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The Antibacterial Activity of Curcuminoid Deliver

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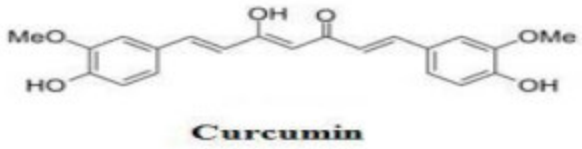
Abstract:
The antibacterial effect of Curcuminoid extract before and after loading on the gel were tested against some of pathogenic microorganisms, and the result shown that the microbial growth were inhibited largely by the herbal which loaded on gel.

Introduction

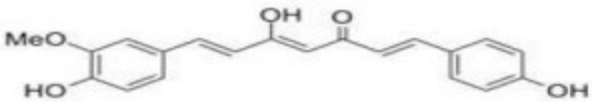
Turmeric is a spice stemming from the rhizome belonging to a ginger family (Zingi beraceae) component called *Curcuma longa.* Described as horizontal underground stems with shoots and leaves, rhizomes are notable for their vibrant yellow color ([1])

Curcumin a yellow pigment in turmeric. The dietary[1]Phytochemical curcumin has a long history of medicinal use in India and southeast Asia for a wide variety of medical conditions [2,3], Curcumin was reported to have antitumor [4,5]; antioxidant[6]; anti arthritic[7] and anti- inflammatory properties[9].

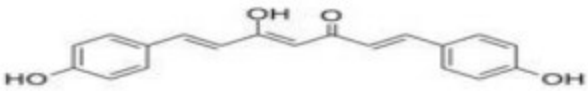
Curcumin, demethoxy curcumin and bis demethoxy curcumin are dietary photochemical obtained from dried rhizomes of the turmeric plant (*Curcuma longa*), curcumin is a main coloring substance in *Curcuma* which is accounting for 60-80% and two related compounds, demethoxy curcumin (DMC) accounting for 15-30% and bis demethoxy curcumin (BDMC) with level of 2-6% are all together known as Curcuminoid. The values of the turmeric products is based on their Curcuminoid content [9, 10], as shown below:



Curcumin



Demethoxycurcumin



Bisdemethoxycurcumin

So, the main aim of this study is to isolate of the Curcuminoid compounds from *Curcuma longa* and study of their antibacterial and cytological activity before and after loading on gel.

Materials and Methods

Plant material

Curcuma longa was brought from local market of Basrah city. The rhizomes were washed with tap water and dried at room temperature (25°C). Dried rhizomes were cut in small pieces, powdered by electronic mill.

Extraction of Curcuminoid

50 gram of *Curcuma longa powder* was added to thimble and then placed in a Soxhlet extractor. Heat was applied in a round bottom flask which contain ethanol solvent (300 ml) was placed at the base of the Soxhlet extractor. The extract was concentrated using a rotary evaporator (Puchi Rotavapor –Re), then dried at room temp. [11].

Chemical analysis

Separation of Curcuminoid by TLC

Ethanol extracts were tested on TLC for presence different Curcuminoid. The plate TLC pre- coated silica gel

(10X 5 cm.) and the plate was run with chloroform: ethanol (9.4: 0.6) as an elute for 20 min., after development plate was removed and dried. Spots were analyzed [9].

Formulation of topical preparation

Herbal gel was prepared using carbopol-934 as a gelling agent in 1% w/w concentration with deionized water using magnetic stirrer. The pH of the gel was adjusted to neutral by addition of small quantities of tri ethanol amine with continuous stirring. Propylene glycol was added for acting as a co-solvent. Herbal extract of Curcuminoid was soluble in dimethyl sulfoxide. Various concentrations of herbal extract of Curcuminoid were added to the gel and stirred for sufficient time for homogeneous mixing of extract in gel base (table (1)). Prepared gels were filled in collapsible tubes and stored at a cool and dry place. Physical parameters such as colour, appearance, and feeling on application were recorded. PH of the gels were recorded using a litmus paper. .

