Volume 2019; Issue 01

Chronicles of Complementary, Alternative & Integrative Medicine

Review Article

Divya R, et al. Chronic Complement Altern Integra Med: CCAIM-100004

CURCUMIN: The Golden Nutraceutical from The Most Powerful Herb in the Planet-Turmeric!!

Divya R[1], Ashok V[2], Rajajeya kumar M[3*]

[1]Department of Physiology, Karpagam Faculty of medical sciences and research, Coimbatore, India. (Affiliated by Dr. MGR Medical University, Chennai).

[2]Department of Biochemistry, Karpagam Faculty of medical sciences and research, Coimbatore, India. (Affiliated by Dr. MGR Medical University, Chennai).

[3]Department of Physiology, Trichy SRM Medical College Hospital & Research Centre, Trichy, 621105. (Affiliated by Dr. MGR Medical University, Chennai).

[*]**Corresponding author:** Rajajeya kumar M, Department of Physiology, Trichy SRM Medical College Hospital & Research Centre, Trichy, 621105. (Affiliated by Dr. MGR Medical University, Chennai) Tel: +919751382650; Email: rajakumar60@gmail.com

Citation: Divya R, Ashok V, Rajajeya kumar M (2019) CURCUMIN: The Golden Nutraceutical from The Most Powerful Herb in the Planet-Turmeric!!. Chronic Complement Altern Integra Med: CCAIM-100004

Received Date: 16 March, 2019; **Accepted Date:** 19 March, 2019; **Published Date:** 25 March, 2019

Turmeric: The Most Powerful Herb in The Planet

Turmeric is one of the chief essential of Indian cooking. It is added flagrantly in the curries and various favoured Indian dishes [1].

Turmeric is considered of the top most herb nutrients in the world. It was utilised all-through the olden times by some of the most active health care benefactors in the world. A plant called *Curcuma longa*, native of India and other Southeast Asian countries producesTurmeric. The dried out root of this plant is pulverized to a characteristic colored yellow powder called the turmeric powder. The turmeric contains more than a few chemical composites called curcuminoids. Curcumin is the most dynamic compound of turmeric. It is because of the presence of Curcumin; turmericis called the functional food. According to the Mayo clinic, beyond basic nutritional benefits, functional foods have a significant positive effect on health of the user. Turmeric helps in fighting and possibly reversing the disease process. The health benefits of turmeric are amazingly massive and very methodically researched. Presently, more than 12,500 peer-reviewed research articles published across the world evidencing the health benefits of

turmeric, specifically one of its prominent therapeutic component, the curcumin [1].

Why Curcumin Is Called the Golden Nutraceutical?

Curcumin holds antimicrobial, anti - inflammatory, antidepressant, antioxidant, antidiabetic, antigrowth, antiarthritic, anticancer, antiaging, anti-atherosclerotic, memory - enhancing, wound healing properties. Furthermore, it also has radio sensitization, chemo sensitization and chemo preventive features [1,2]. For various illnesses like hepatic disorders, dermatitis, acne, gynaecological disorders, rash, infectious diseases, gastric infections, blood disorders, psoriasis, and other chronic disorders were treated using turmeric in customary Indian medicine [3] Various in vivo research demarcated the therapeutic potential of curcumin against various types of cancers, diabetes neurodegenerative disorders, atherosclerosispro - inflammatory diseases, depression and obesity [3].

Curcuminis Multifunctional

Curcumin acts as a multitargeted agent has been shown to exhibit anti - inflammatory action due the with holding of several cell signalling pathways such as NF - κB, STAT3, Nrf2, ROS and COX - 2 at the molecular level. It has been proven in more than a few studies that the curcumin has an extremely powerful antimicrobial agent and acts against innumerable chronic diseases such as obesity cancers, diabetes, and neurological autoimmune cardiovascular, pulmonary diseases. Moreover, curcumin has a synergistic mode of action when combined with the other nutraceuticals such as piperine, catechins, genistein, quercetin and resveratrol. So far, more than 100 diverse clinical trials done with curcumin, showed the tolerability, safety, and its efficacy against several chronic ailments in human beings [4].

