NCNE-2020 Special Issue

J. Indian Chem. Soc.,
Vol. 97, July 2020, pp. 1124-1128

Formulation development by solvent evaporation method and drug enclose of *Acacia arabica* microparticles

Ritika Singh*, Trilochan Satapathy, Jhakeshwar Prasad and Shalini Singh

Department of Pharmacy, Shri Rawatpura Sarkar University, Dhaneli, Raipur-492 015, Chhattisgarh, India

E-mail: ritikasingh.166143@gmail.com

Manuscript received online 30 March 2020, accepted 12 June 2020

In current research work our aim was to formulation conniving, characterization, and *in vitro* and *in vivo* anti-inflammatory activity in rats. During this research we have formulated *Acacia arabica* microparticles by solvent diffusion evaporation technique. From prepared microparticle particle of size and size of distribution study was done. It was estimated that whole particles shaped was approximately circular with this size 520–770 μm. This study was performed to establish the transverse section and surface of the microparticles. XRD studies indicated that polymer and drug does not make any contact in each other; no breakdown during microparticles composition and constant at room temperature environment.

On the two types of concentration microparticles of drug incorporated (F1-1:1, F2-1:2) was estimated for contented of drug, and release of drug. Outcome indicated that microparticles of F1-1:1 drug encumbered was having contented of drug was 28.4% and F2-1:2 Microparticles of incorporated drug was having drug contented was 29.61%. In the process of *in vitro* release study was 0.1 *N* HCl for 9 h. It was found that microparticles of F1-1:1 incorporated drug shown 72.41% release of drug and microparticles of 1:2 incorporated drug shown 62.77% release of drug in a constant way. *In vivo* studies like Egg-yolk and Dextran induced paw edema were performed on albino rats. It was found that group cure with F1-1:1 microparticles of *Acacia arabica* 1:1 shown more percentage inhibition of inflammation at 6 h than that of control and marketed preparation treated groups.

Keywords: Egg-yolk, ethyl cellulose, anti-inflammatory, microparticles, sustain.

Introduction

Microparticles have obtained extensive identification as a way to achieve novel drug delivery systems. They repeatedly require a polymer as transporter as well as core material[1,2] suspended drug delivery systems are the changes of traditional dosage forms, and are relatively original in the market, or might be used as special procedure before, throughout or after administration, encompasses a huge potential to retain the accomplishment of the drug discharge. Multiparticulate are one of the microparticle DDS and are approved to gained extensive or CDDS, to get improved bioavailability and to objective drug to correct sites ethyl cellulose, an anionic, compatible polymer with no toxicity[3,4].

Huge number of microparticles making techniques is offered for the preparation of sustained release of micro particulate systems. This is one of the trendy techniques for the encapsulation of drugs along with water-insoluble polymers is the solvent evaporation method[5–7].

Acacia arabica is a multipurpose tree of Fabaceae family broadly detached in very hot and semitropical areas. For the effective treatment *Acacia arabica* is used by many researchers[8]. In the present study we have designed and developed *Acacia arabica* microparticles. Probably this is one of the effective ways for the treatment of inflammation and gives betterment for society and rural area.

Experimental

Materials:

These herbal drugs extract obtained as a gift sample from SUNPURE Extract Private Limited. Acetone and liquid paraffin (Rajiv Traders Private Limited, Delhi), n-hexane (Credence Chem. Private Limited, Changodar, Ahmadabad), HCl (Shijiazhuang Xinlongwei Chemical Private Limited, Japan),

ethyl cellulose (Mehta Chemical Industries, Bangalore), Petroleum ether (Shivam petrochem, Kandiveli).

Results and discussion

Size of particle and distribution of size:

On the evaluation size of particle and distribution of size are indicated in Table 1 and this graph are mentioned in Fig. 1. It was analyzed that whole particles shape were almost circular (depicted in Fig. 2) with size 520–770 µm. It seems that progression inconsistent did not affect a lot the dimension and distribution of size.

Morphological analysis:

SEM study:

The topography, morphology, particle size was examined by SEM using LEO 440i, England and these images are showed in Fig. 3. It was analyzed that size procured in opti-

Table 1. Prepared microparticles of particle size and size distribution

Sr. no.	Range of size[a]	Mean size range (d^b)	Number of particles in each size range (n)	% Number of particle	Cumulative percent number of particle
1.	500–550	525	10	4.0	4.0
2.	550–600	575	18	7.2	11.2
3.	600–650	625	112	44.8	56.0
4.	650–700	675	65	26.0	82.0
5.	700–750	725	23	9.2	91.2
6.	750–800	775	22	8.8	100.0

[a]Size range in µm. [b]Mean size range in µm. [c]%. [d]%.

