RESEARCH PAPER

Formulation Of Solid Lipid Nanoparticles Containing Aegle Marmelos (Linn) Correa Extract

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ABSTRACT
Aegle marmelos is considered the most sacred or holy plant and is grown along the edges of Hindu temples. This plant is dedicated to Lord Shiva, who is said to reside beneath the Bael tree. Furthermore, ancient scriptures such as the Vedas, Puranas, Charaka Samhita, and Brihat Samhita explain the plant's numerous medical benefits. Ajanta cave paintings have also depicted it. Numerous ailments are treated with the complete body of the Bael plant.In Ayurveda, the herb is used in Panchang form to treat diarrhea, dysentery, and ulcers.A number of ailments, including diabetes, skin disorders, typhoid, wound healing, ulcers, stomachaches, jaundice, high blood pressure, malaria, and cancer, are said to be treated by the plant parts. The fruit of the plant is edible and has a great deal of therapeutic potential because it contains vitamins, minerals, and other antioxidants. The pulp of the fruit is fragrant, sweet, pale orange, and resinous. Juice, pudding, and murabba are made from the unripe fruit pulp of this plant.
Keywords: Ayurveda, Bael, *Aegle marmelos*, folk perspective, pharmacological activities
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INTRODUCTION

Since Charak's time (1500 B.C.), the Indian miraculous healing herb bael (*Aegle marmelos*) has been widely recognized. *Aegle marmelos (L.)* Correa, also referred to as Bael, is a member of the Rutaceae family and has been utilized extensively for several reasons "A wooden apple," "Bengal Quince," and "Indian Quince" are other examples. In Hindu ceremonies, it is also regarded to have great sacred importance. The tripatra, or "holy leaf," of this revered tree has greatly helped Lord Mahadev. A. marmelos contains a wide range of phytochemicals, such as alkaloids, flavonoids, saponins, marmelin, limolin, tannins, phenolics, coumarin, etc. Compounds from A. marmelos have several uses, such as treating diarrhea, preventing diabetes, preventing cancer, healing ulcers, preventing obesity, and more.

MATERIAL AND METHODS:

Materials

The leaves of *Aegle Marmelos* were purchased at Umerga's local market. The lipid core is cow's ghee. The remaining ingredients, such as tween 80, polyethylene glycol 400, and pluronic F68, were all of pharmaceutical q **Table** uality.

Table no 1:Formulation Table of SLN

Sr.No	Ingradients	F1	F2	F3	F4	F5	F6	F7	F8	F9
1	***Aegle Marmelos* (mg)**	100	100	100	100	100	100	100	100	100
2.	**Cow ghee (ml)**	10	10	10	15	15	15	20	20	20
3.	**PEG-400 (ml)**	10	10	10	10	10	10	10	10	10
4.	**Pluronic F68 (mg)**	100	100	100	100	100	100	100	100	100
5.	**Tween 80 (ml)**	1	1	1	1	1	1	1	1	1
6.	**Distilled Water (ml)**	29	29	29	24	24	24	19	19	19

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7.	**RPM**	15000	17500	20000	15000	17500	20000	15000	17500	20000

Table no 2: Drug Entrapment Efficiency

Batch	**Absorbance**	**Conc (ug/ml)**	**Dilution**	**Actual Conc (ug/ml)**	**Final Conc (mg)**	**Initial Conc (mg)**	**% EE**
F1	0.091	8.43	10	84.28	0.84	10	91.57
F2	0.068	6.28	10	62.83	0.63	10	93.72
F3	0.082	7.59	10	75.89	0.76	10	92.41
F4	0.099	9.17	10	91.74	0.92	10	90.83
F5	0.083	7.68	10	76.82	0.77	10	92.32
F6	0.084	7.78	10	77.75	0.78	10	92.22
F7	0.087	8.05	10	80.55	0.81	10	91.95
F8	0.097	8.99	10	89.87	0.90	10	91.01
F9	0.085	7.87	10	78.68	0.79	10	92.13

Table no 3: F2 Batch Drug Release

F2			
Time (min)	**Absorbance**	**Dilution**	**% DR**
0	0.000	1	0.00
30	0.012	1	8.49
60	0.027	1	19.68
120	0.051	1	37.58
180	0.072	1	53.25
240	0.089	1	65.93
360	0.109	1	80.85
480	0.117	1	86.82
720	0.130	1	96.52

Developing *Aegle Marmelos* extracts using the maceration method

1.5 kg of fresh leaves was cleaned with water. The leaf material was then allowed to air dry for two days. In order to obtain extracts, a specific amount of dried material was macerated with ethanol by soaking 500 g of dried powdered plant in a bottle with two liters of ethanol for seventy-two hours. After that, the ethanol mixture was filtered and concentrated by utilizing a rotary evaporator to evaporate the alcohol under low pressure.

