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Revulsive Action of Lycopene Over Lung Cancer.

D Subhashini*, and R Vaishali.

Department of Biotechnology, School of Bio and Chemical Engineering, Sathyabama University, Rajiv Gandhi Salai, Chennai-600 119.

ABSTRACT

Extricate radicals are innately originated in our body posterior to metabolism. They are entailed to uphold homeostasis autogenously in the cell. Howbeit, increased accretion impairs the DNA, enzymes, proteins or the cell itself; thereby they devastate host cell machinery and persuade cancer. Antioxidants are organic, biochemical molecules that intermingle with and counterbalance the free radicals, thus avert the cells from their antagonistic effect. Lycopene - a bright, red carotene is well known for its antioxidant property. They are spotted in innumerable fruits and vegetables. Out of which, fruit of farmed tomatoes (*Solanum lycopersicon*) is a chief source to endow 85-90% of lycopene. In the Indian diet, tomatoes usage is extremely familiar in culinary dishes. Ingestion of tomatoes indulges fortification from in vivo oxidative ravage. In so doing, they potentially thwart mutations conjoined with cancer inception and succession. Recurrent ingurgitation of tomato products was related with a noteworthy, debased peril of lung cancer. Oxidative stress is one of the premiers, reinforcing aid for lung cancer. Elevated dose of lycopene ensued in steeper lycopene amassment in the lung tissue, which hindered the venture of lung cancer by fencing agin the oxidative agony.

Keywords: Oxidative stress, Antioxidant, Lycopene, Anticancerous effectualness.

Corresponding author

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INTRODUCTION

Every single aerobic organism necessitates oxygen for their metabolism to eventuate felicitously in the cells. In the course of interim, there brings about a compendium of radicals called Reactive Oxygen Species (ROS), which interpolates unshackle radicals such as, hydroxyl radical ($^{\bullet}OH$), superoxide anion ($O2^{\bullet-}$) aside from disparate radicals like, singlet oxygen ($^1O_2$), hydrogen peroxide (H_2O_2) over and above. They took shape attributable to the pace wise diminution of molecular oxygen (O_2) by exorbitant energy revelation or electron transference response that gave rise to the reactive, parlous ROS [1].

De facto, ROS are coveted within the cell orderliness to uplift homeostasis. They are evolved just after illness in white blood cells such as neutrophils, eosinophils, monocytes, and macrophages through the whole of respiratory burst. Those ROS backfire with and extinguish the plundering pathogen. Even supposing, when their intensification builds up, they blemish the cell thereby they set off legion disorders namely aging, atherosclerosis, cardiovascular diseases, cancer, Diabetes mellitus and whatnot [2].

ANTIOXIDANTS AGAINST FREE RADICALS

Antioxidants could be vitamins, minerals or innate tinting ingredient that defend the body cells from the grievous upshot of unbound radicals, molecules that rise in the body by virtue of interaction with oxygen [6]. Nature has endowed each cell with adequate protective mechanisms against any harmful effects of free radicals. It includes superoxide dismutase (SOD), glutathione peroxidase, glutathione reductase, thioredoxin, thiols and disulfide bonding, vitamins E, C. Non-enzymatic antioxidants include carotenoids, flavanoids and related polyphenols, α-lipoic acid, glutathione etc are buffering systems in every cell.

LYCOPENE IN TOMATOES - A PUISSANT ANTIOXIDANT

Lycopene, indicatively a crimson coloured carotenoid, espied in ubiquitous fruits and vegetables. They pre-eminently enact as antioxidants when devoured [3]. Being a claret pigment, it has been gifted in apricot, papaya, pink grapefruit, pink guava, tomatoes, tomato sauce, watermelon [4, 5]. Centrally located, *Solanum lycopersicum* L., a distinguishing tomato species is tremendously plentiful in lycopene content of 85-90% [6, 7]. When cooked, they were not mutilated rather thermal energy upsurges their proportion in the frizzled food [7].

