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ORIGINAL ARTICLE **OPEN ACCESS**

Formulation and Evaluation of Curcumin Coated Microsphere

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ABSTRACT
Curcumin, a yellow pigment from Curcuma longa, is a major component of turmeric & is commonly used as a spice & food coloring agent which is lipophilic in nature. This study describe formulation and evaluation of sustained release pellets of coated curcumin for the treatment of cancer by oral route .curcumin is has long been used as a powerful anti-inflammatory. It also used as wound healing, ant diabetic agent etc. The present work report on extraction method by using soxhlet extractor Acetone is used as a solvent for extraction .separation were determine by the TLC plate by using the chloroform: methanol (98:2) Rf value is 0.5 . 20-25 mesh size pellet are used for coating. Coating was carried out by fluidized bed processor. In-vitro study was carried out by determining the drug content & drug release of the coated pellets.
Key word: *Curcumin, Fluidized bed processor, Anticancer agent, Pellets.*

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INTRODUCTION

Microspheres are characteristically free flowing powders consisting of protein or synthetic polymers having a particle size ranging from 1-1000µm .microspheres as carriers for drugs also known as microparticles.It is the reliable means to deliver the drug to the targeted site with specifically, if modified, and to maintain the desired concentration at the site of interest. Microsphere are matrix system and essentially spherical in Shape.[1]
The aim of present work to prepare formulation of curcumin coated microsphere and evaluate prepared microsphere of curcumin.

MATERIAL AND METHODS

DRUG PROFILE

***Curcuma longa* L, (zingiberaceae)**

Fig (1): *Curcuma longa* L rhizome

Botanical name: Drug consist of dried rhizome of the plant *Curcuma longa* L
Belonging to family: zingiberaceae
Chemical constituent: The rhizome contain curcuminoids, volatile oil ,sterol , sugar, starch and other polysaccharide .curcuminoids are the principal coloring agent (6%) of which curcumin amount 60% ,

with demethoxy curcumin , bismethoxycurcumin forming the rest. volatile oil contain high amount of bisabolene derivative along with borneol , camphene and *α*-phellandrene.It also contain number of monoterpens and sesqueterpene mainly zingibrene ,α and β tumerone. A novel sesqueterpene curcuma L is isolated from *Curcuma longa*.[2].

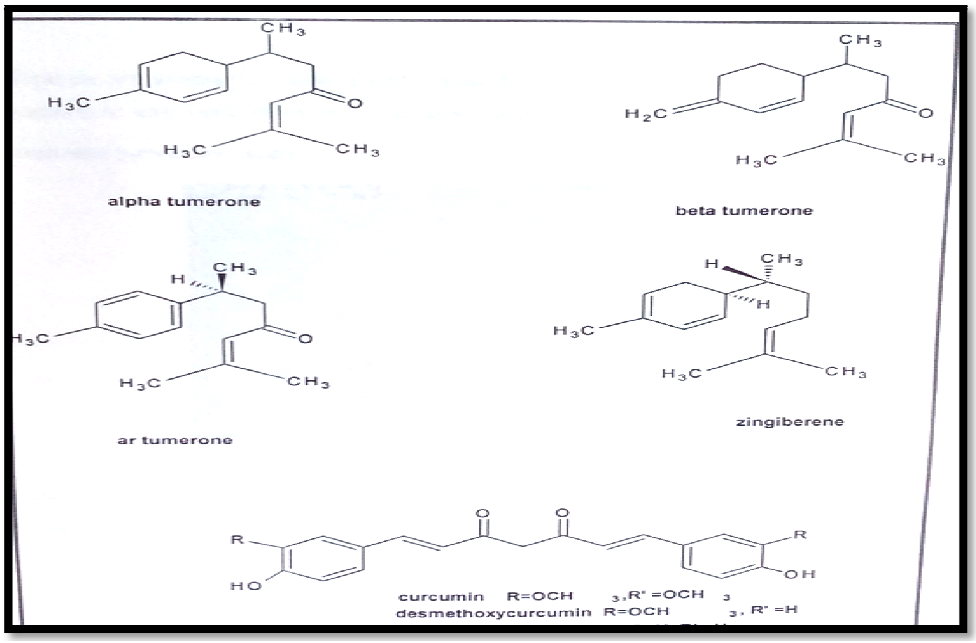

Fig (2) : chemical constituent of *Curcuma longa*, L

Common name :