Solid lipid nanoparticle formulation for *Aegle Marmelos* extract

Aegle Marmelos extract was loaded into solid lipid nanoparticles (SLNs) using a high-speed homogenization method. In a beaker heated to between 60 and 70 degrees Celsius, the medication was dissolved in cow ghee. After that, the mixture was sonicated for five minutes. The polymers and surfactant were then mixed in a different beaker, introduced to distilled water, and agitated for five minutes using a magnetic stirrer. After gradually adding the prepared oil phase to the aqueous phase, the mixture was homogenized for ten minutes and allowed to cool at room temperature.

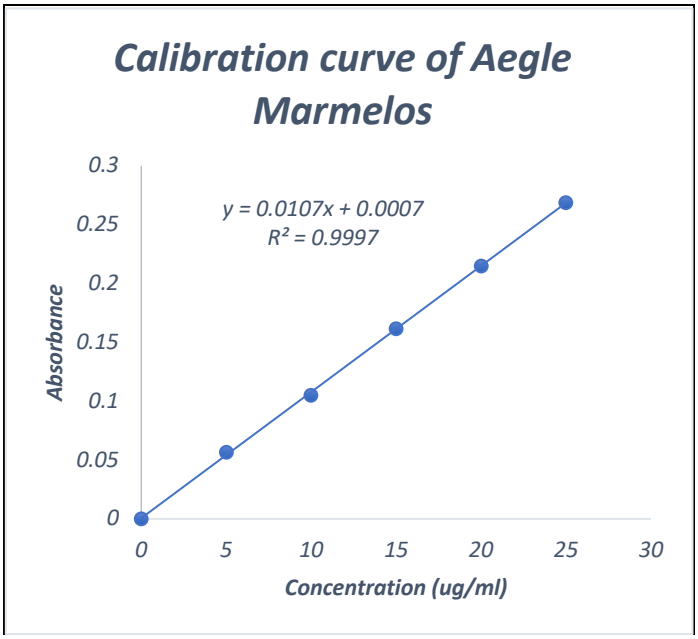

Fig.no 1: Calibration Curve of *Aegle Marmelos*

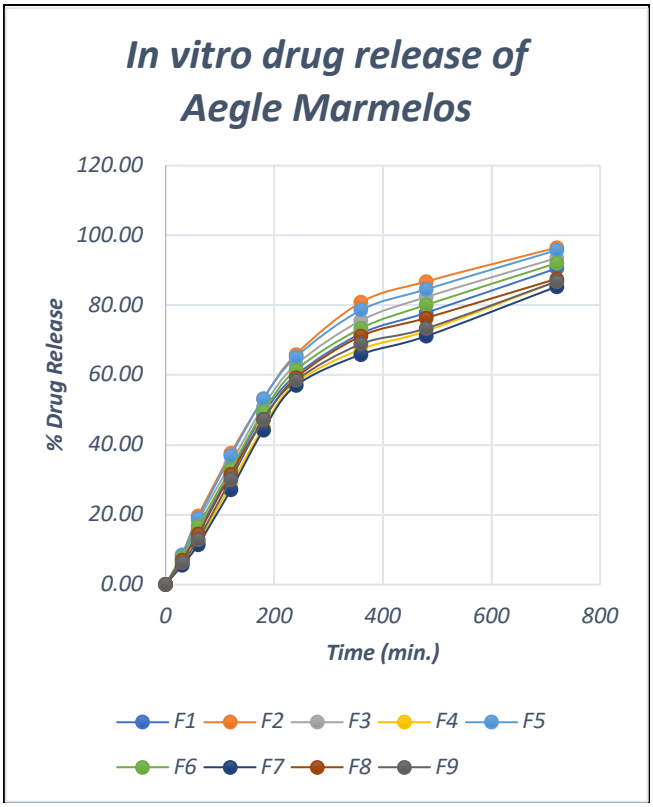

Fig.no 2: % Drug release

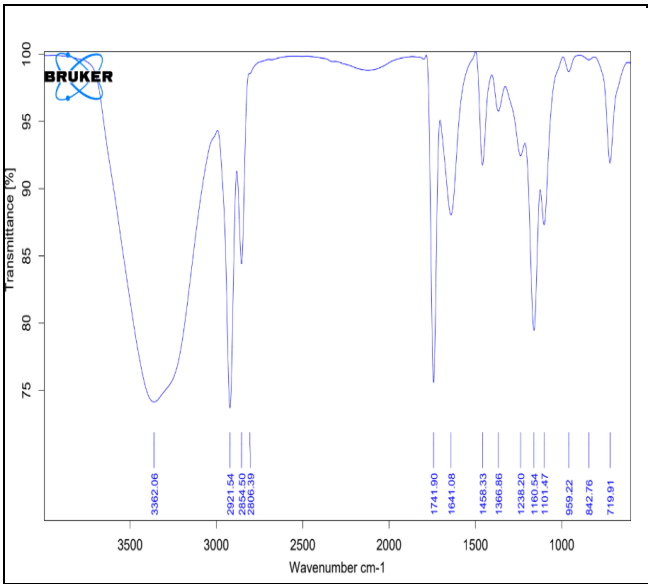

Fig. no 3: FTIR of F2 Batch SLN

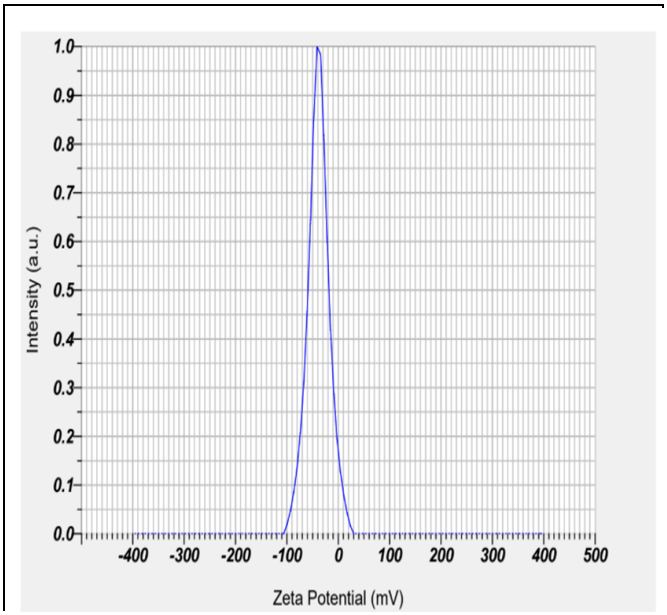

Fig.no 4: Zeta Potential of F2 Batch

Evaluation of solid lipid nanoparticles

1. Drug Entrapment efficiency
2. In-vitro drug release study
3. Measurement of Particle size Analysis

1. Drug Entrapment Efficiency:

The Entrapment efficiency of SLNs represents the proportion of the drugs that has been trapped within the lipid matrix's core. The drug's entrapment percentage in SLN formulations was measured using high-speed cooling centrifugation centrifuged at 10000 rpm for 2 hours at 4 °C. The concentration of the unbound drug in the supernatant was determined using a double beam UV-Visible Spectrophotometer. The proportion of the drug that was successfully entrapped was determined using the following equations:

$$\% EE = \frac{Weight\ of\ initial\ drug - weight\ of\ free\ drug}{Weight\ of\ initial\ drug} \times 100$$

2. *In-vitro* drug release:

