ANTICARCINOGENIC ASSESSMENT OF *MORINGA OLEIFERA* AND ITS ISOLATED SAPONIN IN ATTENUATUATION OF 7, 12-DIMETHYLBENZ[A]ANTHRACENE INDUCED HEPATIC CARCINOGENESIS

Veena Sharma*, Ritu Paliwal and Lokendra Singh[#]

Department of Bioscience and Biotechnology, Banasthali University, Banasthali-304022, Rajasthan, India
[#]Department of Botany, Meerut College Meerut
E-mail: drvshs@gmail.com, paliwal.ritu18@gmail.com

Abstract: The present investigation was carried out to elucidate anticarcinogenic potential of hydro-ethanolic extract of *M. oleifera* (MOHE) and its isolated saponin (SM) in attenuatuation of 7, 12-dimethylbenz[a]anthracene (DMBA) induced hepatocarcinogenesis in male mice. Single oral administration of DMBA (15 mg/kg) to mice resulted in elevated levels of xenobiotic enzymes, hepatic malondialdehyde, with reduction in hepatic glutathione content, superoxide dismutase, catalase and phase-II metabolizing enzymes such as glutathione-S-transferase. The status of hepatic biochemical markers and total protein content were also found to be decreased along with increase in total cholesterol in DMBA administered mice. Pretreatment with the *Moringa oleifera* and its isolated saponin orally for 21 days offered almost complete protection against DMBA induced tissue toxicity. The current investigation supports *Moringa oleifera* and its isolated saponin as a potent chemopreventive agent and suppresses DMBA-induced hepatic carcinogenesis in mice that might be due to decreased free radical generation.

Keywords: *Moringa oleifera*; 7, 12 dimethyl benz[a]anthracene, Hepatocarcinogenesis; Saponin, Xenobiotic, Mice

REFERENCES

Abei, H. (1983). Catalase. In: Methods in enzymatic analysis, Bergmeyer H.ed. New York: Academic press, **2:** 876-80.

Arabshahi, D.S.; Devi, V. and Urooj, A. (2007). Evaluation of antioxidant activity of some plant extracts and their heat, pH and storage stability. *Food Chemistry*, **100**: 1100–5.

Bharali, R.; Tabassum, J. Azad, M.R.H. (2003). Chemomodulatory effect of *Moringa oleifera*, Lam. on hepatic carcinogen metabolizing enzymes, antioxidant parameters and skin papillomagenesis in mice. *Asian Pacific Journal of Cancer Prevention*, **4**: 131-139.

Eesha, B.R.; Mohanbabu Amberkar, V.; Meenakumari, K.; Sarath, B.; Vijay, M.; Lalit, M. and Rajput, R. (2011). Hepatoprotective activity of *Terminalia paniculata* against paracetamol induced hepatocellular damage in wistar albino rats. *Asian Pacific Journal of Tropical Medicine*, **4**(6): 466-469.

El Mesallamy, H.O.; Metwally, N.S.; Soliman, M.S.; Ahmed, K.A. and Abdel Moaty, M.M. (2011). The chemopreventive effect of *Ginkgo biloba* and *Silybum marianum* extracts on hepatocarcinogenesis in rats. *Cancer Cell International*, **11**(1): 38.

Habig, W.H.; Pabst, M.J. and Jakoby, W.B. (1974). Glutathione S transferases. The first enzymatic step in mercapturic acid formation. *The Journal of Biological Chemistry*, **249**: 7130–7139.

International Agency for Research on Cancer (1983). IARC monographs on the evaluation of carcinogenic risk of chemicals to humans. Vol. 32. Polynuclear aromatic compounds, Part 1. chemical, environmental and experimental data. Lyon, France: International Agency for Research on Cancer.

International Agency for Research on Cancer (1987). IARC monographs on the evaluation of carcinogenic risk of chemicals to humans, supplement 7. Overall evaluations of carcinogenicity: an updating of IARC monographs volumes 1 to 42. Lyon, France: International Agency for Research on Cancer.

Jollow, D.J.; Mitchell, J.R.; Zampagilone, N. and Gillette, J.R. (1974). Bromobenzene induced liver necrosis. Protective role of glutathione and evidence for 3, 4-bromobenzene oxide as the hepatotoxic intermediate. *Pharmacology*, **11**: 151-69.

Lowry, O.H.; Rosebrough, N.J.; Farr, A.L. and Randall, R.J. (1951). Protein measurement with the Folin phenol reagent. *The Journal of Biological Chemistry*, **193**: 265–275.

Marklund, S. and Marklund, G. (1974). Involvement of super oxide anion radical in the auto oxidation of pyrogallol and convenient assay for SOD. *European journal of biochemistry*, **47**: 469-74.

Mohandas, J.; Marshall, J.J.; Duggin, G.G.; Horvath, J.S. Tiller, D.J. (1984). Differerential distribution of glutathione and glutathione related enzymes in rabbit kidney. *Biochemical Pharmacology*, **33**: 1801-1807.

Ohkawa, H.; Ohishi, N. and Yagi, K. (1979). Assay for LPO in animals tissue by thiobarbituric acid reaction. *Analytical Biochemistry*, **95**: 351-58.