Drawbacks in Utility of Curcumin

- Colour
- Lack of water solubility
- Poor absorption
- Rapid metabolism
- Rapid systemic elimination
- Low bioavailability

The efficacy of curcumin is pointedly stalled by its colour, absence of water solubility and low-slung bioavailability. Meagre absorption, swift metabolism and speedy systemic elimination are linked with the main reasons contributing to the low-slung bioavailability of curcumin in tissue and plasma. Under physiological conditions, its active methylene group and β - diketone moiety makes curcumin unstable[4].

Modified Curcumin Analogues/Derivatives

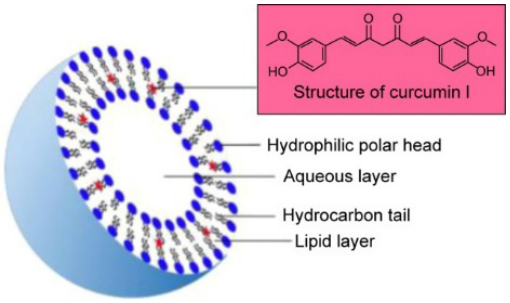
Diverse structural modifications resulted in active methylene and carbonyl substituted curcumin analogues. These derivatives possess enhanced antioxidant activity. Using different alterations in the chemical structure, several synthetic analogues of curcumin are obtained. The demethoxy curcumin and bidemethoxy curcumin are the natural analogues of curcumin which were testified to have a parallel bioavailability to curcumin [4].

Curcumin in Nanomedicine

Several techniques were used to augment the bioavailability of Curcumin, whichcomprises of the usage of liposomal curcumin, curcumin reformulated with various oils adjuvants, curcumin phospholipid complexes, curcumin nanoparticles, and conjugation of curcumin prodrugs with inhibitors of metabolism, and connecting curcumin with polyethylene glycol. The combination of synthetic curcumin analogues and usage of organizational analogues of curcumin plays a major part in the augmentation of its bioavailability [2,5-7].

Curcumin liposomes/CUR liposomes

Liposomes are used as an operative carrier to augment the targeting property, bioavailability and stability of conventional curcumin grounding methods. CUR liposomes (curcumin liposomes) are synthesised by Freeze-dried method, Reversed-phase evaporation method Thin-film hydration method for CUR, Solvent injection methods, Thin-film ultrasonic dispersion methodFreeze-thawing method, thin-film dispersion method. The new fangled formulations are Ligand-modified CUR liposomes, Long-circulating CUR liposomes, CUR nano liposomes [8].



Cur liposomes& Cancer

In various categories of cancer that includes, breast cervical, prostate, liver, lung and OS cancers CUR liposomes has exercised beneficial therapeutic properties. Because of its meagre solubility and decreased bioavailability the in vivo actions of CUR are insufficient. Liposomes delivers an operative drug delivery arrangement for CUR. The liposomes can enhance the antitumor and pharmacological activities of CUR, reduce the amount critical for targeting the tumour cells by altering the pharmacokinetics and pharmacodynamics of curcumin. In the liposomes, the Curcumin is merged in with many provisions like hyaluronic acid, silica, folic acid CS, PEG conjugates, CMD vitamin A, β-CD. Incorporation of CUR in liposomes is a flawless approach in cancer patients as the incorporation of the drug that is condensed in the liposomal nanoparticles can make cancer cells sensitive such as CUR, C6 ceramide in OS cell line [9].

