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# To Isolate and Characterise Curcumin from Turmeric and Formulate Sucrose Free Anti-Bacterial, Anti Carcinogenic Curcumin Chewing Gum

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**ABSTRACT:** In this study, curcumin, the bioactive compound of turmeric (*Curcuma longa* L.), was extracted using Soxhlet extraction, the traditional and reference method. UV-vis spectroscopy was used to confirm the presence of curcumin in the extracted samples, and the amount of curcumin was quantified using thin layer chromatography TLC analysis. Extraction methods are more appealing due to their cost-effectiveness (due to significant time and energy savings) and environmental friendliness.

The sixth most common cancer is squamous cell carcinoma of the head and neck. As a result of field cancerization, second primaries and recurrences are common. As a result, chemoprevention has become the focus of research. Curcumin, a polyphenol compound with anticarcinogenic, anti-inflammatory, antibacterial, antiviral, and antifungal properties, is one such promising nutraceutical. Due to the limited bioavailability of curcumin, a novel gum formulation that allows for direct mucosal absorption into the bloodstream was tested. This preliminary study validates curcumin gum's efficacy by assessing its release and transmucosal absorption, as well as its effects on serum cytokine levels

**KEYWORDS:** Chewing gum, Herbal, Anti-bacterial, Anti-Cancer, Antioxidant agent

## I. INTRODUCTION

Curcumin is a yellow crystalline polyphenol with a low molecular weight that is extracted from the turmeric rhizome.

Turmeric, also known as *Curcuma longa* L., is a tropical and subtropical herb that grows primarily in India, Southeast Asia, and China.

*Curcuma longa* is the most important producer, consumer, and exporter in the world. Turmeric's biological properties are thought to be attributed to the curcuminoids found in its dense structure. As a dietary food ingredient, dying agent, therapeutic agent, and medicament, curcumin has numerous applications in the treatment of various diseases.

Curcumin has antioxidant, antibacterial, anti-inflammatory, hepatoprotective, anti-tumour, and anti-viral properties.

Curcumin has been shown to be a promising agent for the prevention and treatment of cancers such as gastro-intestinal, breast, lung, melanoma, head and neck, neurological, and sarcoma.

*Curcuma longa* contains 2-9 percent curcuminoids such as curcumin, desmethoxycurcumin, and bis-desmethoxycurcumin, which are all diarylheptanoids.

Curcuminoids vary in percentage composition depending on geographical location; it contains roughly 80% curcumin, 17% desmethoxycurcumin, and 3% bisdemethoxycurcumin. Curcuminoids' chemical structure is depicted.

In the last few decades, interest in extraction processes has led to new technological achievements, resulting in curcumin with admirable properties. Curcumin's structural characteristics and properties are significantly influenced by the extraction method. Traditional and modern extraction methods are available.



Conventional extraction methods based on solvent extraction power include Soxhlet extraction, maceration, and hydro-distillation. Soxhlet extraction was invented in 1879 to extract lipids, but it has since evolved into a common and popular method for efficiently extracting a wide range of bioactive compounds from natural plants (Soxhlet, 1879). This extraction technique is regarded as a fundamental extraction technique for evaluating the efficacy of other conventional and non-conventional extraction methods.

## II. RELATED WORK

Extraction of curcumin

Confirmatory test for curcumin

Identification and detection of curcumin

TLC (Thin Layer Chromatography)

- Spectroscopic analysis
  - UV/VIS Spectroscopic analysis
  - FTIR analysis

Formulation of sucrose free curcumin chewing gum

## III. METHODOLOGY

|                                    |                                                                                                                                                                  |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| In order to extract                | Soxhlet apparatus, evaporating dish, Heating mantle, Turmeric<br>N-hexane, ethanol, turmeric powder & glassware's required (beaker, stirrer, measuring cylinder) |
| In order to identify the extract   | TLC – (silica gel, curcumin, Slide, Chemicals, Beaker)<br><br>UV Analysis (By JASCO SPECTROPHOTOMER)<br><br>IR analysis (FTIR 4100 JASCO)                        |
| To create a product out of extract | Chemicals required, mixture, Heating mantle, Mortar Pestle, glass wares, Beaker, Stirrer,                                                                        |

#### IV. EXPERIMENTAL RESULTS



Evaporation & Concentration

Extraction

Recrystallization

#### Confirmatory test for curcumin

When treated with sulfuric acid in a glass test tube, the powder drug turns crimson red, confirming the presence of curcumin.



### Identification test

Identifying compounds, determining their purity and following the progress of a reaction

Prepare and standard solution of 1%w/v in pure methanol and run on tlc

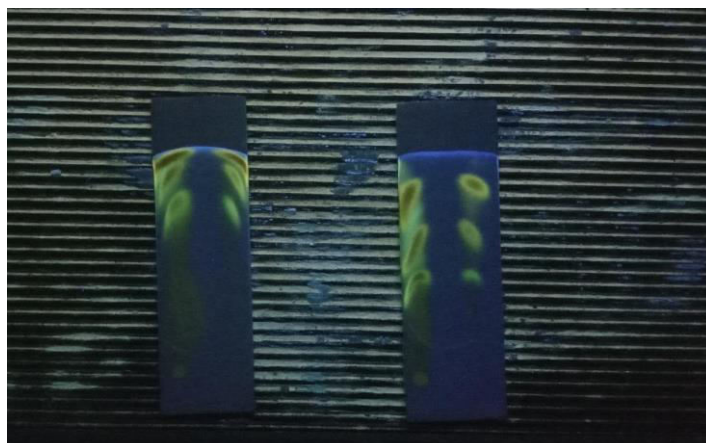
Solvent system

chloroform: ethanol: gaa (glacial acetic acid) = 9.5:0.5:0.1



## Detection test TLC

TLC chromatogram of turmeric (*Curcuma longa*) extract versus curcumin; examined under UV illumination at 254 nm and 365 nm, accordingly.



