International Journal of ChemTech Research
CODEN(USA): IJCRGG ISSN : 0974-4290
Vol. 3, No.4, pp 1932-1936, Oct-Dec 2011

A Novel Antisettlant from the Fruit pulp of *Artocarpus heterophyllus*

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Abstract: The aim of our research work was to screen and isolate a novel bio-material from fruit pulp of *Artocarpus heterophyllus* and to formulate and evaluate its indomethacin loaded suspensions. The bio-material was isolated from fruit pulp of *Artocarpus heterophyllus* by our earlier published method. It was subjected for various physicochemical parameters like color, colour changing point, chemical tests, spectral study. Four indomethacin loaded suspensions (FS1-FS4) were prepared using various ratios(1:0.5, 1:1, 1:1.5, 1:2) of bio-material. Tween 80 was used as a wetting agent. The formulated suspensions were subjected for various evaluation parameters like particle size, density, viscosity, sedimentation volume, redispersibility, *in vitro* release study and stability study shape. Our experimental research showed that the isolated bio-material possesses good anti-settlant property. The formulated suspensions showed promising stability, rease of redispersibility, and uniform particle size, density and viscosity. The formulated suspensions showed a bio-7.3 -8.6 µm and a drug content of 91-97%. The formulation FS3(1:1.5) was found to be the best formulation on the basis of evaluation parameters as it showed a sedimentation volume of 0.97, drug content of 97.3%, particle size in the range of 6.2-7.8µm and a uniform drug release and excellent stability. A smart conclusion was drawn that the isolated bio-polymeric material can serve as a good suspending agent for the formulation of various drug loaded suspensions.
Key words: Indomethacin, Suspensions, *Artocarpus Heterophyllus*, Anti Settlant.

INTRODUCTION

Suspensions are defined as heterogeneous system consisting of two phases. The continuous (or) semisolid (or) external phase and internal phase (or) dispersed phase which is made up of particulate matter i.e., insoluble in but dispersed throughout the continuous phase. The particle size of dispersed phase ranges from 0.5µm- 5µm. To formulate any type of dosage form different excipients are essential apart from active therapeutic agent. The preparation of suspension also requires a no. Of excipients (or) formulation additives so as to render it more stable and present it in desired form with desired properties.[1-3] The various excipients used in the formulation of suspension are: Vehicles, Wetting agents, Suspending agents, Flocculating agents, Viscosity modifiers, Formulation additives. Biopolymers are polymers that are generated from renewable natural sources, are often biodegradable, and not toxic to produce. They offer the advantages of being bio-degradable, non-toxic and ability to bind with a number of drugs. They can be easily fabricated into a number of pharmaceutical dosage forma and hence be used as novel drug delivery carriers. By combining different biopolymers, materials of highly specialised or even

novel properties can be made. Jackfruit (*Artocaropus Heterophyllus)* belongs to the family moraceae, it contains morin, carotenoids, provitamin A. It is used medicinally as a laxative, tonic and demulcent. The drug atorvastatin is an HMG-Coenzyme inhibitor and is used for the treatment of hyperlipidimea i.e. elevated cholesterol levels in the body. It is generally administered once daily, the aim of our experiment is to formulate a ovel bio-polymeric based sustained release tablet of atorvastatin for once daily dosing. Jackfruit pulp contains morin and a crystalline constituent, cyanomaclurin, probably isomeric with catechins. It contains provitamin A carotenoids. It is also composed of a new flavonone, a new prenylfalvone, a novel phenolic compound, heterophylol and nine known flavonoids. Ripe fruit is used as demulcent, nutritive, laxative. Pulp or flesh surrounding the seed is aromatic, cooling and tonic. Also used in Diarrhea, fever and asthma. Indomethacin is used as model drug, it is a non-steroidal anti-inflammatory drug commonly used to reduce fever, pain, stiffness, and swelling. It works by inhibiting the production of prostaglandins, molecules known to cause these symptoms. The drug is best used as an anti-inflammatory, rather than an analgesic. It works at an oral dose of 25-50mg and is equivalent to 600mg of aspirin at the same dose.[1]

MATERIALS AND METHODS:

The drug Indomethacin was obtained as a gift sample from Ranbaxy Paonta Sahib, India. Jackfruit was procured from the local market. All other reagents used were of highest purity and analytical grade. Double distilled water was used throughout the experimental work.

