



Synthesis of Anti- Cancer of derivatives of Curcumin and Eugenol

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Abstract:

Active ingredients or active plants phytochemicals are chemicals that are obtained from the medicinal plants. Active ingredients are reported to be used as preliminary sources for drug discovery. Medicinal plants possess a variety of therapeutic and biological activities due to presences of active ingredients. Turmeric and Clove are significant medicinal plants. Turmeric (*Curcuma longa*) Contains Curcumin and Clove (*Syzygium aromaticum*) possess Eugenol as one of the significant active ingredients. Synthetic derivatives of Curcumin and Eugenol may be more therapeutic because of their diverse functional groups and structural complexities. This paper provides a comprehensive overview of the pivotal role of Synthetic derivatives of Curcumin and Eugenol as anticancer drugs.

Keywords

Active ingredients, (*Curcuma longa*), (*Syzygium aromaticum*) Curcumin, Eugenol, Synthetic derivatives, anticancer drugs

Introduction:

Natural medicines¹ were prepared in the lives of people in the course of prevention and protection from various types of diseases from ancient times in India. Many diseases are treated with various parts of the medicinal plants. In India societies have been reported to use natural medicines for the healing of diseases. natural medicines contains plant active ingredient. Active ingredient or active plant phytochemicals are chemicals that are obtained from the medicinal plants. Natural, biologically active ingredients are used as preliminary sources for new drug discovery. The government also approves plant based medicines synthesized from active ingredients.

The phytochemical analysis is a scientific technique that reveals the ingredients in plants. Some plants have medicinally active ingredients and are known as medicinal plants. Medicinal plants have number of therapeutic and biological activities.

Isolated active principles have been used to synthesize the various derivatives by using different reactants and reaction conditions. Synthesized derivatives are more therapeutic because of their diverse functional groups and structural complexities.

Synthesized derivatives show different biological actions such antioxidant activity, anti microbial anti-inflammatory activity, anti-fungal activity and anti-cancer activity.

Cancer is abnormal cell division in body produced due to the damage in DNA of cell. This leads to a formation of mutant cell. The cell division and growth of such mutant cell results into formation of malignant or benign tumors. There are different carcinogens responsible for causes of cancers in human beings. The cancer increase rate of mortality worldwide. Cancer reduces the average human life span. Nowadays the cancer is becoming one of the deadliest diseases.

There are 36 different types of cancers viz cervix cancer, oral cancers, colorectal cancer , liver cancer, stomach cancer, lungs cancer, prostate cancer, blood cancer, Thyroid cancer breast cancer. Amongst these Cancers, colorectal cancer, prostate cancer and liver cancer cancers are mainly occurs in men while breast cancer, cervical cancer and thyroid cancer found in women.

In recent days there are different conventional techniques used for cancers treatments such as Radiation therapy chemotherapy or surgery. However all these technique have drawbacks because of medications toxicities and its side-effects. The present cancer therapies are costly and show enormous side effects on patients' health. The main objective of this study is to give an overview on the potential anti-cancer activities of Curcumin and Eugenol.

Curcumin

Among medicinal plant Curcumin is significant active ingredient isolated from rhizomes of *Curcuma longa L.* Curcumin²⁻⁵ also known as diferuloyl methane, is a symmetric molecule. Its IUPAC name is (1E, 6E) 1,7- bis(4-hydroxy-3-methoxyphenyl)-1,6-heptadiene-3,5- dione, with the chemical formula C₂₁H₂₀O₆, and the molecular weight of 368.38 g/mol.

Extraction of Curcumin

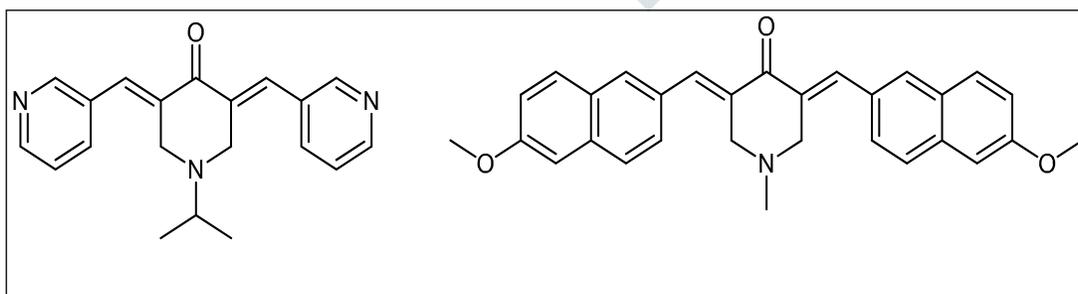
Materials: Rhizomes of turmeric, dried Clove buds were purchased from Local Market, Akola,(M.S). All other solvents and chemicals purchased were pure and Analytical reagent grade. The test plant material collected was subjected to soxhlet and solvent extraction by using suitable organic solvents. To obtain therapeutically important extracts containing natural ingredients with promising medicinal potential. The rhizomes of turmeric were dried in oven at 105 °C for 3 h. Dried rhizomes were triturated using mortar and screened through a sieve with to obtain uniform powder with particle size. The Soxhlet extraction was performed as follows:

15 g ground turmeric powder was weighed and embedded in a thimble and put in the Soxhlet apparatus which was gradually filled with acetone as the extraction solvent. The extraction experiment was carried out at 60 °C for 8 h. Upon completion of the extraction, the acetone was separated from the extract using rotary evaporator under vacuum at 35 °C.

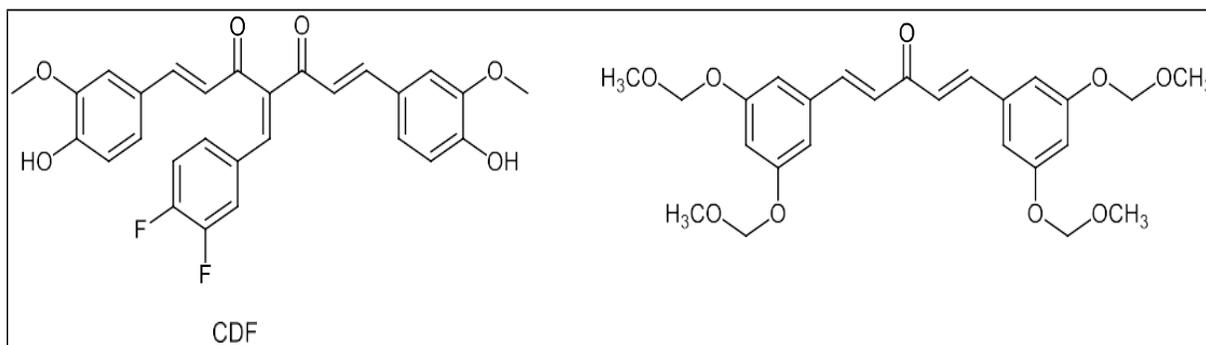
Several anti-cancer agents are from Curcumin have been synthesized. The researcher investigated the number of the different biological activities of synthetic derivatives prepared from active plant ingredients. These derivatives show diverse and prominent biological activities^{06, 07}.

These derivatives have shown prominent anti-cancer activities^{08, 09, 10}. These derivatives are known as potent anti-cancer agents. The anti-cancer agent's demands are increasing day by day because different types of cancers are induced in people. People wanted to use safer and non-toxic anti-cancer medication across the globe.

The number of derivatives of Curcumin^{11, 12, 13}, have been reported to be safe, non-toxic, and effective against different diseases. Literature study also reveals that the number of derivatives of Curcumin have been reported as therapeutic agent used as Literature study reveals that the number of derivatives of Curcumin has the potential to inhibit the cancer mutagens' in the organisms. Literature study also reveals that the no of derivatives of Curcumin was reported as the anti-cancer agents of different type of cancers,^{14, 15}



Derivatives of Curcumin was reported as the anti-cancer agents



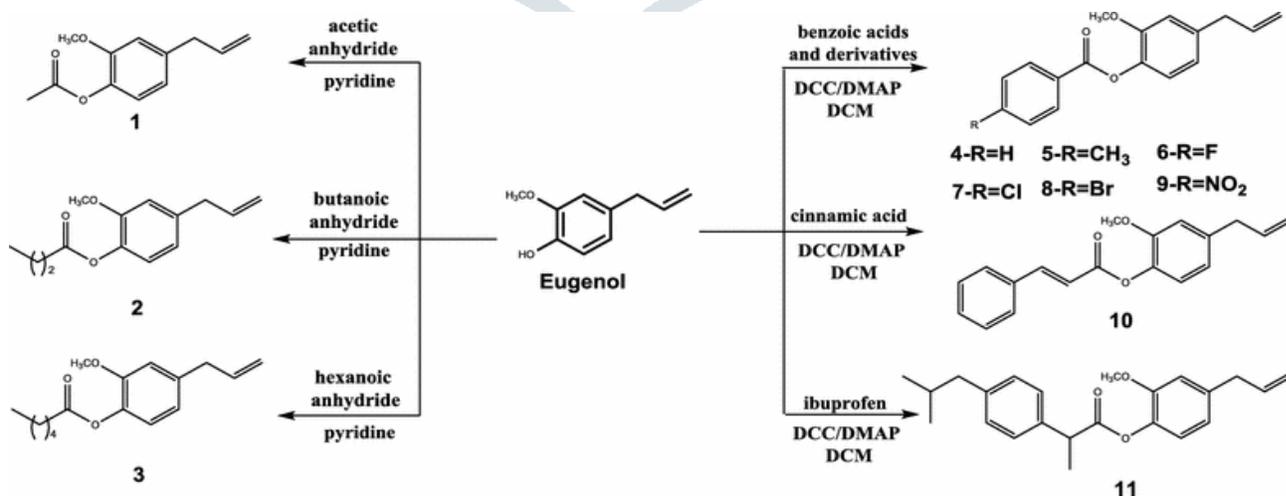
Derivatives of Curcumin was reported as the anti-cancer agents