Omura, T. and Sato, R. (1964). The carbon monoxide binding pigment of liver. *The Journal of Biological Chemistry*, **239**: 2370-2378.

Paliwal, R.; Sharma, V. and Pracheta. (2011a). A review on horse radish tree (*Moringa oleifera*): A multipurpose tree with high economic and

commercial importance. *Asian Journal of Biotechnology*, **3**(4): 317-328.

Paliwal, R.; Sharma, V.; Pracheta. and Sharma, S. (2011d). Elucidation of free radical scavenging and antioxidant activity of aqueous and hydro-ethanolic extracts of *Moringa oleifera* pods. *Research Journal of Pharmacy and Technology*, **4**(4): 566-571.

Paliwal, R.; Sharma, V.; Pracheta. and Sharma, S.H. (2011c). Hepatoprotective and antioxidant potential of *Moringa oleifera* pods against DMBA-induced hepatocarcinogenesis in male mice. *International Journal of Drug Development and Research*, **3**(2): 128-138.

Paliwal, R.; Sharma, V.; Pracheta; Sharma, S.; Yadav, S. and Sharma, S.H. (2011b). Antinephrotoxic effect of administration of *Moringa oleifera* Lam in amelioration of DMBA-induced renal carcinogenesis in Swiss albino mice. *Biology and Medicine*, **3**(2): 27-35.

Paraskevi, A. and Ronald, A. (2006). Hepato cellular carcinoma pathogenesis: from genes to environment. *Nature Reviews Cancer*, **6**: 1–14.

Parimalakrishnan, S.; Dey, A. and Manavalan, R. (2009). Effect of methanolic extract of *Cleome chelidonii* on drug metabolising enzymes, antioxidant status and chemomodulatory efficacy of mice. *Journal of Basic and Applied Sciences*, **5**: 37-46.

Parkin, D.M.; Bray, F.; Ferlay, J. and Pisani, P. (2005). Global cancer statistics, 2002. *CA Cancer Journal for Clinicians*, **55:** 74–105.

Parmar, J.; Sharma, P.; Verma, P.; Sharma, P. and Goyal, P.K. (2011). Modulation of DMBA induced biochemical and histopathological changes by *Syzygium cumini* seed extract during skin carcinogenesis. *International Journal of Current Biomedical and Pharmaceutical Research*, **1**(2): 24-30.

Ramakrishnan, G.; Augustine, T.A. and Jagan, S. (2007). Effect of silymarin on N-nitrosodiethylamine induced hepatocarcinogenesis in rats. *Experimental Oncology*, **29**: 39–44.

Reitman, S. and Franckal, S. (1979). A colorimetric method for the determination of serum glutathione oxaloacetate and glutamic- pyruvic transaminase. *Journal of Clinical Pathology*, **28**: 481-90.

Sadashivam, S. and Manickam, A. (2004). Phenolics. Biochemical Methods. New age publishers, (New Delhi), 193–194.

Satyanarayana, K. (1969). Chemical examination of *Scoparia dulcis* (Linn). *Journal of Indian Chemical Society*, **46**: 765-766.

Sharma, V.; Paliwal, R.; Janmeda, P. and Sharma, S.H. (2012a). Renoprotective effects of *Moringa oleifera* pods in 7, 12-dimethylbenz[a]anthracene exposed mice. *Journal of Chinese Integrative Medicine*, **10** (10): 1171-1178.

Sharma, V.; Paliwal, R.; Janmeda, P. and Sharma, S.H. (2012b). Chemopreventive efficacy of *Moringa oleifera* pods against 7, 12-dimethylbenz[a]anthracene induced hepatic carcinogenesis in mice. *Asian Pacifc Journal of Cancer Prevention*, **13**: 2563-2569.

Sharma, V.; Paliwal, R.; Pracheta. and Sharma, S. (2011). Phytochemical analysis and evaluation of antioxidant activities of hydro-ethanolic extracts of *Moringa oleifera* lam. Pods. *Journal of Pharmacy Research*, **4**(2): 554-557.

Singh, R.P.; Padmanathi, B. and Rao, A.R. (2000). Modulatory influence of *Adhatoda vesica* (Justicia adhatoda) leaf extract on the enzymes of xenobiotic metabolism antioxidant status and lipid peroxidation in mice. *Molecular and Cell Biochemistry*, **213**: 99-109.

Sparg, S.G.; Light, M.E. and van Staden, J. (2004). Biological activities and distribution of plant saponins. *Journal of Ethnopharmacology*, **94**: 219-243.

Traore, F.; Faure, R.; Ollivier, E.; Gasquet, M.; Azas, N.; Debrauwer, L.; Keita, A.; Timon-David, P. Balansard, G. (2000). Structure and antiprotozoal activity of triterpenoid saponins from *Glinus oppositifolius. Planta Medica*, **66**: 368-371.

Yates, M.S. and Kensler, T.W. (2007). Keap 1 eye on the target: chemoprevention of liver cancer. *Acta Pharmacologica Sinica*, **28**: 1331–42.

Zak, B. (1977). Cholesterol methodologies: a review. *Clinical Chemistry*, **23**: 1201-1214.