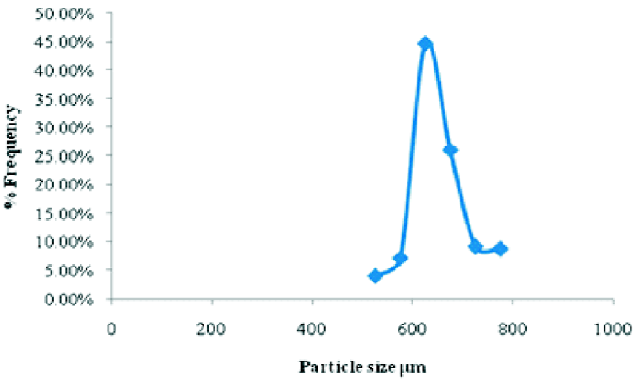

Fig. 1. Distribution of particle size plot.

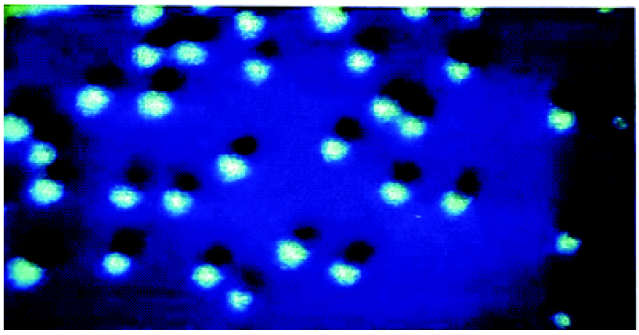

Fig. 2. image of optical (AA) microparticle.

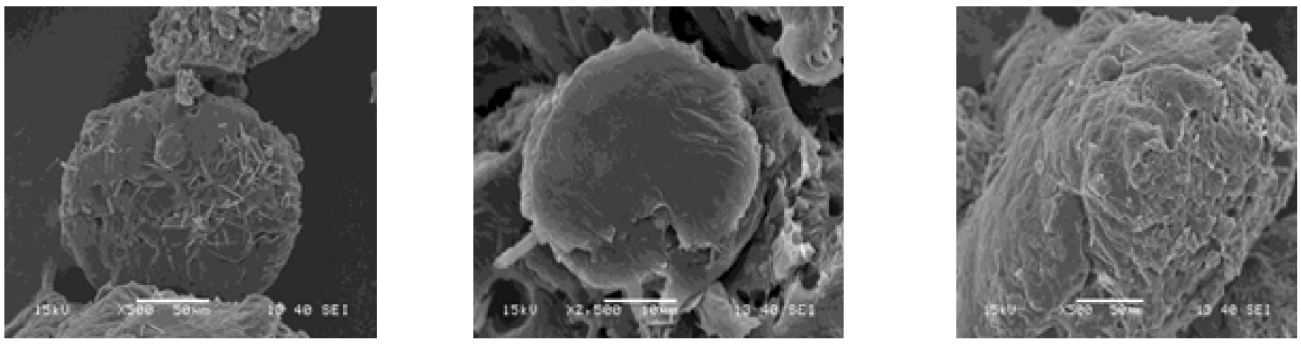

Fig. 3. Scanning electron microscopy study.

cal microscopic examination about equal the scanning electron microscopy data. The surfaces of microparticle were soft and a microparticle was approximately circular environment.