- ❖ Synonym : curcuma domestica valeton
- ❖ Sanskrit : Harida
- ❖ Hindi : Haldi
- ❖ English : Turmeric
- ❖ Marathi :Halkund

Molecular formula: $C_{21}H_{20}O_6$
Molecular wt: 368.126g/mol
Description: orange –yellow , crystal powder gives brownished–red color
With alkali , light yellow color with acid .
Melting point: 179-182^{0}c
Solubility: insoluble in water & ether.
Soluble in alcohol, glacial acetic acid.
Very soluble in ethanol, acetic acid.
Log p: 3.29
Wavelength: 426 nm
Uses: The rhizomes are aromatic, used for carminative, jaundice, liver disorder and urinary diseases. It shows excellent anti-inflammatory, anticancer & antioxidant properties.

RATIONAL

- Curcumin is a lipophilic, phenolic compound isolated from the turmeric (*Curcuma longa*) rhizome widely used in traditional medicine.
- It has a poor oral bioavailability (a low % of what you consume is absorbed), poor solubility, low absorption from the gut, rapid metabolism & rapid systemic elimination and does not show the prolonged effect.
- To overcome this problem curcumin is coated on a pellet .formulation of such drug is important to Enhanced absorption and thereby improve bioavailability

METHODOLOGY AND TECHNIQUE

Material: Curcumin as active drug, ethanol as a solvent, HPMC as a polymer etc.
Instrument: Fluidized bed processer, UV spectrophotometer.

Extraction of curcumin:

1. 250 gm of turmeric powder + 300 ml of acetone in a soxhlet extractor.
2. Extraction was carried out still the cycle get completed (20cycles).
3. After exaction filtration of solvent was carried out.

4. Then filtrate is concentrated under the rotary evaporator.
5. Solvent was completely evaporated and extract was dried in Desiccator.

Technique used: fluidized bed processer (using the bottom spray Wurster Process.)

Analysis of extract:

TLC Method
Stationary phase: silica gel G
Mobile phase: chloroform: methanol (98:2)
Distance travelled by solute = 1.9
Distance travelled by solvent =3.8

Calibration of drug in ethanol: (plain drug)

Table no.01: Calibration of drug in ethanol: (plain drug)

Sr.no.	Concentration	Absorbance
1	5	0.215±0.02
2	10	0.528±0.04
3	15	0.883±0.03
4	20	1.134±0.05
5	25	1.479±0.07

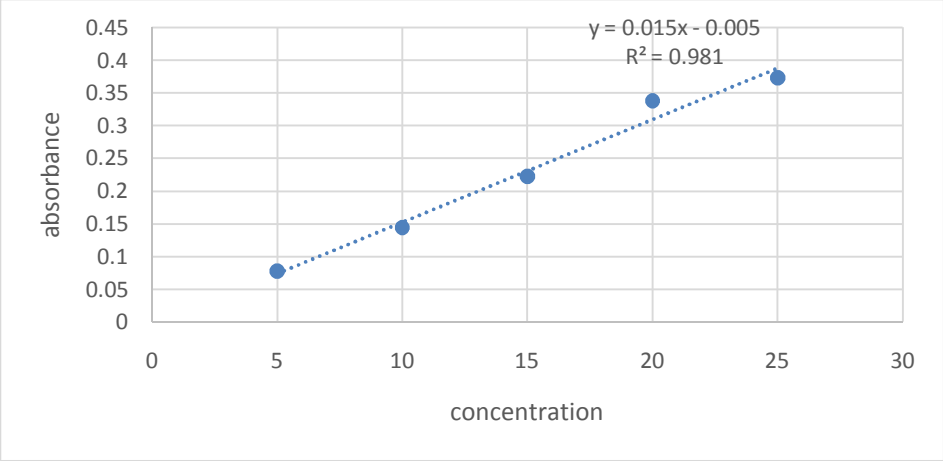

Fig.no.01:Calibration of drug in ethanol: (plain drug)

Preparation of phosphate buffer (6.8):

250ml monobasic potassium phosphate+112ml of 0.2 N NaOH make up the volume upto 1000ml with distilled water.