## TLC

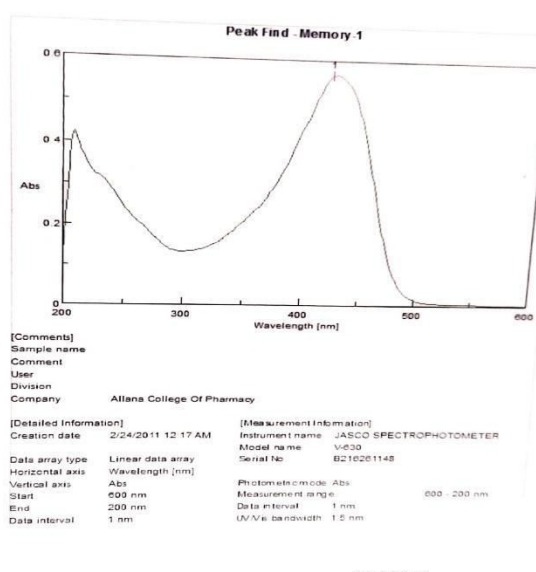
Rf value of standard curcumin = 0.91

Rf value of test solution = 0.90

## Spectroscopic analysis

### UV ANALYSIS

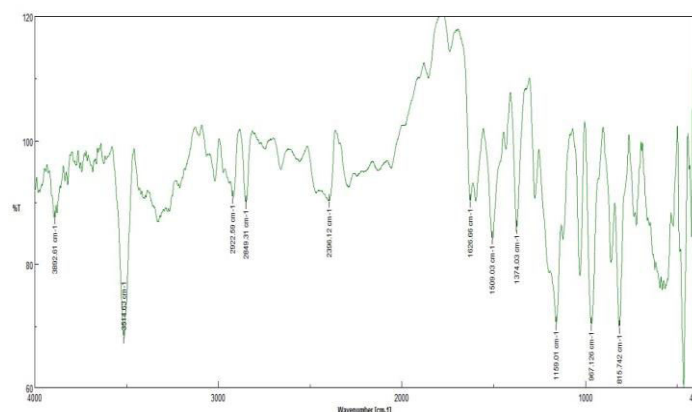
Prepare a sample of 0.1g curcumin dissolved in 100ml methanol, pipette out 0.1ml from the stock solution, and dilute to 10ml with methanol.



| SOLVENT USED | OBSERVED LAMDA MAX |
|--------------|--------------------|
| METHANOL     | 425nm              |

### FTIR Analysis

Dry potassium bromide at 60°C for 1 hr & make mixture of sample and potassium bromide (1:9) measure spectra by taking graph of % transmittance vs wave number



FTIR OF CURCUMIN

| GROUP                    | VALUE (cm <sup>-1</sup> ) |
|--------------------------|---------------------------|
| OCH <sub>3</sub> Stretch | 2849.31                   |
| C=C                      | 2396.12                   |
| C=O                      | 1626.66                   |
| Aromatic ring            | 1374.03                   |
| OH                       | 3514.63                   |

### Final Product



FIGURE: curcumin chewing-gum

### V. CONCLUSION

Firstly, we did all the analytical study of herbal drug curcumin which is extracted from turmeric (*curcuma longa*) So, the analytical parameter includes; Organoleptic properties, Extraction, Confirmation through the confirmatory test of curcumin which results positive.



After that we did identification and separation by thin layer chromatography also, detection and spectroscopic analysis was done with the help of UV-Spectrophotometer and FTIR analysis.

After that we decided to formulate a novel drug delivery system medication with using API curcumin in chewing gum that is known as medicated chewing gum.

The purpose to formulating medicated chewing gum which gives the anti-tumour and anti-bacterial properties also, we use the erythritol (substitute of sugar) so that diabetic patients also take this.

#### FUTURE SCOPE

As we all know, there are medicated chewing gums on the market today, but their formulation contains sucrose as a sweetener, whereas our formulation contains erythritol (which is good for oral health because it slows the growth of one type of bacteria that affects oral health and also acts as an antioxidant) so that diabetic patients can consume it.

Curcumin has anti-bacterial, anti-tumour, and anti-inflammatory properties, and using it in the form of chewing gum helps to improve oral health. It is also intended to function as an extended-release dosage form, allowing the medicine contained to be released continuously.

Also, people who are afraid of medicines can use this medicated chewing gum. Only the API is absorbed by the body when chewing gum is consumed. Reduced risk of overdosing while the entire dose is swallowed, as well as the ability to remove the gum at any time, resulting in the termination of drug delivery

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