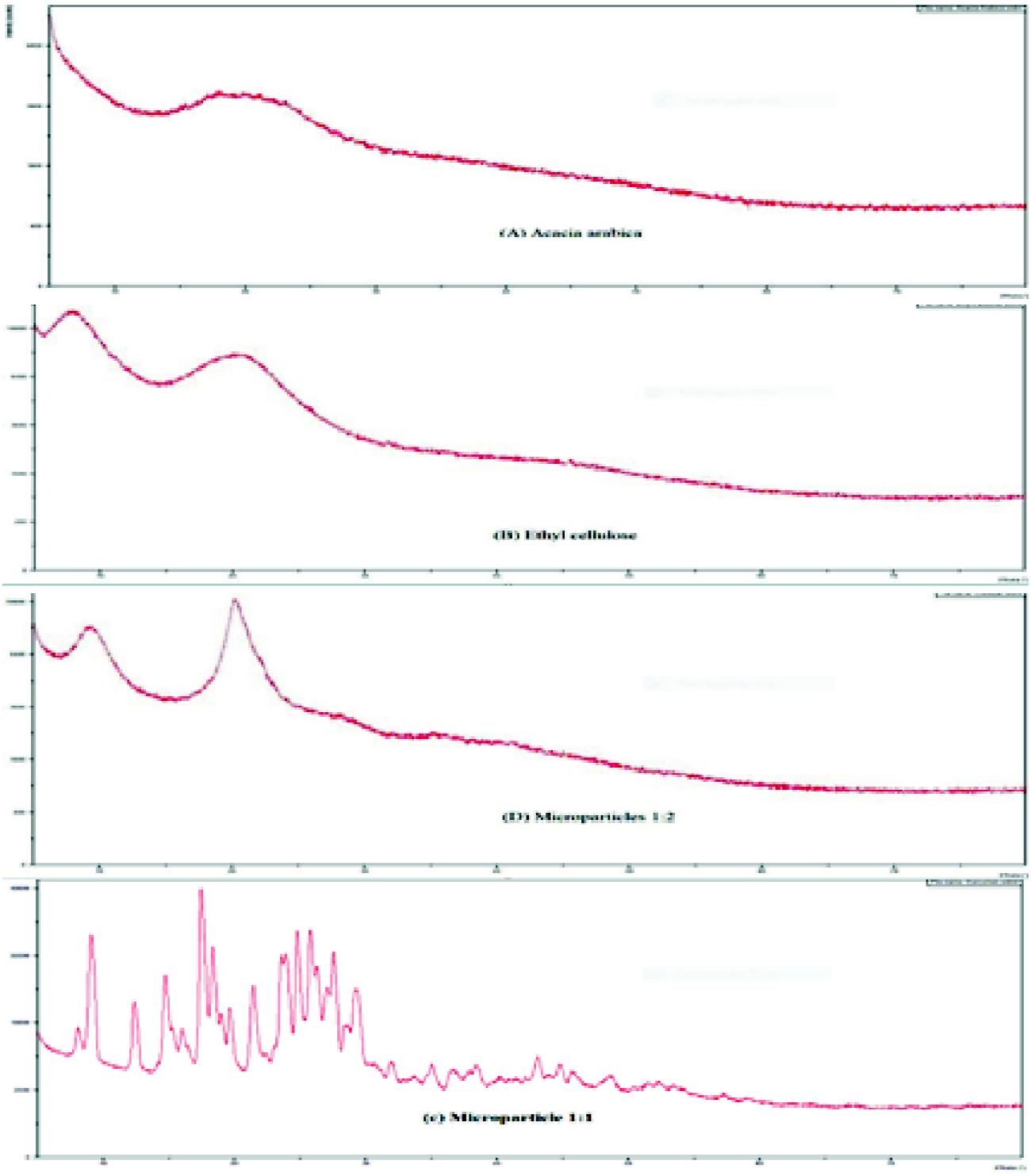

Fig. 4. Graph of X-ray diffraction study.

XRD study:

The X-ray diffraction motif of herbal drug *Acacia arabica* is display in Fig. 4. Various different peaks in the X-ray diffraction of *Acacia arabica* showed that it was available in a crystal form. However, these peaks were not examined in the X-ray diffraction pattern of this drug incorporated microparticles 1:1 and 1:2 showed that *Acacia arabica* would be either molecularly separated in the polymer or divided in an unstructured form.

Analysis of drug content:

These microparticles showed one peaks at 257 nm and this was additional utilized to quantitative examination. Standard curve was recognized; these outcomes were showed in Fig. 5. Result of % content of drug for F1-1:1 and F2-1:2 preparations are specified in Tables 2 and 3. It was examined that *Acacia arabica* (F1-1:1) were having content of drug was 28.4% and *Acacia arabica* (1:2) were having content of drug was 29.61%.

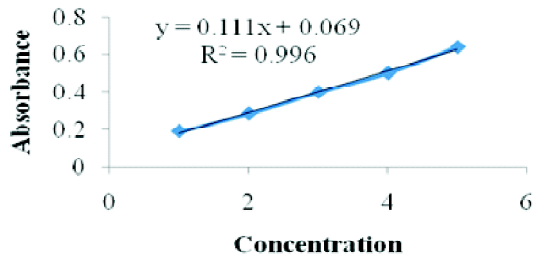

Fig. 5. Standard calibration curve of *Acacia arabica* microparticle.

Table 2. Analysis of drug content F1-1:1

Sr. no.	Theoretical drug content[a]	Percentage content of drug	Practical drug content per 100 ml (µg/ml)	Percentage drug content[b]
1.	10	100	25	28.4

[a]Theoretical drug content is expresses in µg/ml in 100 ml. [b]%.

Table 3. Analysis of drug content F2-1:2

Sr. no.	Theoretical drug content[a]	Percentage drug content	Practical drug content per 100 ml (µg/ml)	Percentage drug content[b]
1.	10	100	16.66	29.61

[a]Theoretical drug content is expresses in µg/ml in 100 ml. [b]%.

