



# Anti-inflammatory properties of Turmeric(*Curcuma longa*)in Anti cancer activity

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## Abstract

Turmeric (*curcuma longa*) is a spice which has been widely used for its medicinal properties in traditional medicine system of South Asia including china and India (ayurvedic system), the main component of turmeric; curcuma includes the three curcumin, which are responsible for its different physical and medicinal properties. Present study deals with systematic review of literature on anti-inflammatory activity curcumin in treatment of cancer. Researches have shown curcumin to be highly pleiotropic molecule capable of interacting the numerous molecular targets. A careful literature survey reveals that curcumin, the most active component of turmeric contributes significantly in certain types of cancer. The anticancer potential of curcumin is mainly due to its ability to inhibit and or activate various intercellular transcription factors which regulates the expression of proteins and development. The mechanism of action and effects are discussed briefly in present review.

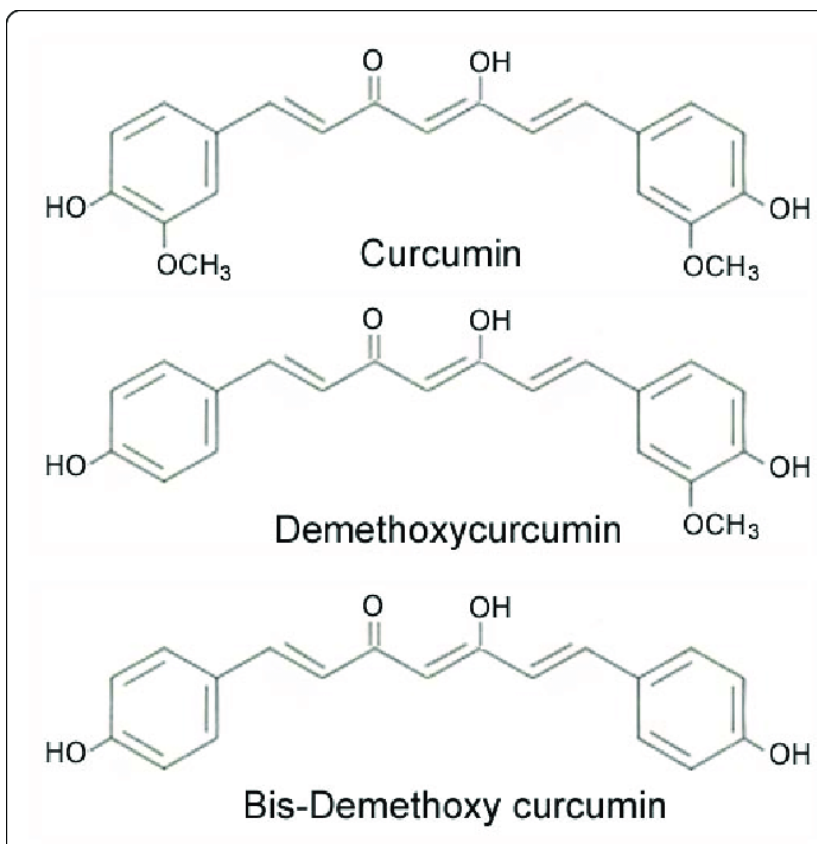
*Keywords:* Curcumin, Anti-Inflammatory properties, Pharmacology

## 1.Introduction

Turmeric (*curcuma longa*) belonging to family is a perennial rhizomatous herb native to South Asia<sup>1</sup>. The rhizome is the part of the plant which is actually the source of bright yellow colour spic essential in kitchen and used as colouring agent and food preserving agent<sup>2</sup>. In traditional system of medicine mainly in India and China turmeric is used to treat inflammatory conditions. Not only in inflammation it is also used in wound healing and blood purification<sup>3</sup>. Other pharmacological activities include antioxidant<sup>4,5</sup> and antimicrobial properties<sup>6</sup>. This article focuses on Anti-inflammatory effects of curcumin in cancer treatment. Curcumin is one of the most studied compounds and it is generally believed that curcumin is the compound responsible for the therapeutic success of turmeric in a wide range of disorders like ulcerative colitis<sup>7</sup>, Inflammation and edema<sup>8</sup> Rheumatoid arthritis<sup>9,10</sup>, pancreatitis<sup>11</sup>, osteoarthritis<sup>12</sup>, ocular conditions<sup>13,14</sup>, Despesia and Gastric ulcer<sup>15</sup>, Irritable bowel syndrome<sup>16,17,18</sup>. Not only this various in vivo studies provide supporting evidence and highlighted the therapeutic potential of turmeric in Alzheimer disease<sup>19,20</sup>.