Table (1) formulation code of various gels.

Curcuminoid mg/1g of gel	formulation code
50	N1
100	N2
200	N3
250	N4
500	N5

Infrared spectroscopy:

IR spectrum using Pye –Unicom- 30 -300 Sinfrared spectrophotometer.

Anti bacterial Activity

Test-bacteria

The antibacterial activity of the prepared compounds was assessed against some bacterial species: *Staphylococcus aureus, Escherichia coli* and *Bacillus* sp. Overnight cultures were used. After 24 h of incubation, bacterial suspension (inoculums) was diluted with sterile physiological solution, for the diffusion test, to 10^8 CFU/ml. (turbidity = McFarland barium sulfate standard 0.5).

Agar diffusion well-variant

The bacterial inoculums was uniformly spread using sterile cotton swab on a sterile Petri dish MH agar. 50 µL from each concentration of chemical products were added to each well (7 mm diameter holes cut in the agar gel, 20 mm apart from one another). The plates were incubated for 24 h at 36ºC ± 1ºC, under aerobic conditions. After incubation, confluent bacterial growth was observed. Inhibition of the bacterial growth was measured in mm [12].

Result and Discussion:

The result of Thin layer chromatography of Curcuminoid extract revealed the presence of three compounds (Rf= 0.72, 0.81 and 0.88) as shown in figure (1). The crude Curcuminoid mixture contained curcumin, demethoxy curcumin and bis demethoxy curcumin.

Figure (1): Thin layer chromatography for Curcuminoid extract

Figures (2 and 3) and tables (2 and 3) shown the IR- Spectra of extracted Curcuminoid, from the spectra we can show the presence of - OH group in the Curcuminoid which loading with poly acrylic acid gel at 3433cm-1, this band may be due to the environmental moisture or some of the extract did not completely react with the gel (fig 2) , meanwhile the absence of carboxyl group in the infra red spectra of the Curcuminoid which loaded with the polymeric gel, the indicate the success of the loading process between the gel and the extract (fig 3).

The herbal gels were prepared and subjected to evaluation of various parameters. These gels were blackish in color with colorless transparency appearance and cooling sensation throughout the evaluation period.

The antibacterial activity of all Curcuminoid and herbal gel compounds were tested against some types of pathogenic bacteria, the results revealed that all tested compound with several concentrations have high antibacterial activity against bacteria and this effect of the Curcuminoid increased after loaded with the gel in different concentrations (table 4 and figure 4).

