

Cancer: Back to kitchen-curcumin and its Analogs

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Editorial

Cancer is a group of diseases characterized by the uncontrolled growth and spread of abnormal cells. Many factors act together or in sequence to cause cancer including life style and hereditary. WHO documents cancers as the leading causes of death worldwide, with approximately 14 million new cases and 8.2 million cancer related deaths in 2012 which is estimated to rise by about 70% over the next 2 decade. Data indicates men are more vulnerable to lung, prostate, colorectum, stomach and liver cancers, while, in women breast, colorectum, lung, cervix, and stomach cancers were the predominant ones. More than 60% of world's total new annual cases of cancer occurrence are in Africa, Asia and Central and South America accounting to 70% of the world's cancer deaths. More than 30% of cancer deaths could be prevented by modifying lifestyle. By avoiding key risk factors, like tobacco, obesity, unhealthy diet and sedentary life, alcohol use, HBV and HPV-infections, the cancer can be prevented or delayed. About 20% global cancer deaths and 70% of lung cancer death are primarily caused by tobacco. Also, in many underdeveloped countries, upto 20% cancer deaths are due to infection by hepatitis B virus (HBV) and human papillomavirus (HPV).

Due to scientific proof of concepts and enhanced acceptability of herbal products in disease prevention and cures dreadful diseases like cancer are being targeted through natural compounds/extracts. Commercially available curcuminoids which is a mixture of curcumin (77%), demethoxycurcumin (17%) and bis-demethoxycurcumin (3%) have shown broad large of biological activities. Among them, curcumin, a bis- α , β -unsaturated β -diketone, possess multitude of biological activities such as antitumor, anti-carcinogen, anti-angiogenesis, chemoprevention and anti-rheumatoid activities among many more. National Cancer Institute (NCI) classified curcumin as

'generally recognized as safe' (GRAS) compound. Till date no toxicity has been reported in any animal and human studies even at extremely high doses. Worldwide, more than 65 clinical trials are underway for various therapeutic potential of curcumin for various diseases. The curcumin molecule is unique in its physiological effects in having a larger number of molecular targets than any other molecule. However, one of the major limitations of using curcumin as a drug is its poor plasma and water solubility. To conquer this boundaries, large number of synthetic analogues have been tried to screen for a molecule with better pharmacokinetics.

The physiological activity of a compound is largely determined by their structural and functional group, especially if they affect their receptor binding interactions. Structural variations also alter their pharmacokinetics, like absorption, distribution, excretion and metabolization. Extensive structure activity relationship studies have been carried out on the curcumin molecule, and a large number of synthetic analogues are known with better activity, bioavailability and solubility. It is also necessary that, along with synthetic analogues of curcumin, its naturally occurring analogues should also be studied exhaustively. Literature reports a number of naturally occurring bioactive compounds having some structural similarity to the curcumin molecule, or at least having a pharmacophore containing one aryl function with 3,4 substitution. These compounds include caffeic acid, chlorogenic acid, capsaicin, cinnamic acid, cassumuin, dibenzoylmethane, dehydrozingerone, eugenol, ferulic acid, gingerols, paradol zingerone and yakuchinone.

To avoid cancer, best way is to change lifestyle and include habits like regular exercise, intake of fruits and vegetables, avoidance of tobacco, smoke and drinks.