

## Synthesis anti-bacterial and anti-fungal activity of curcumin and its derivatives

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### ABSTRACT

Three curcumin derivatives having modification in active methylene group (1,3) and keto groups (2) where successfully synthesized. Derivative-1 synthesized from curcumin with 2-hydroxy benzaldehyde using EDTA and Chloroform. Derivative-2 synthesized from curcumin with 4-aminophenol using pyridine and ethanol. Derivative-3 synthesized from curcumin with N,N-dimethylamino benzaldehyde using EDTA and chloroform. The substitution on the active methylene site of curcumin increases the anti-bacterial and anti- fungal behaviour. While comparing compound 2 which have more potent bacterial activity with compound-1 and compound-3, the former shows higher scavenging activity. Finally the yield was found to be 63%.

### INTRODUCTION

Curcumin is a bright yellow colour chemical produced by some plants. It is a principal curcuminoid of turmeric, a member of ginger family. It is used as herbal supplement, cosmetics ingredient, food flavouring and food coloring. Curcumin is a component of the Indian spice turmeric (curcumin longa), a type of ginger. It acts as powerful antioxidant and anti-inflammatory with highest bio availability[1-5] .

### PHYSICAL PROPERTIES OF CURCUMIN

#### Source

The main source of curcumin is zingiberaceae family plant curmin longa, curcumin zedoaria.

#### Colour

Yellow crystalline powder

#### Odour

Slightly bitter taste

#### Solubility

Insoluble in water and ether, soluble in in ethanol, glacial acetic acid, propylene glycol and alkali solution.

### CHEMICAL PROPERTIES

**Molecular Formula** :  $C_{21}H_{20}O_6$

**Molecular Mass** : 368.38g/mol

**Melting Point** : 183°C

**Iupac** : (1E,6E)-1,7-bis (4-hydroxy-3-methoxy phenyl)-1,6-heptadiene-3,5-dione

## MEDICINAL USES OF CURCUMIN

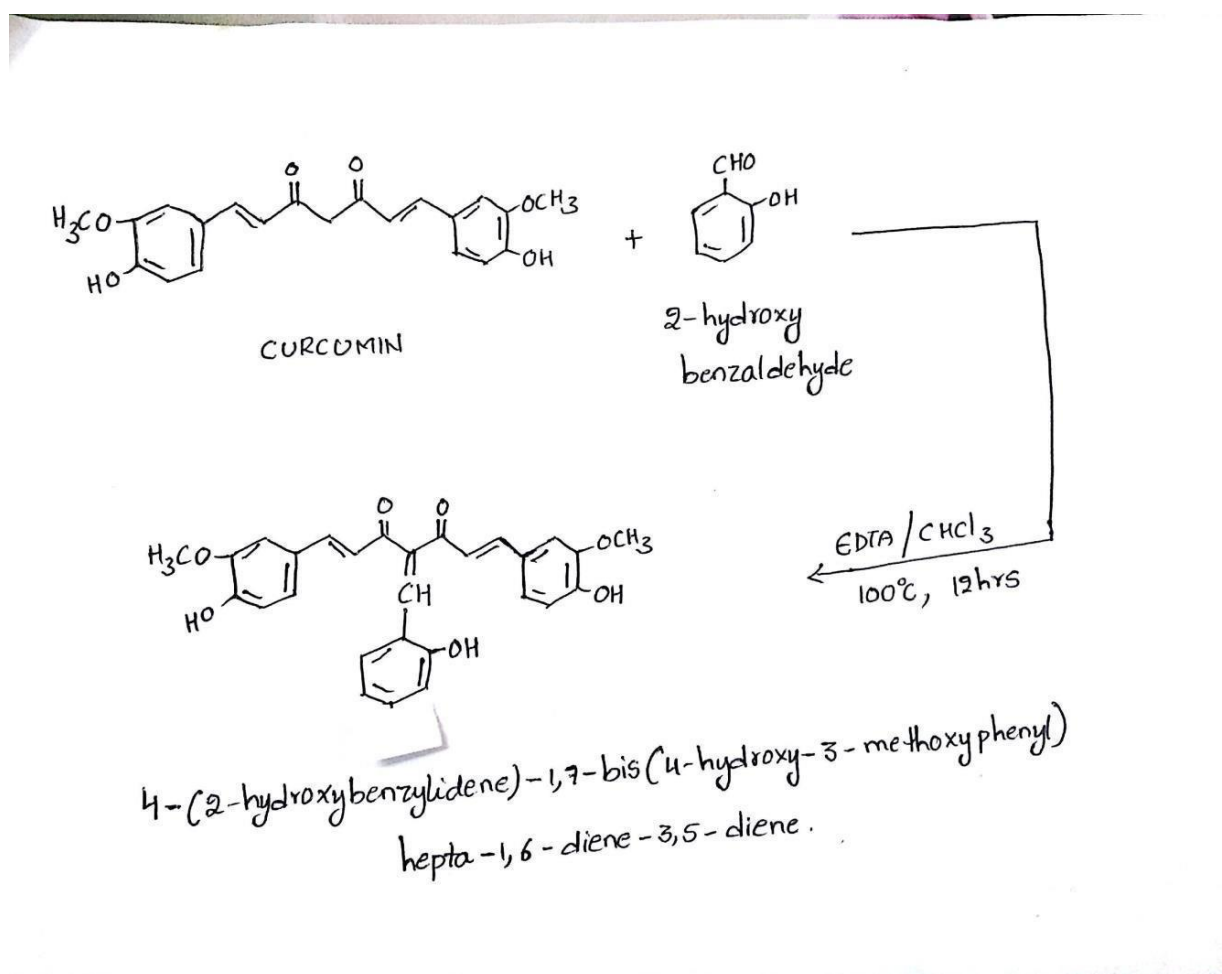
It is medicinally used as:

1. Anti-inflammatory drug
2. Anti-depressants
3. Chemotherapy
4. Anti coagulant
5. Pain killer
6. Diabetic drug
7. Arthritis medication
8. Inflammatory bowel disease drug
9. Cholesterol drug
10. Steroids

## ISOLATION OF CURCUMIN

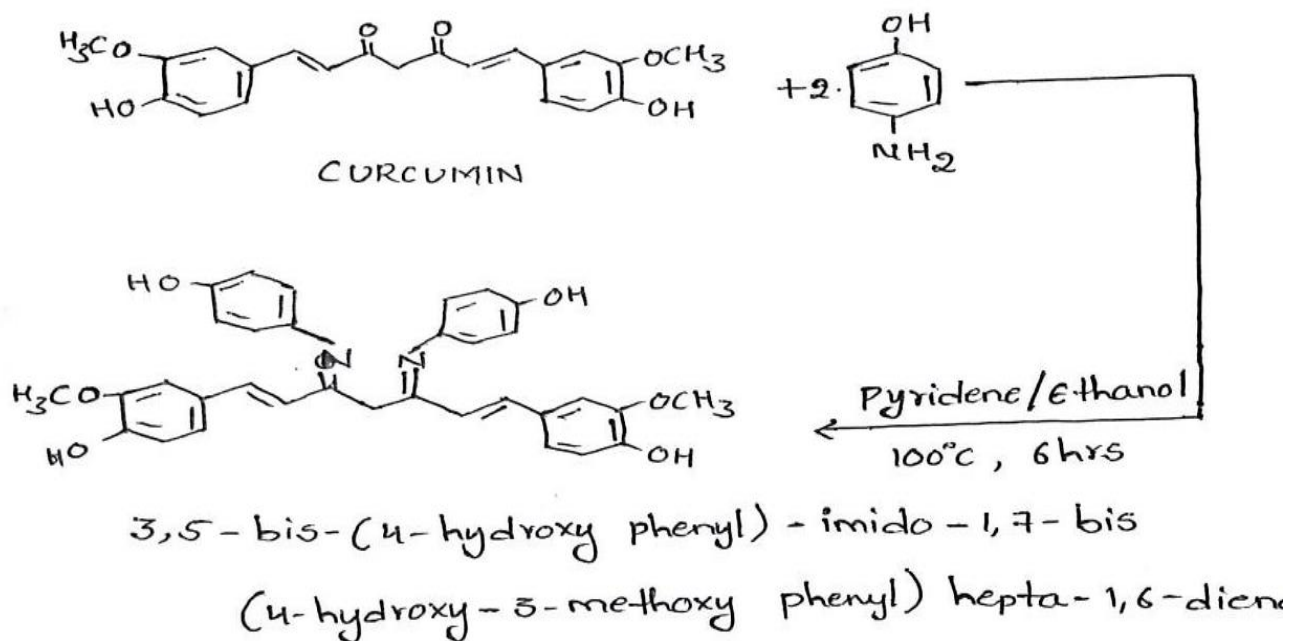
Curcumin is isolated from the turmeric powder using ethanol by extraction process. 10 grams of curcumin and 150ml of ethanol was taken in a round bottomed flask and stirred for 2 minutes and refluxed for 90 minutes. Then the product is filtered and organic layer was separated. Then the collected organic layer was kept for extraction until the solid product was obtained and finally the extracted curcumin was collected and weighed [6, 7].