Cancer type	Trial	Influential effect
Lung cancer	CUR liposomes effect on Lewis lung carcinoma LL/2 cell in mice	Made LL/2 cells stagnate in G2/M phase
	CUR-PEG-PEI liposomes on A549 cells	Enhanced cell delivery Better anticancer effect
	β-CD-CUR liposomes effect on A549 cells	Improved inhibition effect
	CUR with cholesterol-based cationic liposomes on A549 cells	Higher cytotoxicity Lower adverse effects
Cervical cancer	CUR-loaded cationic liposomes on Hela and SiHa cells	Increase cell apoptosis More cytotoxicity
	CUR-loaded CMD liposomes on Hela cells	Enhanced stability and cell delivery Protected from leak and longer retention time Stronger cytotoxicity
Prostate cancer	CUR liposomes in PC-3 human prostate cancer cells	Promoted drug uptake Higher inhibition with concentration- and time-dependence Had targeting activity
	CUR nanoliposomes on LNCaP and C4-2B cells	Improved the bioavailability and anticancer effect
	CUR liposomes with resveratrol effect on male B6C3F1/J mice	Improved CUR level in serum and prostate tissues Inhibited cell growth and induced apoptosis
Breast cancer	CUR nanoliposomes on MCF-7 cells	Inhibited cell cycle arrest and induced apoptosis with dose-dependence Enhanced bioavailability
	CUR-γ-CD liposomes on MCF-7 cells	Higher anti-tumor activity Lower adverse effects
Osteosarcoma	CUR nanoliposomes with C6 ceramide on KHOS cells	Induced G2/M arrest Enhanced cytotoxic effect
	CUR-γ-CD liposomes on KHOS cells	More uptake Promoted effectivity
Liver cancer	CUR liposomes on Bel-7402 cells	Better inhibited cell proliferation and induced apoptosis
	CUR cationic liposomes on HepG2 cells	Exhibited higher cytotoxicity[9]
Abbreviations: CUR: Curcumin; CD: Cyclodextrin; CMD: Carboxymethyl Dextran		

Table: Actions of liposome-based delivery systems of CUR on different types of cancers [9].

Conclusion

Curcumin is a low-priced polyphenol compound mined from *curcuma longa* that is profusely accessible and non-hazardous with unveiled medicinal values.The positive effects of curcumin against various diseases vastly applicable in current population has been proved. Research assures that curcumin liposomal formulations improve curcumin bioavailability and are systemically benign. The testing of these preparations as therapeutic modalities is extremelynecessary and is vital for forthcoming clinical trials, foruse by humans. The need of the hour is to lessen the dosage of primary drugs used therapeutically, and also the enactment of curcumin formulations as amalgamation agents may help to enhance the efficacy therapeutically as well as reduction in causing systemic toxicity.

References

1. Aggarwal BB, Gupta SC, Sung B (2013) Curcumin: an orally bioavailable blocker of TNF and other pro-inflammatory biomarkers. Br J Pharmacol 169: 1672-1692.

2. Gupta SC, Kim JH, Kannappan R, Reuter S, Dougherty PM, et al. (2011) Role of nuclear factor kappaB-mediated inflammatory pathways in cancer-related symptoms and their regulation by nutritional agents. ExpBiol Med (Maywood) 236: 658-671.

3. Gupta SC, Kismali G, Aggarwal BB (2013) Curcumin, a component of turmeric: from farm to pharmacy. Biofactors 39: 2-13.

4. Kunnumakkara AB, Bordoloi D, Padmavathi G, Monisha J, Roy NK, et al. (2016) Curcumin, the golden nutraceutical: multitargeting for multiple chronic diseases. Br J Pharmacol 174: 1325-1348.

5. Anand P, Kunnumakkara AB, Newman RA, Aggarwal BB (2007) Bioavailability of curcumin: problems and promises. Mol Pharm 4: 807-818.

6. Anand P, Sundaram C, Jhurani S, Kunnumakkara AB, Aggarwal BB (2008) Curcumin and cancer: an “old-age” disease with an “age-old” solution. Cancer Lett 267: 133-164.

7. Goel A, Kunnumakkara AB, Aggarwal BB (2008) Curcumin as curecumin»: from kitchen to clinic. BiochemPharmacol 75: 787-809.

8. Nair HB, Sung B, Yadav VR, Kannappan R, Chaturvedi MM, et al. (2010) Delivery of antiinflammatory nutraceuticals by nanoparticles for the prevention and treatment of cancer. BiochemPharmacol 80: 1833-1843.

9. Feng T, Wei Y, Lee RJ, Zhao L (2017) Liposomal curcumin and its application in cancer. Int J Nanomedicine 12:6027-6044.

Citation: Divya R, Ashok V, Rajajeya kumar M (2019) CURCUMIN: The Golden Nutraceutical from The Most Powerful Herb in the Planet-Turmeric!!. Chronic Complement Altern Integra Med: CCAIM-100004