

In the present study, the fungal flora of Laam Leek Forest and Purdon Forest, Kumrat valley KP was investigated. During this study, eight mushrooms from the families Agariceaceae, Cortinariaceae, Russulaceae, Helvellaceae, Psathyrellaceae, and Strophariaceae were collected, characterized, and biologically screened for their pharmacological properties (antioxidant, antibacterial, anticancer potential). On the basis of morpho-anatomical characteristics, mushrooms were categorized. FTIR spectroscopy of five mushrooms (*Ploliota squarrosa*, *Lepoita magnispora*, *Psathyrella candolleane*, *Helvella elastic*, *Cortinarius crassustipus*) using revealed the presence of various antioxidant functional groups, including alcohol, phenols, carbonyl, and halogens. *L. magnispora* showed different groups like C-H, N=H, S=O, C-O, C=C stretching. *P. candolleane* showed different peaks at 988.46-3271.70 having different groups O-H, C-H, C=C, O-H, S=O C=C stretching. *C. crassustipus* showed four peaks at 986.99-3263.17 wave number. *H. elastic* also showed four different peaks having four functional groups. Afterwards, *Phiolota squarrosa* was used for the green synthesis of BaO nanoparticles. Different structural characterization of BaO nanoparticles i.e. XRD, UV Vsi and FTIR was done. *P. squarrosa* and BaO nanoparticles, both of them were selected for further investigation of their role as antibacterial, antioxidant and anticancer agents. The FTIR spectrum of *P. squarrosa* and the BaO NPs that was prepared from that mushroom extract showed the C-N, S=O, C=C, C-H and N-O groups showed that these functional group are rich in pharmacological activities due to the abundant in secondary metabolites. Moreover, anti-bacterial potential of total mushrooms extract of four mushroom and Ba+2 nanoparticles were determined by disc diffusion method against four bacterial strains (*Bacillus subtilis*, *Escherichia coli*, *Staphylococcus aureus* and *Klebsiella pneumonia*) at 4 different concentrations (1, 2, 3, 4 mg/ml). All the mushroom samples showed zone of inhibition against all bacterial strains, however Ba+2 nanoparticles had no antibacterial potential. Futhermore, the antioxidant potential of all mushrooms and Ba+2 nanoparticles was determined by DPPH radical scavenging array. All the samples showed antioxidant potential. The anticancer potential of the selected testing samples (*P. squarrosa* and Ba+2 nanoparticles) was also studied. The beneficial role of aqueous extracts of test samples against CCl<sub>4</sub>-induced hepatotoxicity in Balb C mice was evaluated. Blood plasma enzyme activities were altered as a result of CCl<sub>4</sub>-induced hepatotoxicity, which caused an increase in ALAT, ASAT, ALP, LDH, and MDA but a decrease in catalase. Also increased in level of bilirubin, when selected test samples were delivered intraperitoneally, the CCl<sub>4</sub>-induced damage was mitigated. Laam Leek and Purdon forest, Kumrat valley KP proved to be good fungal diversity spot. The selected mushrooms have good biological screening properties that could also be used as a benchmark in the pharmaceutical industry.