## Synthesis of 3,5-bis-(4-hydroxy-phenyl)-imido-1,7-bis(4-hydroxy-3-methoxy phenyl)hepta-1,6-diene SCHEME

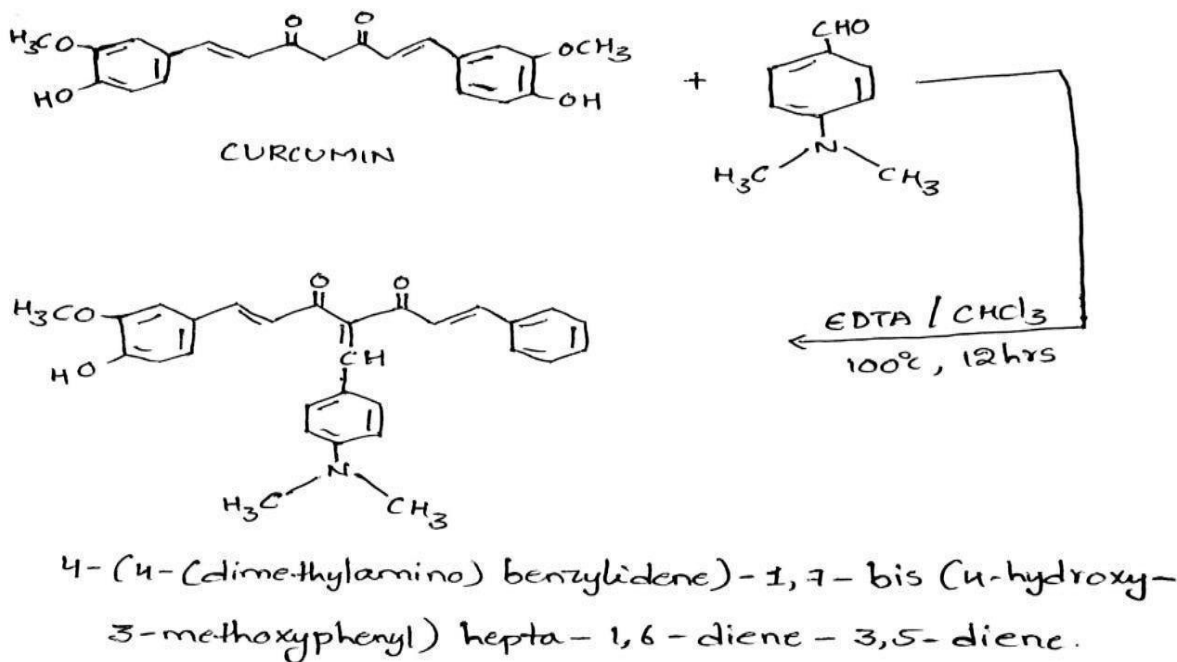


**Synthesis of 3,5-bis-(4-hydroxy-phenyl-imido-1,7-bis(4-hydroxy-3methoxyphenyl)hepta-1,6-diene**  
[8]

**SCHEME**



**Synthesis of 4-(4-(Dimethylamino) Benzylidene)-1,7-Bis(4-Hydroxy-3methoxyphenyl)Hepta-1,6-diene 3,5- diene** [9-10]



## RESULTS

**Anti-Bacterial Activity of Curcumin Derivatives**

S.No		Bacterial Zone of Inhibition		
	SAMPLE	DERIVATIVE-1	DERIVATIVE-2	DERIVATIVE-3
1	AMOXACILLIN	0.1	1.5	1.1
2	SAMPLE PRODUCT	0.1	0.7	1.1

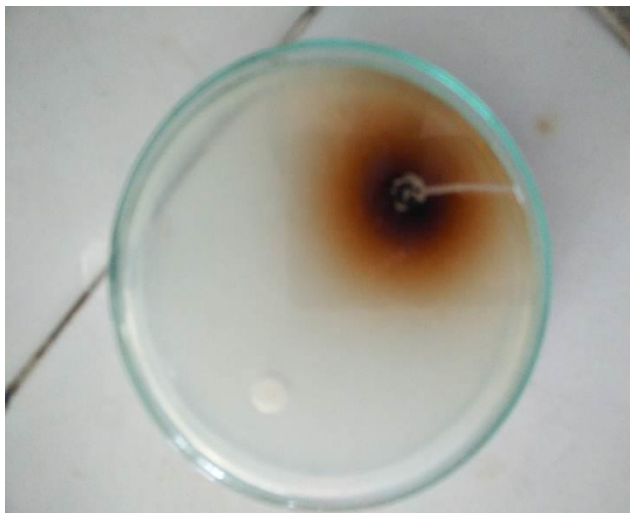
**Anti-Fungal Activity of Curcumin Derivatives**

S.No		Fungal Zone Of Inhibition		
	SAMPLE	DERIVATIVE-1	DERIVATIVE-2	DERIVATIVE-3
1	KETOCONAZOLE	2.2	1.4	0.9
2	SAMPLE PRODUCT	1.1	1.1	0.2

## CONCLUSION

The 2<sup>nd</sup> derivative (3, 5-bis-(4-hydroxy-phenyl-imido-1, 7-bis (4-hydroxy-3-methoxyphenyl) hepta-1,6-

diene) has more potent anti- bacterial activity when compared to derivative 1 and 3.



The 3<sup>rd</sup> derivative (4-(4-dimrthylamino)benzylidene)-1,7-bis(4-hydroxy-3-methoxyphenyl)hepta-1,6-

diene3,5diene) has more potent anti-fungal activity when compared to derivative 1 and 2.



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