Bio-material extraction

The bio-material was isolated from the fruits of *Artocarpus heetrophyllus* from our previously published method. The isolated bio-material was subjected for physico-chemical characterization and spectral analysis.[1]

Physicochemical characterization and spectral analysis of the bio-polymer:

The isolated biomaterial was subjected for various physicochemical parameters like colour, odour, taste, colour changing point,(table no.1) chemical tests(table no.2) and spectral analysis using IR spectra(fig. no. 1, table no. 3).

Formulation of suspensions:

Suspensions were formulated by using indomethacin, bio-polymer, tween 80 and double distilled water. The formulated suspensions were compared for various evaluation parameters.(table no. 1)[3-5]

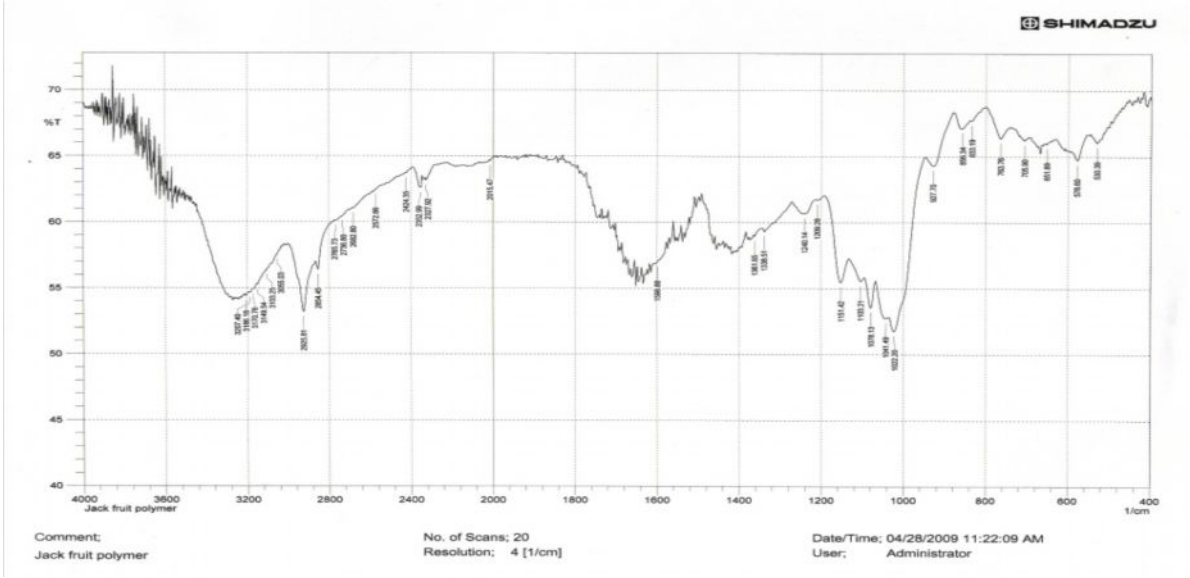

Fig. No. 1 Infra red spectra of the bio-material

Table no. 1- Physical Properties of the Bio-material

S.no.	Physical Property	Inference
1.	Colour	Brownish To Dark Brown
2.	Odour	Odourless
3.	Taste	Characteristic
4.	Colour changing point	160-165°C

Table no.2-Chemical identification tests of the bio-polymer.