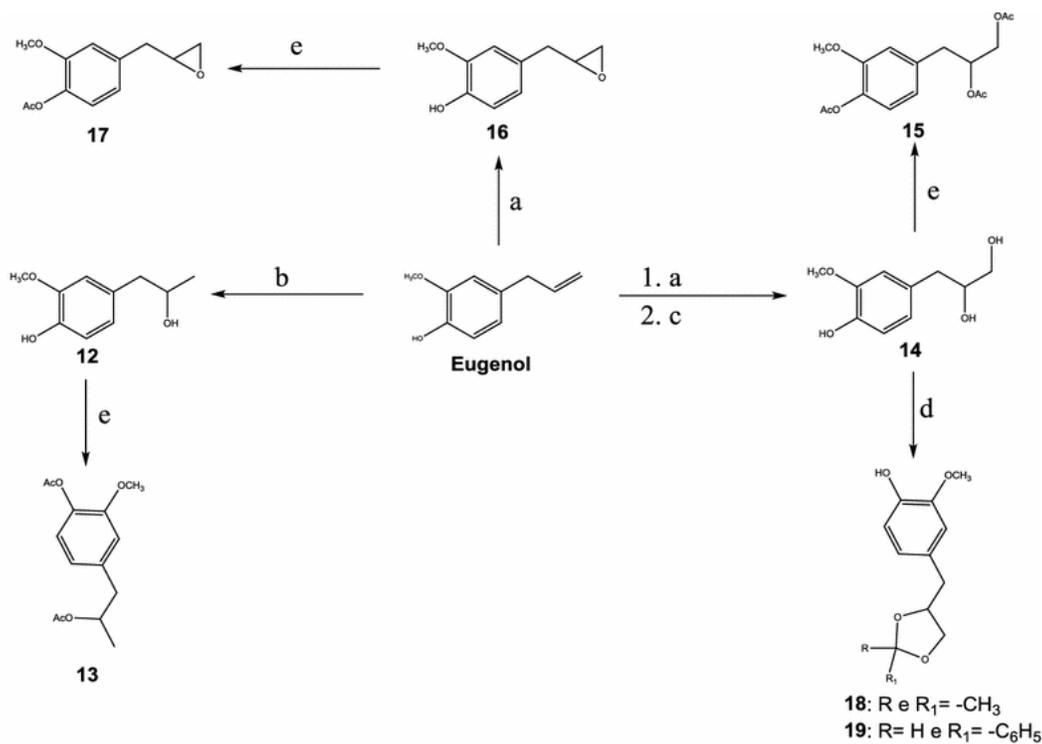
Eugenol

Eugenol is significant active ingredient isolated from *Syzygium aromaticum*. Eugenol is volatile oil isolated from clove. The number of derivatives of Eugenol^{16, 17, 18} was the potential to inhibit the cancer mutagens in the organisms. Literature survey also reveals that several attempts have been made to develop potential anti-cancer agents, but many natural products have been found to possess anti-cancer activities and are yet to be explored, thereby exploring certain medicinal plants. Derivatives of Eugenol^{19, 20, 21} was reported as the anti-cancer agents

Extraction of Eugenol

Grind up cloves to create powder. Distilled clove powder solution and water until about 25 ml of distillate is obtained. Transfer the distillate to a separation funnel and extract diethyl ether. Put top layer in beaker and add small portions of magnesium sulfate until water is removed from the solution and filter. Put filtered liquid into a beaker and perform a steam bath until there is only 1-2 ml of solution left.





a. m-CPBA/CH₂Cl₂, 24h; **b.** 1-HgSO₄/THF/H₂O and 2- NaBH₄; **c.** NaOH (aq), Heating; **d.** acetone or benzaldehyde, AlCl₃; **e.** Pyridine, (Ac)₂O

Anti-Cancer Activity

The anti-cancer activities of derivatives of Curcumin and Eugenol have been done from CDRI, Lucknow. In Vitro Studies of derivatives against cancerous cell show prominent activities.

CONCLUSION

Derivatives of Curcumin and Eugenol possess significant pharmacological activities. Overall, this review concluded that Derivatives of Curcumin and Eugenol can be vital and prominent anti-cancer agents.

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