOPARTICLES AND BIOACTIVE SCREENING

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Abstract : Nano particles are the small, minute substance that behaves the whole unit with respect to its transport and properties ,which have a size range between 1 – 100 nm. Because of their minute property nature , they are commonly used in industry such as Biomedical field, electronic field, optical field, food industry and in textile industry etc. Nano particles have superior properties than bulk materials like electric conductivity, mechanical strength, thermal ability. Because of their amazing property, so much researchers work more on their field of nano particles to make it much more effective and useful to day to-day life. In the present study, zinc oxide nano particles were synthesised from passion fruit leaves. Further production of nano particles from plant extract was performed. We were tested the antibacterial and antifungal property of nano particles , it was found that na o particles enhanced the prolubition growth of bacteria - *Salmonella typhi, Pseudomonas aeruginos, Listeria , E. coli, P. oryzae and Pneumonia.* And it also inhibited the growth of fungi *Aspergillus flavus and Aspergillus niger* . The result evaluated that the bacteria and fungi inhibited by the *Passiflora edulis* leaf nano particles.

Keywords-Nanoparticles, Passiflora edulis, Antibacterial, Antifungal.

1.INTRODUCTION

Infectious disease still remains an vital cause of morbidity and mortality in man. In recent years drug resistance in human pathogenic microorganisms has developed and the use of several antibiotics has been ineffective in solving the global problem. Great efforts are being made to reverse this trend and one of them is the widespread screening of medicinal plants from the traditional system of medicine hoping to get some newer, safer and more effective agents that can be used to fight infectious diseases. Plants like *Passiflora edulis* (Passion fruit) belongs to family *Passifloraceae* are known to produce phytochemicals, which are potential sources of anticarcinogenic, anticancer, antimicrobial, and antioxidant activity. The antimicrobial activities of medicinal plants extracts have been linked to the presence of bioactive compounds such as tannins, flavonoids and alkaloids which sometimes serve to protect the plants themselves against bacteria, fungi and viral infections as well as exhibiting their antimicrobial properties on these organisms Nanoparticles are of great scientific interest as they are effectively a bridge between bulk materials and atomic or molecular structures. A heavy material should have a stable physical property despite of its size, but at the nano- scale. Based on the size properties the quantum confinement in semiconductor particles, the surface plasmon resonance in some metal particle and super-paramagnetism in materials that are magnetic were analyzed. The properties of materials can change when the size approaches the nanoscale and when the percentage of atoms at the surface of material became significant (Victoria Raffa. 2013). Nanoparticles can be used in applications related to biomedical ,where they show laboratory diagnostics , or in medical drug targeting. They are used for in vivo applications such as contrast for magnetic resonance imaging [MRI]. Very promising nano particles of this applications are super magnetic nano particles based on a core consisting of iron oxide that can be targeted through the external magnets. SPION are coated with biocompatible material and can be functionalized with drugs (Tobias , Neuberger , 2005).In the present the extraction of nano particles from passion fruit leaves acted as antibacterial and anti fungal agents in medical diagonsis. We discussed about nano technology , nano particles, nano particles that are extracted from leaves, importance of passion fruit leaves, applications of nano particles in other various fields.

2. METHODOLOGY AND METHOD

2.1 Collection of samples

Dry greenish grey coloured Passion fruit leaves were collected from Arinnalloor , Kollam. The leaves were rinsed and allowed to dry and make it as a fine powder with help of grinder.

2.2 Preparation of leaf extract

For preparing the leaf extract , weigh the dried powered Passion fruit leaf (20g) in the weighing machine. A conical flask is taken with 400 ml of sterilised distilled water and leaf extract is added to it. The conical flask was kept on Hot air play at 60- 70 C for about 45 minutes. Filtered the content using Whatsman filter paper and a funnel to a dried conical flask after 45 minutes. The resultant product is a brownish green coloured precipitate.

2.3 Synthesis of Nanoparticles

The filtered extract is added with equal amount of (1.6g) of Zinc sulphate and Sodium hydroxide and mix it well. A conical flask is taken with 400ml of distilled water, equal amount of distilled water and extract is taken,. The 2 conical flask is kept in the shaker for about 24 hours. After 24 hours, pellets appeared to be present . Then this 2 solution where heated on a rectangular hot play for about 1 hour then cooled for centrifuged for 10 minutes at 5000rpm. Then more pellets are appeared to be present and these were extracted out and put it in a china dish. And kept in hot air oven for 24 hours and the nano particles were appeared.

2.4 Bioactive Screening

2.4.1 Antibacterial activity

A little of pre- made 5 kinds of bacteria like *Pneumonia , Listeria , S. typhi , P. aeruginosa, E.coli* were transferred into the respective test tubes using swabs, as an inoculum into equal amounts of distilled water. And kept in incubator for 24 hours. And after 1 day, sky cloudy appearance was seen in all the 5 test tubes which implies bacteria is grown in test tubes and antibacterial activity were performed.

2.4.2 Antifungal activity

Fungi like *A. flavus, A.niger*, Curvularia Lunata, Earliella Scabrosa, *C. Albicans* were transferred to individual test tubes using swab and it was kept in fungal incubator for 3 days and antifungal activity were performed.