S.no.	Chemical test	Observations	Inference
1.	Fehlings test	Positive	Carbohydrates present
2.	Benedicts test	Positive	Carbohydrates present
3.	Molischs test	Positive	Carbohydrates present
4.	Ninhydrins test	Positive	Protiens present
5.	Biurets test	Positive	Protiens present

Table no. 3 -Interpretation of the IR spectra

S.No.	Wave number	Inference
1.	2925.81	C-H stretching (Saturated hydrocarbons)
3.	1598.88	C-C stretching (Aromatic ring)
4.	1000-1150	O-H streching (Alcohols)
5.	1078.13	O-H streching (Secondary alcohol)
6.	1151.42	O-H streching (Tertiary alcohol)

EVALUATION PARAMETERS:

The suspensions were evaluated for the following parameters,[3-7]

Particle size- The particle size was determined by optical microscopy method. The procedure was repeated 3 times and standard deviation calculated.

Viscosity- The viscosity of the suspensions was measured by using Brookfield viscometer. The procedure was repeated 3 times and standard deviation calculated.

Surface tension- The surface tension was measured using stalagmometer. The procedure was repeated 3 times and standard deviation calculated.[1-3]

pH- The ph of was measured in digital ph meter using ph 7 as standard. The procedure was repeated 3 times and standard deviation calculated.[1-2]

Sedimentation volume- the sedimentation volume was determined in order to establish the stability of the suspensions and evaluate the suspendability of the bio-material. The procedure was repeated 3 times and standard deviation calculated.

In-vitro release studies- The in-vitro release studies in case of suspensions were performed using dissolution apparatus for 2 hrs.

Stability studies: Stability studies were subjected to accelerated stability studies where the representative samples were stored at various temperatures. i.e. room temperature, 37˚C,45˚C and 60˚C.[1-3]

Table no. 4- Formulations prepared

Formulation	FS1	FS2	FS3	FS4
Indomethacin(mg)	50	50	50	50
Bio-polymer(mg)	50	100	150	200
Tween 80(ml)	0.1	0.1	0.1	0.1
DistilledWater(ml)	10	10	10	10

Table no.5-Evaluation parameters

Formulation	FS1	FS2	FS3	FS4
pH	6.3±0.2	6.5±0.3	6.2±0.2	6.9±0.1
Sedimantation Volume	0.94±0.02	0.95±0.01	0.97±0.01	0.95±0.02
Particle Size(µm)	6.2-7.5	6.4-7.2	6.2-7.8	6.5-7.8
Redispersibility(Cycles)	++	+++	+++	+++
Density(g/cc)	1.5±0.2	1.62±0.15	1.9±0.23	1.98±0.24
Viscosity(cps)	7.6±0.93	11.1±2.1	13.8±0.87	14.4±1.2
% Drug content	91.5±1.2	93.4±1.3	97.3±1.5	95.4±0.92