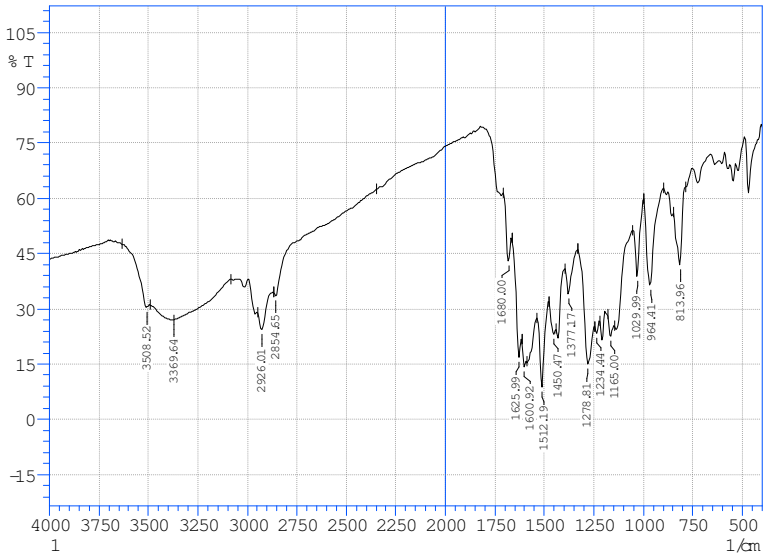


Figure (2): FT-IR spectroscopy for Curcuminoid extract

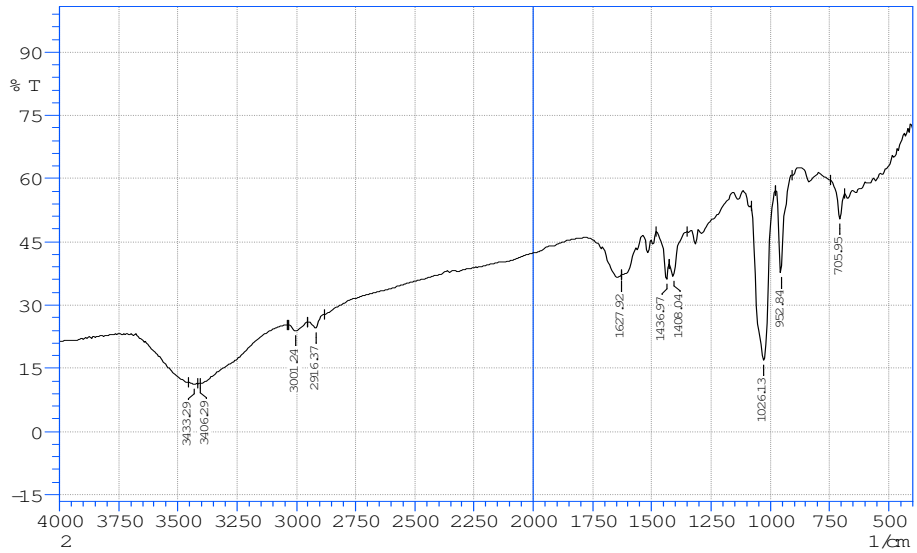


Figure (3): FT-IR spectroscopy for Curcuminoid loaded with the polymeric gel

Table (2): Main infrared characteristics peaks and their assignment for Curcuminoid spectrum.

Stretching Frequency) cm^{-1}(	Assigned Bond	Functional Group
3369.64 (br.)	O-H	Phenolic
2926.01 (w)	CH-	Aliphatic
1625.99(w)	C=O	Carbonyl
1450.47 (w)	C=C	Aromatic benzene
1278.81 (s)	Ar-O-C-	Alkyl aryl ether

Table (3): Main infrared characteristics peaks and their assignment for Curcuminoid loaded with the polymeric gel spectrum.

Stretching Frequency) cm^{-1}(	Assigned Bond	Functional Group
3369.64 (br.)	O-H	Phenolic
3001.24 (w)	CH-	Aliphatic
1627.92(m)	C=O	Carbonyl

Table (4): The antibacterial activity of Curcuminoid before and after loaded with the polymeric gel spectrum

Inhibition diameters mm			Con.	compound
Bacillus	*Escherichia coli*	*Staphylococcus aureus*		
10- 11 mm	8-9 mm	-ve	100 mg/ml	0
13mm	12- 14 mm	14- 15 mm	50 mg/ml	N1
12 mm	10-12 mm	11-12 mm	100 mg/ml	N2
13 mm	15-16 mm	12- 13 mm	200 mg/ml	N3
17 mm	15-16 mm	14- 15 mm	250 mg/ml	N4
16 mm	14-16 mm	11- 12 mm	500 mg/ml	N5

