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Allium cepa L., a potential hepatoprotective and antituberculosis agent

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The pharmacological effects of *Allium cepa* L., commonly known as onion, are attributed to its phenolic and flavonoid compounds. In this study, we investigated the pharmacological properties of three varieties of onion (red onion, white onion, and desiccated onion) by evaluating their antioxidant, antimicrobial, antitubercular and hepatoprotective activities. The Soxhlet extraction technique with four solvents was employed to obtain a total of 28 extracts from the onion bulb, skin, and dried powder. The extracts were subjected to various analyses, including yield determination, phytochemical testing, measurement of total phenolic contents (TPC) and total flavonoid contents (TFC), as well as *in vitro* antioxidant assays such as DPPH radical scavenging, hydroxyl radical scavenging, and superoxide radical scavenging methods. Additionally, *in vitro* antimicrobial activity of the extracts was assessed against two Gram-positive bacteria, two Gram-negative bacteria, and two fungi. The *in vitro* antitubercular activity was evaluated using the Microplate Alamar Blue Assay (MABA). Furthermore, we investigated the *in vivo* hepatoprotective activity of the bioactive extracts by using paracetamol-induced and isoniazid-rifampicin-induced hepatotoxicity models. Our results revealed that the red onion skin extracts exhibited higher levels of TPC and TFC compared to other extracts. Additionally, the red onion skin extracts displayed promising antioxidant and antimicrobial activity, while the red onion dry extracts showed significant antimicrobial and antitubercular activity which was statistically tested at 5% significant level. Notably, the hydro-alcohol extract of red onion skin and the ethyl acetate extract of dry red onion demonstrated notable antitubercular and hepatoprotective properties at $P<0.05$. These findings indicate the potential of these extracts for further comprehensive pharmacological evaluation.

Keywords: Antimicrobial,Antioxidant, *In vitro* antitubercular activity, *In vivo* hepatoprotective activity, Liver, Microplate alamar blue assay (MABA), Red onion skin extracts, Tuberculosis