Brassicaceae vegetables are considered as a food all over the world. Brassica species are known for their high fat and protein contents for human and animal consumption. Hence Brassicaceae vegetables are also recognized as a rich source of nutrients such as vitamins, and different groups of phytochemicals such as indole phytoalexins, phenolics and glucosinolates. All these phytochemicals are reported as antioxidant, anticarcinogenic, and cardiovascular protective activities of Brassica vegetables. The present work was carried out to investigate the anti-hyperglycemic, antioxidant and angiotensin converting enzyme inhibitory activity which is responsible to inactivate bradykinin and reducing blood pressure. White albino rats were rendered diabetics by intraperitoneal administration of alloxan. Oral administration of ethanolic extract of *Brassica oleracea* L. was given orally for 30 days. Experimental results showed that alloxan significantly raised the blood sugar level where as ethanolic extract of *Brassica oleracea* L. depressed the alloxan induced high blood sugar level and it revealed significant changes in lipid profile, carbohydrate metabolizing enzymes, lipid metabolic enzymes, hepatic markers level, total protein and membrane ATPase. This study strongly proved that the red cabbage extract accredited its important antidiabetic activity on experimental diabetic rats. Hypertension is recognized as leading risk factor rising across the world. Angiotensin converting enzyme inhibitor (ACEI) is identified as a main therapeutic goal to control high blood pressure. This research work carried out the ACE inhibitory property of *Brassica oleracea* L. extract. *Brassica oleracea* L. was fermented by *Bacillus subtilis* JSKRSB1 and production of biologically active compounds were examined with different fermentation time. A novel *B. subtilis* JSKRSB1 was used for bioconversion of plant into bioactive compounds such as α-amylase, protease, angiotensin I converting enzyme inhibitory activities were proportionately increased with fermentation time. With the help of in silico methods *Brassica oleracea* L. phytocompounds retention time, molecular formula, molecular weight were analysed. From the docking interactions we observed that the presence of Arg 522, Glu411, His 387 are favoring the bonded and non bonded interactions with the docked ligands. These studies suggest that residue Arg 522, Glu411, His 387 in the active site of ACE should be considered during designing of novel ACE inhibitors. Overall *Brassica oleracea* L. extract showed ACE inhibition invitro and insilico which needs further investigations using animal and human clinical trials.