For prepared SLNs, in-vitro release testing was conducted utilizing the dialysis bag technique. Before being used, the dialysis membrane was cleaned with distilled water to get rid of extra glycerin and sulfur. It was then immersed in the release medium (PBS) pH 6.8 for the entire night to verify the dissolving media's sink conditions. Five milligrams of the same amount of the generated SLNs were suspended in five milliliters of the release medium in a dialysis bag that was submerged in the dissolution equipment after being securely sealed on both sides with a thermo-resistant thread to prevent leaks. Each vessel held 400 milliliters of the release media at 75 ±1 rpm and 37 ±0.5 °C. To maintain sink conditions, 5 mL samples were taken out at predefined intervals, filtered using a 0.220 µm syringe filter, and then continually replenished with equal amounts of new

dissolving medium. A UV-Vis spectrophotometer was used to measure the aspirated samples at *Belpatra churna's* computed λ max (240 nm).

3. Particle size measurement

The optimized SLN batches' particle size distribution is shown by the Horiba SZ-100 size analyzer. The SLNs ranged from 160.3 nm to 293.3 nm, according to particle size analysis. In comparison to the other batches, the SLNs made with cow ghee and the F2 Batch exhibit lower particle sizes.

The particles in batch F2 are smaller, measuring 160.3 nm.

Drug characterization

The standard calibration curve for *Aegle Marmelos Linn.Correa* The calibration curve for *Aegle Marmelos Linn.Correa* was determined to be linear over the concentration range of 0-25 µg/ml, with an equation of y=0.0107x+0.0007 and a correlation coefficient of 0.9997 at 240 nm.The curve shows good linearity as a result.

CONCLUSION

Finally, the study showed that cow ghee may be used as the lipid core to properly construct solid lipid nanoparticles from an extract of *Aegle Marmelos Linn.Correa* SLN yields excellent results.

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