

15th International Conference on ALTERNATIVE MEDICINE &
12th World Congress on ENDOCRINOLOGY AND METABOLIC DISORDERS
December 09-10, 2019 Bangkok, Thailand

Plant-based extracts possessing antioxidant and radioprotective properties with particular reference to *Zingiber* species

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Antioxidant and radioprotective properties of rhizome extracts of *Zingiber kangleipakense*, *Zingiber montanum*, *Zingiber officinale* and *Zingiber zerumbet* were assessed using various free radical assays. Both *in vitro* and *in vivo* models were used for radioprotective assays. Extracts were prepared using 60% methanol and 60% ethanol as solvents. Total phenol, total flavonoid and ascorbic acid contents were determined. Antioxidant properties of the extracts were determined using ferric ion reducing power assay, DPPH free scavenging assay, NO scavenging assay, metal chelating assay, thiyl free radical reactivity assay and OH free scavenging assay. For *in vitro* analysis of protection of radiation-induced damage was assessed using plasmid pBR322 DNA. Gamma radiation at 2 Gy was given to albino rats and examined *in vivo* radioprotective effects through chromosomal analyses as well as comet assay. The plant extracts showed different antioxidant and free radical scavenging activities according to the different assays. Among the four samples, *Z. officinale* and *Z. kangleipakense* were selected for *in vitro* and *in vivo* analyses for radioprotection. They have shown protection of pBR322 DNA *in vitro* and bone marrow cells of albino rat *in vivo* from gamma radiation induced damages. The plant extracts exhibited antioxidant properties but difference in their abilities to scavenge free radicals were observed which could be attributed to differential activities of polyphenols, flavonoids, ascorbic acid and other bio-active molecules present. Radioprotection of plasmid pBR322 DNA *in vitro* and bone marrow cells of rat *in vivo* from gamma radiation-induced chromosomal aberrations coupled with comet assay DNA damage analysis data show that the extracts possess significant antioxidant properties for scavenging free radicals largely through physico-chemical vis-à-vis biochemical pathways. The possibilities of these extracts, therefore, in radiation countermeasures coupled with regular dietary intakes provide immense nutraceutical potentials.

Biography

G J Sharma had PhD from Jawaharlal Nehru University, New Delhi and Post-Doctoral Research from Brunel University, London. He was a Visiting Professor at National Institute of Food and Nutrition Research, Rome. Retired as Professor (HAG) after 43 years of academic service, he continues as Emeritus Professor at Manipur University, Imphal. He was Dean, School of Sciences, Director, Department of Biotechnology and Coordinator, Centre of Advanced Study in Life Sciences. Has over 95 publications in international/ national journals, supervised 23 PhDs, participated in over 75 conferences and delivered 33 keynote/plenary/ invited lectures in conferences held in USA, UK, France, China, Netherlands, Italy, Japan, Singapore, Thailand, Korea and India. Reviewer of 25 international journals, he is currently Member, Scientific Panel on GMOs and Foods, FSSAI, Ministry of Health & Family Welfare, Government of India.

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