

Abstract

The present study was conducted to characterize and screen the pathogenic strains of *P.aeruginosa* found in the upper and lower respiratory tract infections. Sampling was done from infants of age group 1-6 months. Hemolytic or Blood agar test was performed to check the pathogenicity of the isolated strains. Out of all isolated strains five strains showed beta-hemolysis that confirmed their pathogenicity. Susceptibility of isolated pathogenic strains is evaluated against nanoparticles, plant extracts and antibiotics. There was a significant difference observed in the antibacterial activity of nanoparticles as the p-value 0.0042 which is smaller than 0.05, this showed that they showed significantly good results as demonstrated by their zone of inhibition. Silver nanoparticles of Eucalyptus (*Eucalyptus radiata*), Pepal (*Ficus religiosa*) and Clove (*Syzygium aromaticum*) showed the best results against all pathogenic strains of *P.aeruginosa*. Plant extracts and antibiotics showed minimal or no effect against the pathogenic strains as the p-values were 0.99 and 0.94 respectively as indicated by the results of one way ANOVA. This showed the resistance that is being developed in *P.aeruginosa*. Further post-hoc analysis by bonferroni test indicated that Pepal (*Ficus religiosa*) extract showed comparatively high antibacterial effects than other extracts. Eucalyptus (*Eucalyptus radiata*) and Jamun (*Syzygium cumini*) showed good antibacterial effects. All the pathogenic stains were susceptible to antibiotic Ciprofloxacin and Levofloxacin as indicated by their zone of inhibition. Metronidazole showed no effects that indicated that bacteria are resistant to it. Maximum zone of inhibition was shown by Pepal (*Ficus religiosa*) silver nanoparticle with value of 20.5 ± 0.20 mm. Zone of inhibition for Eucalyptus (*Eucalyptus radiata*) was 14.6 ± 0.20 mm. Clove showed antibacterial activity for only few pathogenic strain and the value of zone of inhibition was 14.8 ± 0.31 mm. This study concluded that *P.aeruginosa* which is an opportunistic pathogenic bacteria, is involved in various respiratory infections of infants. Antibiotic resistance has been developed in it due to misuse and overuse of antibiotics. It is recommended to replace antibiotics with other biological tools i.e. Nanoparticles and Plant extracts, to overcome the evolution of resistance in *P.aeruginosa*. Silver nanoparticles of Pepal (*Ficus religiosa*), Clove (*Syzygium aromaticum*) and Eucalyptus (*Eucalyptus radiata*) have great potential and can be used as an antibacterial agent against *P.aeruginosa*.

Keywords: Antibiotic resistance, nanoparticles, Plant extracts, Pathogenic bacteria, zone of inhibition, Antibiotics