

ABSTRACT

The present research aimed to fractionate *Solanum nigrum* L (SNL), *Xanthium strumarium* L (XSL), *Sonchus asper* L (SAL), and *Euphorbia helioscopia* L (EHL) foliage phenolics into a set of solvents. Besides, the essential oil (EO) of all the selected herbs was extracted via hydrodistillation. All the fractions and essential oils were evaluated for their in-vitro antioxidant activities and in-vivo antidiabetic potential against alloxan monohydrate-induced diabetic mice. The essential oils were extracted from fresh plant leaves by hydrodistillation using a Clevenger-type tube offered maximum oil yield (% w/w) for *X. strumarium* 0.35 ± 0.01 followed by the *E. helioscopia*, *S. nigrum*, and *S. asper*, 0.28 ± 0.01 , 0.24 ± 0.02 , and 0.15 ± 0.03 , respectively. The total phenolic content (TPC) of all fractions and crude powder estimated by the Folin-Ciocalteu reagent was observed in the case of ethyl acetate solvent in increasing order of *S. nigrum* > *X. strumarium* > *S. asper* > *E. helioscopia* with TPC values 110.06 ± 1.65 mg GAE/g, 95.25 ± 1.41 mg GAE/g, 90.20 ± 1.80 mg GAE/g, and 84.50 ± 1.05 mg GAE/g, respectively. It was interesting to note that the TPC in ethyl acetate fractions were higher than the crude powder whereas those found in ethanol, petroleum ether and water fractions were smaller. The results of the DPPH assay are expressed as IC₅₀ value, and the antioxidant potential of ethyl acetate fractions of *S. nigrum*, *X. strumarium*, *S. asper*, and *E. helioscopia* was found to be 33.21, 46.11, 58.12, and 60.13 $\mu\text{g/mL}$, respectively. Likewise, TPC, the radical scavenging activity of ethanol, petroleum ether and water fractions were smaller than that of ethyl acetate. The IC₅₀ value of essential oils was observed to be 56.81, 73.20, 81.94, and 87.15 $\mu\text{g/mL}$ for *S. nigrum*, *X. strumarium*, *S. asper* and *E. helioscopia*, respectively. The results showed that the ethyl acetate fraction of *S. nigrum* offered the highest FRAP value of 0.32 ± 0.03 μg ascorbate/g followed by the *X. strumarium* (0.24 ± 0.06 μg ascorbate/g), *S. asper* (0.23 ± 0.02 μg ascorbate/g) and *E. helioscopia* (0.22 ± 0.02 μg ascorbate/g). Gas Chromatography-Mass Spectrometry analysis of essential oils of selected herbs disclosed the presence of nineteen potential compounds identified in *S. nigrum* essential oil including citronellol (14.6%), hexadecenal (11.3%), β -pinene (5.5%), geraniol (4.9%), and hexacosane (4.7%). Similarly, *X. strumarium* essential oil contained major compounds limonene (25.5%), borneol (12.1%), bornyl acetate (6.0%), β -cubebene (5.5%), and sabinene (4.5%). Sixteen compounds were identified in the *E. helioscopia* essential oil and the major components found were borneol (12.1%), menthol (7.12%), limonene (5.5%), β -

cubebene (5.4%), p-cymene (4.5%), and fifteen compounds were found in *S. asper* essential oil and the key components were limonene (8.5%), menthone (7.3%), β -citronellol (6.2%), β -cubebene (5.5%), bornyl acetate (5.0%), and phytol (4.5%). *In-vivo* antidiabetic potential and body weight change were determined after oral administration of all fractions and crude powder at a dose of 400, and essential oil 200, and 100 mg/kg body weight of all selected herbs for 18 days in alloxan-induced diabetic mice. The administration of plant fractions at 400 mg/kg of the body weight significantly ($p \leq 0.05$) reduced the blood glucose level of the experimental diabetic mice groups in a dose and time-dependent manner, whereas a similar trend was found for 200 mg of essential oil/kg of body weight. Overall, the decrease in mean blood glucose level for ethyl acetate, crude powder, ethanol, petroleum ether, and water fraction of *S. nigrum* was 53, 33, 32, 9 and 3 %, respectively. Besides, ethyl acetate, crude powder, ethanol, petroleum ether and water fractions of *X. strumarium* reduced the mean blood glucose level by 38, 22, 19, 9 and 3 %, respectively. Similarly, a decrease in mean blood glucose level by 30, 20, 17, 6, 2 % and was observed for *S. asper* ethyl acetate, crude power, ethanol, petroleum ether, and water fractions. Finally, *E. helioscopia* reduced the mean blood glucose level by 14, 8, 7, 3, and 1 %, respectively. The decrease in mean blood glucose level observed for essential oils of *S. nigrum*, *X. strumarium*, *S. asper*, and *E. helioscopia* (administered at 200 mg/kg body weight) was up to 30, 24, 17, and 8 % respectively. By comparing the antidiabetic effect of fractions and essential oils of selected herbs it was observed that the ethyl acetate fractions of *S. nigrum* and essential oil of the same plant offered higher antidiabetic potential. Overall, it can be speculated that ethyl acetate and ethanol may work efficiently for the enrichment of the phenolics without compromising their antidiabetic potential and the essential oil extracted from aerial parts of selected herbs offered higher antioxidant and antidiabetic activities. The observed results suggest a more comprehensive evaluation of studies regarding the hypoglycemic potential of selected herbs.