FRAMEWORK PROFILE OF LYCOPENE

Lycopene - a tetrapene encompassing 40 carbon atoms in addition to hydrogen atoms displaying eleven coadunated bonds along with two non coadunated bonds in its acyclic structure fits in the hydrocarbon class. Its outspread polyene chain is vastly at risk to electrophilic assaults [8]. It is perceived to unveil upward dexterity with regard to quenching of singlet oxygen [8, 9]. Henceforward, lycopene is terrifically reactive in opposition to oxygen and uncage radicals. In that way, it maneuvers as an omnipotent doer thereupon interdicting metastasis of tumor [8].

DOORWAY OF LYCOPENE IN THE HUMAN SYSTEM

In the small intestine, lycopene is slotted in the direction of through to lipid micelles hindmost to consumption. Bile acids and alimentary fats engender that micelle, which succor to mellow the hydrophobic lycopene coupled with infusion through the intestinal mucosal cells by a medium of passive conveyance. In the case of metabolism in the liver, chylomicrons imbibe lycopene after that they manumit them into the lymphatic system. On the other hand, lycopene in blood plasma ultimately combines with the low and very low density lipoproteins. In this manner, lycopene stagnants inside the cell [10, 12]. A pair of researchers reported the conglomeration of lycopene predominantly in fatty tissues, liver, adrenal gland and testes [11, 12].

LUNG CANCER

Cancer in the lungs withal identified as pulmonary carcinoma is a malicious lung tumor owing to unrestrained cell excrescence and unconstrained tissues of the lung. More than half of the lung cancer is

triggered because of extensive vulnerability in contact with soots of tobacco. Furthermore, asbestos, radon and druthers form of atmospheric effluence are the superfluous key factors. Perpetual disclosure to oxidative strain, human lung is defenseless towards oxidative infliction [8]. For this reason, oxidative stress is contemplated as the sole element for lung cancer. The indicia encircle cough, scantiness in breath; plummet in weight and chest throes.

PALTRY CONTRIVANCE OF LYCOPENE FEAT OVER LUNG CANCER

Instigation of apoptosis

In a normal cell, the production of bax protein is habitually at low degree. When the life span of the cell is concluded, the bax protein elevates forthwith they pass out signal to the cell, so that the cell would effortlessly undergo apoptosis, a self suicidal process.

Contrarily, in the cancer cell, there is a reduced amount of bax with a supreme production of Bcl-2 proteins. In this manner, the cancer cells meet with anomalous propagation. Lycopene has been recorded to switch Bax, Bad, Bid and Bcl-2 expression conjointly phosphorylation in dissimilar experimental archetypes [13].

Blockage of cell cycle

Whenever a cell organizes itself to mitosis, there would be a progression in the cell cycle phases: G0, G1, S, G2, M. Uttermost of mitosis, a solitary mother cell would be subdivided into duple daughter cells through the route of cytokinensis. Lycopene in lung cancer animal model prohibited the progression of cell cycle from G0/G1 to the S phase. By this means, the lung cancer cells were retrogressed by lycopene [14].

Down regulation of cholesterol pathway

To certain extent, biosynthesis network of cholesterol may evolve resilient to down regulation by cholesterol. This guides to irregular cholesterol disposition sequentially to stimulation of oncogene [15, 16].

In lung BEN cancer cells, lycopene treatment dose-dependently reduced intracellular total cholesterol by decreasing 3-hydroxy-3-methylglutaryl-coenzyme A (HMG-CoA) reductase expression. Such an effect was accompanied by Ras inactivation, as evidenced by the translocation of the protein from cell membranes to cytosol and by an arrest of cell cycle progression and apoptosis induction [17].

CONCLUSION

Lycopene has utmost supremacy for a wholesome, rational and a virtuous life. An assortment of its traits for instance: demarcating the cell growth, curbing the cellular proliferation, antioxidant activity, etc paves preponderant schema to subjugate the likelihood of cancer. As a matter of fact, lycopene is hugely clustered in tomato contrary to auxiliary fruits and vegetables. Forasmuch as tomato is enormously and swiftly obtainable in India and elsewhere, it could be summated to every day edible nutriment to downgrade the menace of cancer.

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