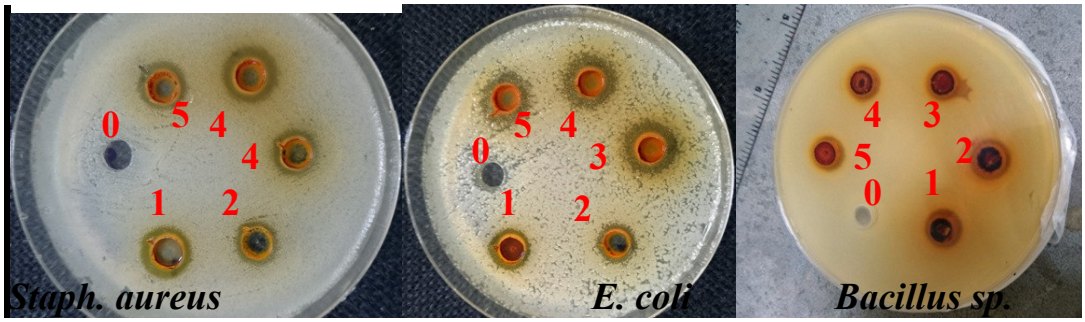


Figure (4): The antibacterial activity of Curcuminoid before and after loaded with the polymeric gel spectrum

References

1- Nadia Salem Alrawaiq and Azman Abdullah. A Review of Antioxidant Polyphenol Curcumin and its Role in Detoxification. International Journal of Pharm Tech Research . 2014; Vol.6, No.1, pp 280-289.

2- Goel Ajay, Kunnumakkara AB, Aggarwal BB. Curcumin as "Curecumin": from kitchen to clinic. *Biochemical pharmacology.* 2008;75(4):787-809.

3- Sharma R, Gescher A, Steward W. Curcumin: the story so far. *European Journal of Cancer.* 2005;41(13):1955-1968.

4- Kumaravel M, Sankar P, Latha P, Benson CS, Rukkumani R. Antiproliferative effects of an analog of curcumin in Hep-2 cells: a comparative study with curcumin. *Natural product communications.* 2013;8(2):183-186.

5- Link A, Balaguer F, Shen Y, et al. Curcumin modulates DNA methylation in colorectal cancer cells. *PLoS One.* 2013;8(2):e57709.

6- Peng F, Tao Q, Wu X, et al. Cytotoxic, cytoprotective and antioxidant effects of isolated phenolic compounds from fresh ginger. *Fitoterapia.* 2012;83(3):568-585.

7- Chandran B, Goel A. A randomized, pilot study to assess the efficacy and safety of curcumin in patients with active rheumatoid arthritis. *Phytotherapy Research.* 2012;26(11):1719-1725.

8- Avasarala S, Zhang F, Liu G, Wang R, London SD, London L. Curcumin Modulates the Inflammatory Response and Inhibits Subsequent Fibrosis in a Mouse Model of Viral-induced Acute Respiratory Distress Syndrome. *PLoS One.* 2013;8(2):e57285.

9- S.J. Kulkarni, K.N. Maske, M.P.Budre & R.P.Mahajan Extraction and purification of curcuminoids from Turmeric (*curcuma longa L.*) .International Journal of Pharmacology and Pharmaceutical Technology (IJPPT), Volume-1, Issue- 2, 2012 , 81-84.

10 - Pornchai Rojsitthisak , Wisut Wichitnithad, Nutthapon Jongaroonngamsang, and Sunibhond Pummangura . A simple isocratic HPLC method for the simultaneous determination of curcuminoids in commercial turmeric extracts. Phytochemical AnalysisVolume 20, Issue 4, pages 314–319, 2009.

11- Veena Sharma, Chitra Sharma, Ritu Paliwal, Pracheta, Shatruhan Sharma. Ameliorative Effects of *Curcuma Longa* and Curcumin on Aflatoxin B. Asian Journal of Biochemical and Pharmaceutical Research *Issue 2 (Vol. 1) 2011.*

Induced Serological and Biochemical Changes In Kidney of Male Mice.

12- Smânia, A.; Monache, F.D.; Smânia, E.F.A.; Cuneo, R.S. (1999). Antibacterial activity of steroidal compounds isolated from *Ganoderma applanatum* (Pers.) Pat. (Aphyllophoro-mycetideae) Fruit body. *Int. J. Med. Mushrooms*, 1, 325-330.

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