Release study:

The drug release analysis was designed in 0.1 *N* HCl for 9 h and about 72.41% of release drug were examined (F1-1:1) drug carrying preparations are showed in Table 4. Regarding 62.77% of release drug was evaluated at 11 h for (F2-1:2) drug carrying preparations are showed in Table 5. Cumulative percentage released drug against time plotted and are showed in Fig. 6 there is no explode effect evaluated for F1-1:1 and F2-1:2 drug incorporated microparticles and discharge system for F1-1:1 and F2-1:2 loaded are approximately same.

Table 4. Drug release study of microparticles of *Acacia arabica* loaded in ethyl cellulose-F1

Sr. no.	Time interval[a]	Absorbance	Concentration[b]	Loss[c]	Amount of D.M. (mg/ml)[d]	Drug release[e]	Cumulative drug release[f]
1.	1	0.50	3.88	19.4	19.41	0.1941	19.41
2.	2	1.20	10.18	60.9	50.96	0.5096	50.96
3.	3	1.23	10.45	67.25	52.31	0.5231	52.31
4.	4	1.29	11	75	55.07	0.5507	55.07
5.	5	1.32	11.27	81.35	56.43	0.5643	56.43
6.	6	1.55	13.34	96.7	66.79	0.6679	66.79
7.	7	1.62	14.21	98.21	67.81	0.6781	67.81
8.	8	1.82	16.11	99.11	69.77	0.6977	69.77
9.	9	1.94	16.81	99.72	72.41	0.7241	72.41

[a]h. [b]Concentration expressed in µg/ml. [c]Loss expressed in mg/ml. [d]Amount of D.M. expressed in mg/ml. [e]%. [f]%.

Table 5. Drug release study of microparticles of *Acacia arabica* loaded in ethyl cellulose-F1 (1:2)

Sr. no.	Time interval[a]	Absorbance	Concentration[b]	Loss[c]	Amount of D.M. (mg/ml)[d]	Drug release[e]	Cumulative drug release[f]
1.	1	0.14	0.639	3.195	3.198	0.031	3.1
2.	2	0.951	7.945	49.72	39.77	0.397	39.70
3.	3	0.973	8.144	55.72	40.77	0.407	40.70
4.	4	0.986	8.261	61.30	41.36	0.417	41.70
5.	5	1.14	9.64	73.24	48.31	0.483	48.30
6.	6	1.23	10.45	82.25	52.33	0.523	52.30
7.	7	1.41	10.81	89.11	58.11	0.5811	58.11
8.	8	1.60	11.24	94.01	60.31	0.6031	60.31
9.	9	1.62	11.90	95.08	62.77	0.6277	62.77

[a]h. [b]Concentration expressed in µg/ml. [c]Loss expressed in mg/ml. [d]Amount of D.M. expressed in mg/ml. [e]%, [f]%.

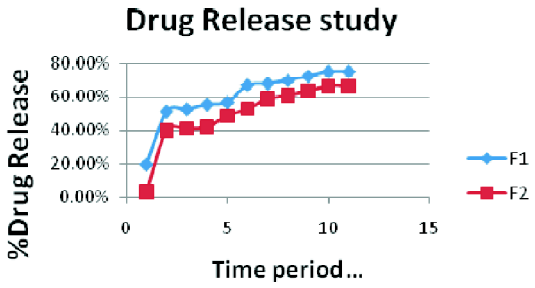

Fig. 6. Drug release study of F1-1:1 and F2-1:2.

Conclusions

It is found that, an *Acacia arabica* microparticle when administered in paw after 6 h is shown important anti-inflammatory activity than traditional drug.

References

1. Garud Navneet and Garud Akansha, *TJPR*, 2012, **11(4)**, 577.
2. Pachuau and S. Sarkar, *Tropical Journal of Pharmaceutical Research, TJPR*, 2008, **7(2)**, 995.
3. Mitra Jelvehgari and Davoud Hassanzadeh, *Iran J. Pharm. Res.*, 2011, **10(3)**, 457.
4. Patrick B. O'Donnell, McGinity, *Advanced Drug Delivery Reviews*, 1997, **28(7)**, 25.
5. V. S. Mastiholimath and P. M. Dangadi, *Journal of Microencapsulation*, 2008, **25(5)**, 307.
6. Kataria Sahil and Middha Akanksha, *IJRPC*, 2011, **1(4)**, 2231.
7. Harshad Parmar and Sunil Bakliwal, *IJABPT*, 2010, **1(3)**, 0976.
8. M. U. Z. N. Farzana and Al Tharique, *Journal of Pharmacognosy and Phytochemistry*, 2014, **3(1)**, 84.