Abstract

Antimicrobial resistance (AMR) has become a huge problem all over the world including Pakistan. Usually β-lactam antibiotics like penicillin, cephalosporin, carbapenem and monobactams are used as first line drugs against common clinical infections. Beta-lactam antibiotics prevent the synthesis of cell wall in bacteria and making them susceptible to death.

Enzyme production (ESBL, MBL) is a most potent mechanism of resistance among gram negative bacteria. Beta lactamases are enzymes that can hydrolyze the β-lactam antibiotics.

A total of 1200 clinical samples including urine, catheter tips, pus, blood and high vaginal swabs (HVS) were collected from the in-doors and out-door patients of tertiary care hospitals Rahim Yar Khan from August, 2014 to September, 2015. Urine has been the most frequently collected samples followed by pus, HVS, blood and catheter tips. *E.coli*, *K. pneumoniae*, *Pseudomonas* spp. .*Acinetobacter* spp. and *Enterobacter* spp. were isolated from clinical samples. Antimicrobial susceptibility showed highly resistant strains of *Enterobacters*pp.,*E.coli, K. pneumoniae, Acinetobacter* spp. and *P. aeruginosa* against amoxicillin-clavulanic acid, ceftriaxone, ceftazidime, ciprofloxacin, Amikacin and Aztreonam. ESBL detection was done by using double diffusion test. ESBL production was observed in 63% of *Enterobacter* spp. followed by 50% *E. coli,* 38% *K. pneumoniae,* 33% *P.aeroginosa and* 21% *Acinetobacter* spp. Carbapenamase production was detected by two phenotypic screening disk diffusion synergy test and Modified Hodge test. Out of all carbapenemase resistant isolates 47% were positive for carbapenemase production in *Acinetobacter* spp. followed by 19% in *E. coli*, 18% in *Enterobacter* spp., 12% in *K. pneumoniae* and 7% in *P. aeruginosa* respectively.

ABSTRACT

Pretreated wheat straw was used to detect inhibitory compounds formed as a result of pretreatment process. The effect of inhibitory substances, mainly phenolic compounds, on saccharification was studied. Different methods were used for the removal of phenolic compounds which included washing with water, treatment with activated charcoal, solvent extraction and overliming. The untreated wheat straw showed 19% of saccharification and Total Phenolic Content (TPC) as 188 mg GAE/g DW. Washing of biomass with distilled water for 60 min showed slight decrease in TPC 177 mg GAE/g DW and little increase in saccharification 19.6%. However, use of activated charcoal resulted in decreased saccharification 14.9% despite the decrease in TPC 161mgGAE/g DW. Solvent extraction using propanol resulted in 26% saccharification and 98mg GAE/g DW of TPC. Among all the methods tested, overliming resulted in maximum removal of phenolic compounds and saccharification. The process was optimized and best results were obtained by using $Ca(OH)_2$ solution of pH 12, for 2 hrs at 80°C showing 77.5 mg GAE/g DW of TPC and 45% saccharification. These results account for almost 2.3 folds increase in saccharification. Scanning electron microscopy of untreated and treated samples was also carried out for comparison.