3. Result

3.1 Extraction of leaf

The dried Passion fruit leaves are collected and made as fine powder, it was mixed with distilled water and is heated for 45 minutes at 60-70 ^{o} C in rectangular hot plate .After sterilisation , a brownish green coloured liquid was formed from the solution containing Passion fruit leaves (Fig 7.1.1).

3. 2 Synthesis of Nano particles

Along with the extraction, 400ml of 1.6g of zinc sulphate and sodium hydroxide were added in the conical flask that contains extract. And the solution were kept in a shaker for 24 hours.After 24 hours, the solution was undergone centrifugation in order to get the nano particle. The pellet that formed in the bottom of centrifugation tube were scrabed out to a china dish and the china dish that contained the pellet were dried in Hot air oven for 24 hours and finally the nano particles were obtained (Fig 7.1.2).

3.3 Preparation of fungal and bacterial broth

In order to find the inhibition of nano particles on anti- bacterial and anti – fungal activity , a nutrient agar media for bacteria and potato dextrose broth for fungal should be needed. A bacterial and fungal culture also be made along with this broth.

3.4 Agar well diffusion technique

For bacterial inhibition , nutrient agar medium were solidify under UV. Passion fruit leaves nano particles was able to inhibit the growth of bacteria like *E.coli, Listeria, P.aeruginosa, S. typhi, and K.pnemonia*.(Fig 7.1.4) For fungal inihibition, potato dextrose were solidify under UV. The nano particles are able to inhibit the growth of fungi like *A.niger* (Fig 7.1.3), *A. flavus.*

4. Discussion

Nano particles are those compounds between 1 and 100 nano meter (nm) in size having an interfacial layer surrounding them. Nano particles as wide range of application in our day today life such as biomedical , food industry , textile industry etc . The various type of micro- organism such as fungi , bacteria are used for tested anti – bacterial and anti – fungal activity of nanoparticle. Metal nano particles have been a great interest due to their distensive feature such as electrical , magnetic , optical properties. The size , distribution and morphology of nano particles have increased their value in our day to day life. Nano particles are the building blocks of nano technology. The diverse structure makes important in fundamental studies. It was reported that zinc oxide nano particle from *Aloe barbadensis* (G Sangeetha *et.al.*, 2011). For that , ZnO nanoparticles were synthesised through a simple and efficient biogenic synthesis approach ,exploited the reducing and capping potential of *Aloe barbadnesis miller* . In his study, he used thioglycerol for the synthesis of zinc oxide nano particle, were used and the effect of concentration was analysed for their effectiveness in limiting the particle growth .In present study we used passion fruit leaf nano particle for the synthesis of zinc oxide nano particle collected from Arinalloor ,kollam .

In another work *Pomgami pinnate* collected from Banglore , mixed with Zn $(NO_3)_2$ and in our work, we made Passion fruit leaf solution with double distilled water and sterilize (M. Surendrarajan *et al.*, 2014) and for the extraction, we add zinc sulphate and sodium hydroxide in equal concentration. In our present study, centrifugation technique was done for the extraction of zinc oxide nano particles for further analysis and also it was reported that, anti – bacterial effect of zinc oxide nano particle on *Campylobacter jejuni* was investigated for inhibition and inactivation of cell growth (Tony Jinn et, al., 2015). The result shown that *C. jejuni* was extremely sensitive to treatment with zinc oxide nano particle. The MIC of zinc oxide nano particle *C. jejuni* was determibed to be 0.5- 0.25 mg/ml which is 8 - to 16- fold lower than that *Salmonella entrica* and E. coli 0157: H7(0.4mg/ml) and in his work *E.coli* shows maximum inhibition. In our study, we used nutrient agar culture for determining the anti- bacterial property of Passion fruit leaf nano particle. The bacteria used for the bacterial culture are *Pneumonia, E. coli, S. typhi, Listeria, and P. oryzae* . Among them, *Pneumonia* 's zone of inhibition was 2.2 cm and the nano particles inhibit the growth of all the bacteria. The nano particles inhibit the growth of fungus, among the fungus we used *A. niger* shows maximum inhibition with 2.5cm. The fungus shows more inhibition than bacteria.

5. Conclusion

In the present study, Nanoparticles synthesized from passion fruit leaf inhibits the growth of bacteria. From above, we can conclude that nanoparticles passion fruit leaf shows better antifungal activity against *A . niger* with 2.5 cm than antibacteria against *K.pneumonia* with 2.2 cm.

6. REFERENCES

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7. Figures

7.1 Figures

Fig7.1.1- Passion fruit leaf extract.

Fig 7.1.2- Passion fruit nano particle.

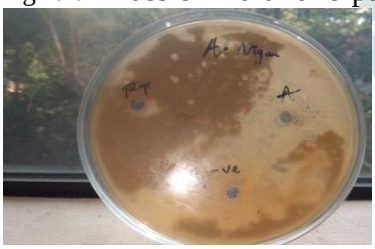

Fig 7.1.3- *A.niger* shows a zone of inhibition with 2.5cm.

Fig 7.1.4- *K.pneumonia* shows a zone of inhibition with 2.2 cm.