## 2.Active components

In the last few decades there has been considerable interest in the active compounds in turmeric known as curcuminoids. The curcuminoids are mainly responsible for bright yellow colour of turmeric. Actually it is a group of three curcuminoids, the major one is called curcumin chemically it is different diferulyl methane. Approximately 90% of the curcuminoid in turmeric is made up of curcumin. Other two curcuminoids are olemethoxy curcumin and Bis –demethoxycurcumin. Bis –demethoxycurcumin is present in lowest amount but stable for longest time which makes it equally vital constituent of curcuminoid mixture<sup>21,22</sup>.



**Figure 1:** Structure of curcumin

This curcuminoid mixture is also known as Indian Saffron<sup>23</sup>. The other popular names of turmeric in some local Indian languages are as follows-

s.no.	Language	Common name
1	English	Turmeric
2	Hindi	Haldi
3	Bengali	Hould
4	Marathi	Halad
5	Tamil	Manjal
6	Sanskrit	Harita
7	Urdu	Halad

**Table 1:** Some common name of Curcumin

### 3. Bioavailability of curcuminoids

Different animal studies have shown that curcuminoids have limited systematic bioavailability of curcumin such as heating or combining piperine<sup>24,25</sup> which is an active component of black pepper. curcumin with turmeric oil also increased bioavailability in rats and human<sup>26</sup>.

#### 4. Anti-inflammatory properties and cancer treatment

Laboratory studies have shown curcumin anticancer effects on cancer cells. Researches on curcumin as a cancer treatment agent is ongoing. As proinflammation states are linked to tumour promotion<sup>27,28</sup>, it is found that phytochemicals like curcumin exert a strong anti-inflammatory effect are anticipated to have some of chemopreventive activity. Anticancer potential of curcumin includes anti-inflammatory mechanism in these ways

- i. Inhibition of NF-K $\beta$  and COX-2<sup>29,30,31</sup>
- ii. Inhibition of arachidonic acid metabolism via lipoxygenase and scavenging of free radicals.
- iii. Decreased expression of Inflammatory cytokines IL, IL-6 and TNF- $\alpha$  resulting in growth inhibition of cancer lines<sup>32</sup>.
- iv. Mediation of inflammation and tumour cells proliferation by down regulations the enzymes such as protein kinase<sup>33</sup>.
- v. curcumin has shown anti-proliferative effects in multiple cancer and is an inhibitor of the transcription factor NF- $\kappa$ B and downstream gene products including C-myc,  $\beta$ Cl-2, COX-2, NOS, Cyclin D, TNF- $\alpha$ , interleukins and MMP-9<sup>34</sup>.

#### 5. Anticancer activity (suppression of carcinogenesis)

Studies have shown that curcumin is very beneficial in multiple human carcinoma as including melanoma, head, neck, breast, colon, pancreatic prostate and ovarian cancer. Animal research demonstrates inhibition at all three states of carcinogenesis, initiation, promotion and progression. During initiation and promotion curcumin modulates transcription factors controlling Phase-I and Phase-II, detoxification of carcinogens<sup>35</sup>, downregulates proinflammatory cytokines, free radicals activated transcription factors and arachidonic acid metabolism via cyclooxygenase and lipoxygenase pathway and scavengers free radicals<sup>36,37,38</sup>. In second and third stage of carcinogenesis curcumin helps in decreasing frequency and size of tumour and induces apoptosis via suppression of NF-K $\beta$  and AP-I in several cancer types<sup>20-37</sup>. Different clinical trials are not focus of this article so not

discussed here.

#### 6. Conclusion

A Literature search revealed that curcuminoid mixture and its individual components show variation in their effect in different pharmacological activities. Several evidences and clinical trials support the conclusion that curcumin may enhance the effect of some chemotherapeutic drugs. Thus curcumin has been found to safe and has demonstrated anti-inflammatory activity. moreover, it is evident for several studies that a number of different molecules like COX-2, Leukotrienes, Phospholipase, lipoxygenase etc, which are involved in inflammation are inhibited by curcumin and is of great potential as therapeutic agent for a variety of inflammatory conditions and cancer type.

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