

# *Summary*

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## SUMMARY

- The present study was planned to evaluate the efficacy of *Allium cepa* by screening the primary phytochemicals, free radical scavenging activity, antimicrobial and antihelminthic activity in different extracts (aqueous, ethanol, chloroform and petroleum ether).
- Water content of *A. cepa* was higher in small onion followed by white and red onion respectively. Organic content in red, white and small onions were 16.24%, 15.38% and 7.40%, while total ash content was 3.26%, 4.02% and 2.60% respectively.
- The preliminary phytochemical analysis on the aqueous, ethanol, chloroform and petroleum ether extracts of *A. cepa* revealed the presence of steroids, triterpenoids, flavonoids, phenols, tannins, alkaloids, saponins, acid, carbohydrates, glycosides and proteins, suggesting the richness of phytochemicals. However, among different extracts of *A. cepa*, ethanolic extract of small onion was found to have more phytochemical constituents when compared with other extracts.
- Ethanolic extract of *A. cepa* (small onion) showed the presence of total phenolic rich constituents (TPC) such as quercetin, kaempferol, ferrulic acid and protocatechuic acid. However, quercetin was found to be the highest (40.25%) followed by kaempferol (23.65%) suggesting the source for potential antioxidant properties.

- The *in vitro* studies on DPPH, nitric oxide and superoxide anion radical scavenging study showed strong dose-dependent free radical scavenging ability in different extracts of *A.cepa* varieties.
- Free radical-mediated DNA damage assay exhibited dose-dependent synergistic action of phytochemicals, present in the different extracts of *A.cepa* when analyzed for scavenging ROS, repairing DNA and metal chelating potential.
- Antimicrobial property of the aqueous, ethanol, chloroform and petroleum ether extracts of *A.cepa* varieties are evidenced from the present investigation.
- Petroleum ether extract of red onion has potent antibacterial activity whereas the white onion has potent antibacterial and fungal activity in the ethanolic and chloroform extracts. However, the small onion has potent antibacterial activity in the aqueous extract. Therefore, different extracts of the edible part of *A.cepa* inhibited the growth of the several Gram positive, Gram negative and fungi species in culture may be due to the presence of flavonoids, polyphenols and secondary metabolites in the plant extract.
- Aqueous, ethanol, chloroform and petroleum ether extracts of *A.cepa* varieties revealed that all the bulb extracts of onion have antihelminthic activity. However, the small onion showed higher efficacy in destroying the survival of *C.cotylophorum* in all the extracts.
- In conclusion, the screening of antioxidant, antimicrobial and antihelminthic activity performed on traditionally used *A.cepa* bulb extracts shows that they

are endowed with potentially exploitable free radical scavenging, antihelminthic and antimicrobial activity. Phytochemical constituents and total phenolic contents (quercetin and kaempferol) present in the onion varieties could have contributed for the efficient inhibition of Gram positive, Gram negative bacteria and fungi along with anti-parasitic effect. Hence, bulb extracts of *A. cepa* varieties could be used as an easy accessible source of natural antioxidants, antimicrobial and antihelminthic agent and therefore, use of onion bulb can be considered as one of the therapeutic phytomedicines. However, further purifications of the active compounds and *in vivo* evaluation of antioxidant, antimicrobial and antihelminthic factors along with toxicity studies of the extracts from *A. cepa* are therefore suggested for further studies.

- The small onion with high water content and least organic content is proved to possess high antibacterial activity in the water extract.
- White onion exhibited high antibacterial and antifungal activity in the ethanol extract.
- Red onion was not comparable with the other two varieties in the present investigation in all the extracts used.
- Again only the small onion registered high antihelminthic activity in its water extract.

- However, small onion in its ethanolic extract registered high DPPH radical, nitric oxide, superoxide anion scavenging activity. Protective effect of DNA sugar damage is also shown to be high in the ethanolic extract of small onion.
- This investigation suggests the consumption of small onion may promote the natural antimicrobial, antihelminthic and immune activities.