Antioxidant and Cytotoxic Activities of Proanthocyanidins of the Bark of *Thespesia populnea* (L.)

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Thespesia populnea is a tree that belongs to the family Malvaceae. In Sri Lanka it is commonly known as Gan-suriya. Almost all the parts of the tree have been utilized traditionally as medicine to treat skin and liver diseases, hemorrhoids, diarrhea, etc. Additionally, in Sri Lanka the bark of the tree is been utilized for the treatment of cancers. The phytochemical analysis of the aqueous ethanolic extract of the bark revealed the presence of flavonoids, saponins, sterols and alkaloids and the absence of anthraquinones in accordance with published data. Most importantly this study revealed the presence of proanthocyanidins, which has not been reported before. Ethyl acetate and aqueous soluble proanthocyanidin fractions (EASPA and AQSPA respectively) were extracted according to a previously published method with minor modifications. They were purified by chromatography on Sephadex LH-20. Acid catalyzed cleavage and Prussian blue tests revealed that proanthocyanidins have been successfully separated from other phenolics. The yields of purified EASPA and AQSPA fractions were 0.04% and 0.64% (by weight) of the fresh bark. Acid catalyzed cleavage followed by TLC studies of both EASPA and AQSPA fractions alongside anthocyanidin working standards, cyanidin, delphinidin and pelargonidin isolated from pomegranate arils under acidic conditions showed the presence of cyanidin and delphinidin, suggesting that they are composed of (epi)catechin and (epi)gallocatechin units with (epi)catechin being more abundant compared to the other.

The preliminary antioxidant activity of purified EASPA and AQSPA fractions were determined using the DPPH assay according a previously published method with some modifications. According to the DPPH assay the IC_{50} values of EASPA and AQSPA fractions were 0.0725 mg/mL and 0.0781 mg/mL respectively and that of ascorbic acid was 0.125 mg/mL. Ascorbic acid is an established standard used for antioxidant studies. The IC_{50} values of the proanthocyanidin samples are clearly lower than the standard. Therefore, samples possess higher antioxidant capacity than ascorbic acid. In addition, the cytotoxic effect of purified EASPA and AQSPA fractions against MCF 7 cell line was determined using the Sulphorhodamine B (SRB) assay according to a previously reported method. According to this study both EASPA and AQSPA fractions exhibited cytotoxic activity. For EASPA and AQSPA fractions the IC_{50} values after 24 hours were 266.8 µg/mL and 186.1 µg/mL while after 48 hours they were 150.0 µg/mL and 150.8 µg/mL respectively.

Conclusion

For the first time we report the presence of proanthocyanidins in the bark of *Thespesia populnea*. Proanthocyanidins have been successfully extracted and purified from other phenolics. They consist of (epi)catechin and (epi)gallocatechin monomeric units and possess antioxidant and cytotoxic activities.

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References

1. Sheetal, A. M. S. B., Srinivasa, M., Kalola, J. and Rajani, M., 2007, *Journal of Natural Remedies*, ***7*** (1), 135-141.
2. Foo, L. Y. and Porter, L. J., 1980, *Phytochemistry*, ***19*** (8), 1747-1754.
3. Brand-Williams, W., Cuvelier, M. E. and Berset, C., 1995, *Food Science and Technology*, ***28*** (1), 25-30.
4. Samarakoon, S. R., Thabrew, I., Galhena, P. B., De Silva, D. and Tennekoon, K. H., 2010, *Pharmacognosy Research*, ***2*** (6), 335-42.