Calibration curve of phosphate buffer (pH6.8): (pellets)

Table no.:02:Calibration curve of phosphate buffer (pH6.8): (pellets)

Sr. No.	Concentration	Absorbance
1	5	0.077±0.03
2	10	0.144±0.02
3	15	0.222±0.06
4	20	0.338±0.07
5	25	0.373±0.01

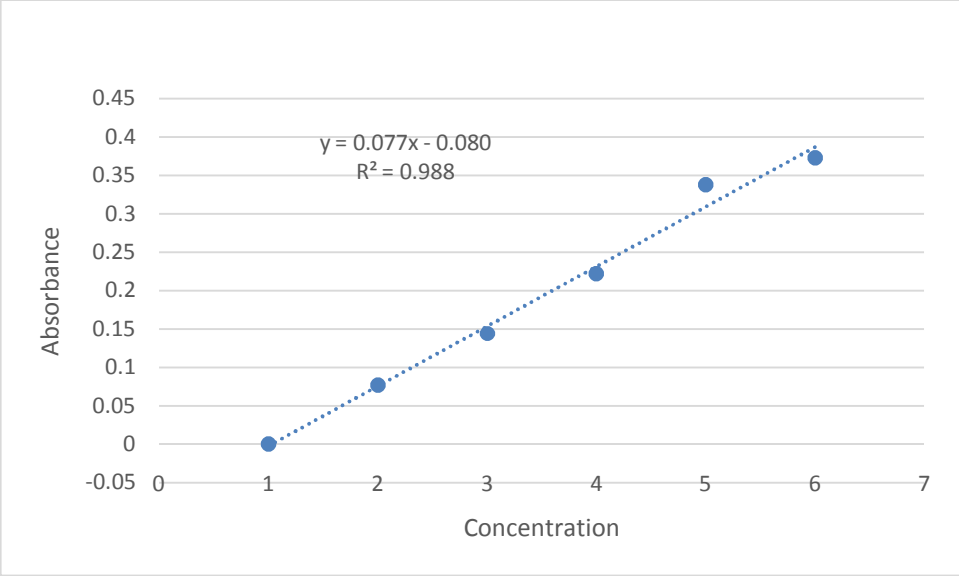

Fig no.:02: Calibration curve of phosphate buffer (pH6.8): (pellets)

EXPERIMENTAL WORK:

FORMULA FOR COATING SOLUTION:

For each single batch

Table no.:03: Formula for Coating Solution

Sr. no.	Ingredient	Quantity Taken
1	Drug	0.5gm
2	HPMC	2%
3	Glycerol	1%
4	Talc	1%
5	Ethanol	95ml
6	Water	5ml

Coating was carried out by using bottom spray of FBP.

Pellet size: 20-25 mesh size

Flow of solvent: 12 rpm

Temp.: 75^{o}c

EVALUATION:

1. **Drug content:**

Procedure:

1. 1gm of pellet in 10 ml ethanol & sonicate for 10 min, filter it.
2. Take 1ml filtrate & dilute with 10ml ethanol.
3. Take 5ml from above solution & dilute upto 10ml ethanol
4. Take absorbance at 426nm

Absorbance: 0.505

x= y+c/m

=0.505+0.0924/0.0623

=9.589 µg/ml * 20 dilution factor

=191.6 µg/ml * 10

=1916 µg/10ml

=1916/1000 =1.9mg/gm

=1.9/1000=0.0019 gm/gm

Drug content=0.19%

2. Drug release:

Procedure:

1. Weighed 10.5gm pellets (equivalent to 20mg) into 100ml of phosphate buffer 6.8.
2. Stirred on magnetic stirrer at 500-600rpm.
3. Withdraw the sample after 30min (upto 8 Hrs.)
4. Taken the absorbance of withdraw samples at 426nm.

RESULT AND DISCUSSION

Organoleptic Characters :

The organoleptic characteristics of the drug were compared with the standard characteristics and both were found to be similar. The colour was found to be yellow externally and internally the same was yellowish to orange, which complies with the standard books [5,6].

