

ABSTRACT

The current study looked at the diabetes treatment potential of fruits and peels extracts from *Cucumis sativus* and *Cucumis melo* plants. The extracts were made by utilizing ultrasonication for methanol ethyl acetate, chloroform, n-hexane, and water for 30 minutes.

To remove moisture, the extracts were freeze-dried at -60°C for two days. The total phenolic and flavonoid contents of ultrasonicated and freeze-dried extracts were determined. DPPH radical scavenging assay was used to determine antioxidant activity.

According to current findings, the most potent extract was the methanolic extract of *C. sativus* peels. The polyphenol and flavonoid contents of both plants were high in methanolic extracts, but the methanolic peels extract of *Cucumis sativus* had shown the highest amounts of polyphenols and flavonoid contents (21.80 ± 1.04 mg GA/g DE and 15.45 ± 1.32 mg RE/g DE respectively.)

The antioxidant potential of various solvent extracts was conducted by the DPPH scavenging method. In terms of 2, 2-diphenyl picrylhydrazil activity, all extracts of both plants displayed antioxidant activity, and methanolic extracts of both plants showed significant DPPH activity, however, the methanolic extract of *C. sativus* peels exhibited the highest antioxidant potential with IC_{50} value of 36.02 ± 1.22 $\mu\text{g/ml}$ comparable with BHA.

The anti-inflammatory activity of fruits and peel extract was estimated using an albumin protein denaturation assay. The results are presented as IC_{50} the peel extract of *C. sativus* had the highest anti-inflammatory activity due to the lowest IC_{50} value i.e. 38.34 ± 0.33 among all extracts was comparable with diclofenac sodium.

The anti-obesity and anti-diabetic potential of fruits and peels of both was determined using an enzyme inhibition assay. The methanolic extract of peels and fruits of both plants had shown the enzyme inhibition potential. The current finding is expressed IC_{50} value. The methanolic extract of *C. sativus* peels has the lowest IC_{50} value (46.49 ± 4.24 $\mu\text{g/mL}$, 42.34 ± 1.23) $\mu\text{g/mL}$ for both enzymes pancreatic lipase and alpha-glucosidase.

The optimization was carried out using the experiment design software version 13.01 and three independent design variables were chosen: solvent composition (40-100%), extraction temperature ($21-54^{\circ}\text{C}$), and extraction time (17-43 minutes). The best extraction conditions, as

determined by a mathematical model, were 70% methanol composition, 37° C extraction temperature, and 30 minutes extraction time. In these optimized conditions, the TPC (Total Phenolic Content) extraction yield was 22.055 mg GA/g DE.

The secondary metabolites profile of the methanolic extract of *C.sativus* fruit peels underwent FTIR and HPLC analysis. At different retention times of 2.458, 2.2952, 3.666, 4.086, 5.287, and 7.797 min, HPLC analysis of a methanolic extract of *C.sativus* peels revealed the presence of various compounds such as caffeic acid, protocatechuic acid, gallic acid, kaempferol, chlorogenic acid, and vanillic acid.

The proximate analysis revealed that *C. sativus* peels have high nutritive value. The mineral composition analysis revealed the presence of Pb, Ca, Ni, Co, Mg, Na, and K in reasonable amounts. The *C. sativus* peel extract also showed negligible toxicity in hemolytic assay and acceptable thermal stability.

Significant in vitro activities and phytochemical profiling encouraged to investigate of the anti-obesity, anti-diabetic and immunity-enhancing potential of methanolic plant extracts in albino mice. Obesity was induced in mice by HFD therapy and diabetes was induced in the mice by giving a single injection of Alloxan. The mice treated with 450 mg/kg body weight extract showed significant reductions in blood glucose levels, total cholesterol levels, and LDL levels. The results were comparable to Glucophage. The waste material in the form of *C. sativus* peels is a rich pool of medicinally important compounds and can serve as a low-cost and natural source to reduce the socio-economic burden due to metabolic disorders.