In this study, twenty Lactobacillus plantarum strains which were isolated from the fecal samples of humans were investigated in vitro for their characteristics as potential new probiotic strains. The L. plantarum strains were examined for resistance to gastric acidity in simulated gastric juice at pH 2.0, 2.5, 3.0, and 3.5. The growth of test cultures with different pH was monitored after 0, 10, 30, 60, 90, and 120 min of incubation using a spectrophotometer at 550 nm. At the same time, samples were serially diluted in sterile PBS, and counts of viable bacteria were determined by plating counts using MRS agar for each pH and time parameter. The strains were also examined for resistance to 0.4% phenol, production of H2O2, adhesion to Caco2 cell line, and antimicrobial activity. It was determined that the artificial gastric juice, even at pH 2.0, did not significantly change the viability of the cultures. Except L. plantarum AA12, all strains were detected at 8 similar to 9 log (10) CFU/g. It was found that all L. plantarum strains showed good resistance to 0.4% phenol, and only one strain (AC18-82) produced H2O2. Good adhesion of L. plantarum strain to Caco-2 cells was observed in this experiment. These selected strains also showed antimicrobial activity.