Table no. 04: Organoleptic Characteristics

Sr.no	**parameter**	***Curcuma longa* rhizome**
1	Color	Externally yellow &internally Yellowish to orange.
2	Odor	Aromatic
3	Taste	Aromatic & bitter
4	Size	No
5	Shape	Ovate, oblong cylindrical and short branched

Summary of Extraction:

Extraction was done with the help of soxhlet extractor by using ethanol. This extract has percentage yield was 16%. The obtained extracts were Dark Yellowish in colour and were obtained as Dry Powder [7].

Table no. 05: Summary of Extraction:

Extract	Color	Nature	Percentage yield (W/W)
Curcuma longa extract	Dark yellowish	Dry powder	16%

TLC of curcumin extract:

The TLC of Curcumin extract were compared with the standard Rf value and both were found to be similar. The mobile phase used was 'Chloroform:Methanol' in the ratio 98:2 and it was observed under UV Chamber [6,7].

Table no. 06: TLC of curcumin extract:

Sr.no.	Mobile phase	Stationary phase	Spraying agent	Color of spot	Rf
1	Chloroform: methanol (98:2)	Silica gel G	Self-visualizing agent under UV chamber.	yellow	0.5

Determination of Drug Contents:

The determination of drug content was done with the help of double beam UV VIS Spectrophotometer. *In vitro* Cumulative Drug Release (CDR) was evaluated at different Time Intervals in respective of the detected absorbance and graphical results were calculated and reported [8].

Table no. 07: Drug Content

Sr.no.	**Time**	**Absorbance**	**%CDR**
1	30	0.430	34.25
2	60	0.520	41.45
3	90	0.570	45.45
4	120	0.620	49.4
5	150	0.675	53.8
6	180	0.724	57.7
7	210	0.771	61.45
8	240	0.798	63.6
9	270	0.818	65.2
10	300	0.831	66.25
11	330	0.863	68.8
12	360	0.898	71.6
13	390	0.930	74.15
14	420	0.990	78.9
15	450	1.080	86.12
16	480	1.130	90.11

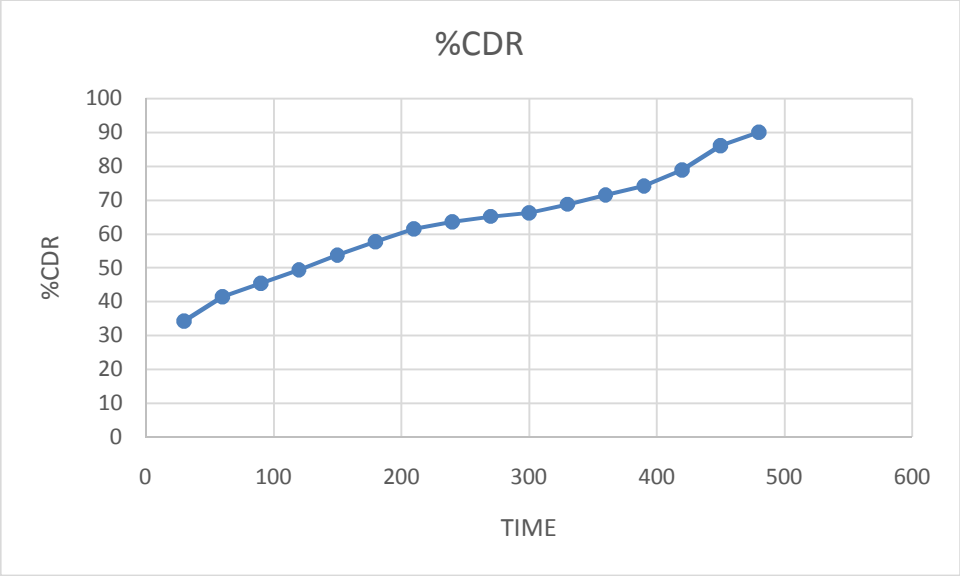

Fig no.: 03:Drug Content

CONCLUSION

From the obtained result it can be concluded that *Curcuma longa* rhizomes extract were used to prepare formulation .In TLC, extract shows effective separation .formulation of coated microsphere was done by using the curcumin, HPMC as a polymer coating was done by using the fluidized bed processer. The developed microsphere formulation was stable by oral administration for the various diseases like an anticancer treatment. The evaluation parameter of the formulated microsphere gives the 0.23% drug content present in the 1 gm of pellets & the drug release shows the conformation about the delivery system was sustained release drug delivery system.

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