

ABSTRACT

The present study was conducted to isolate and characterized bacteria from water sample taken at Head Islam in River Sutlej, City Hasilpur, District Bahawalpur. Identification of isolated bacterial strains were done by morphological characterization. Identification was confirmed by growing isolated bacteria on selective media. Physicochemical parameters like pH, temperature, TDS, colour, odour, TSS, TS, DO and total hardness were also observed to evaluate the quality of river water. Antibiotic resistance test was also performed to observe the resistance of bacteria against two antibiotics *i.e.* All six strains showed resistance against cefixime. Strain 3 was most susceptible against meronem while Strain 4 showed minimum susceptibility against meronem. Blood agar test was done which resulted in identification of different pathogens. Out of 9 strains only 6 strains showed alpha and beta haemolysis while 3 strains showed gamma haemolysis. Different nanoparticles and plant extracts were also used to check the antibacterial activity and zone of inhibition. There was no significant difference in antibacterial activity of nanoparticles ($p > 0.05$) and results of stem and leaf extract of *Carissa opaca* showed strong antibacterial activity. Optimum pH and optimum temperature were also observed to check the growth rate at pH 6, 7 and 8 and at different temperatures respectively using spectrophotometer. Isolates identified from River Sutlej *Escherichia coli*, *Staphylococcus aureus*, *Streptococcus pyogenes*, *Pseudomonas aeruginosa*, *Streptococcus pneumonia* and *Lactobacillus acidophilus*. The study concluded that Pathogens present in river water cause different types of infections in humans. Because of misuse and over use of antibiotics to treat infections, bacteria have developed resistance against these antibiotics. It is recommended that different biological tools like plant extracts and nanoparticles should be tested more as antibacterial tools against which pathogens might not developed resistance.

Keywords: Physicochemical parameters, antibacterial activity, antibiotic resistance, 16SrRNA gene