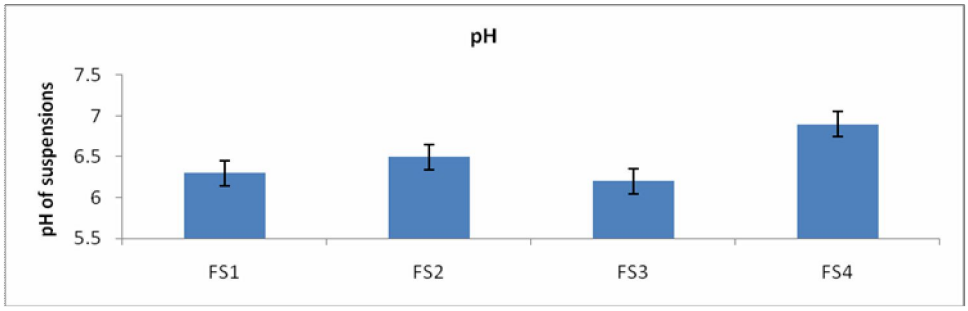

Fig. no. 2 ph of formulations

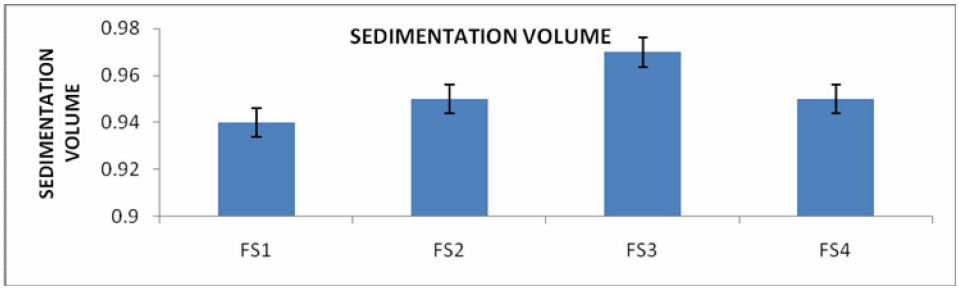

Fig. no. 3 sedimentation volume of suspensions

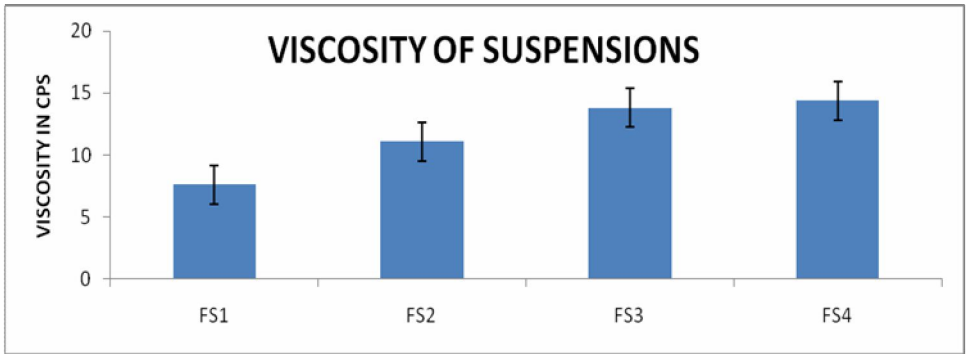

Fig. no. 4 viscosity of suspensions

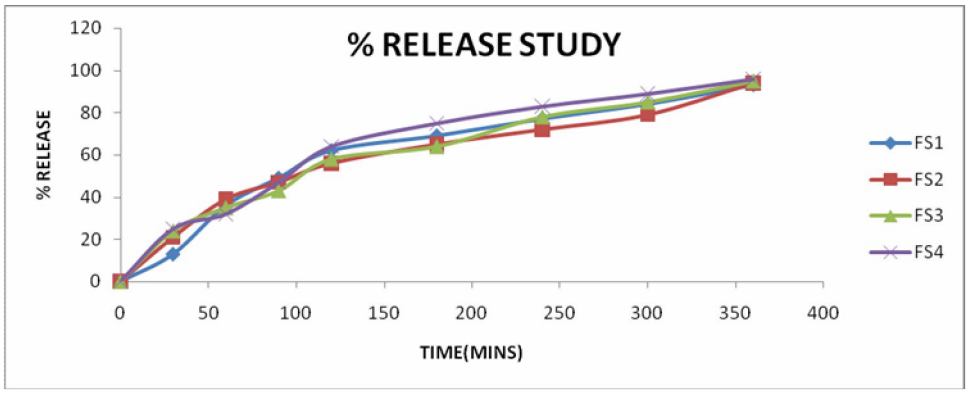

Fig. no. 5 % in-vitro release of formulated suspensions

RESULTS AND DISCUSSIONS:

Four batches of indomethacin loaded suspensions (FS1-FS4) were prepared and evaluated for drug content, particle size, sedimentation volume, redispersibility, viscosity, density, pH and in vitro release profile. Uniformity of drug contents was found to be Satisfactory (91-97%). These values are shown in (Table I). The average particle sizes for (FS1-FS4) were found to be suitable for the formulation of suspension. The *in-vitro* drug release studies for different batches of suspensions showed that increase in amount of bio-material resulted in decrease in the rate of release. The formulation FS3(1:1.5) was found to be the best formulation as it uniform drug release with t80% of around 300 mins and excellent stability. Stability studies were subjected to accelerated stability studies where the representative samples were stored at various temperatures. i.e. room temperature, 37˚C, 45˚C and 60˚C and there was no considerable change in the formulation after three month.

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