It is well established that ionizing radiation causes damage to DNA. Exposure of individuals to ionizing radiation is quite frequent at certain work places (X-ray operators, Nuclear power plant workers); or to patients undergoing radio therapy, or at times during accidental exposure. Therefore, for such individuals it is crucial to develop or search compounds with potency to protect, modulate or mitigate the harmful insults of ionizing radiation.

Most radio-protectants are toxic at higher doses or at recurrent usage and are expensive as well. This has spurred interest in exploring natural products. Since plants or plant products have innumerable pharmacological properties and are often lesser toxic, less expensive and devoid of any known side effects, they have been the target in pursuit of radio-protectants.

In the present study, we first tried to compare possible ameliorative effects of aqueous and methanolic extracts from bark, stem and leaves of Alstonia scholaris against BLM-induced cytogenetic alterations in cultured human lymphocytes. The results indicated that the bark, but not stem or leaf possesses ameliorative effects. Based on the results so obtained, we challenged the second objective by investigating (qualitative as well as quantitative) phytochemicals present within the bark, stem and leaves of A. scholaris. Total glycosides, alkaloids, gums and mucilage were present in higher quantities in the bark as compared to stem and leaf, indicating their probable role in ameliorative effects. These results encouraged us to study probable mechanisms involved in amelioration and link the same with radio-protective property. The bark extracts exhibited total antioxidant and free radical scavenging potentials, suggesting their probable role in radio-protection and radio-modulation. Further, results of chemosensitive G2 assay indicated that bark extracts have DNA repair capabilities against BLM-induced DNA damage.

Lastly, we analysed radio-protective, radio-modulatory and radio-mitigatory properties of the methanolic and aqueous extracts from bark of Alstonia scholaris against radiation (2, 4 and 6Gy X-rays) induced DNA damage in the form of chromosomal aberrations (CAs) as well as micronuclei (MN) frequency from in vitro cultured human lymphocytes. To the best of our knowledge, this study is the first of its kind, where radio-protective, radio-modulatory and radio-mitigatory properties of Alstonia scholaris has been reported using cultured human lymphocytes.
This data has an important application for the protection of human lymphocytes from the genetic damage and side effects induced by X-ray irradiation in patients undergoing radiotherapy. However, an extended examination of actual and individual phytochemicals from the plant responsible for radio-protection, radio-modulation and radio-mitigation would help better understand the probable mechanisms and increase the applicability value of the plant.