

Formulation and evaluation of L-Arginine Sustained Release tablets

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Abstract:

L-Arginine is an amino acid that has numerous functions in the body. In the body L-Arginine is used to make nitric oxide which reduces blood vessels Stiffness, increases blood flow and improves blood vessel function. L-Arginine also used for erectile dysfunction by enhancing the action of Nitric Oxide, which relaxes muscle surrounding blood vessels supplying to the penis. As a result blood vessels in the penis dilate, increasing blood flow which helps to maintain an erection. Due to its less biological half life i.e., ≥ 1 hours in India L-Arginine was available in 5-8 gms of granules and 1050 mg capsule and intake of dose is twice daily whose dosage quantity is much more. This can be overcome by formulating Sustained Release tablet of L-Arginine 525 mg twice daily. The tablet can be developed with the combination of 30% HPMC- K 100 and HPMC -K 15 M Polymer which can retard the drug release up to 12 hours.

Key words: HPMC-K 100-Hydroxy Propyl Methyl Cellulose, PVP- Poly Vinyl Pyrrolidone

Introduction:

L-Arginine is an amino acid that has numerous functions in the body. It helps the body get rid of ammonia (a waste product); it is used to make compounds in the body such as creatine, L-glutamate and L-proline, and can be converted to glucose and glycogen if needed. L-Arginine is used to make nitric oxide, a compound in the body that relaxes blood vessels. Preliminary studies have found that L-Arginine may help with conditions that improve when blood vessels are relaxed (called vasodilatation), such as atherosclerosis, erectile dysfunction.

Materials and Methods

L-Arginine, HPMC- K 100, Aerosil, Polyvinyl Pyrrolidone, HPMC K -15 M, Magnesium Stearate, FTIR Spectrophotometer. USP Dissolution Apparatus, Tablet Compression Machine etc.

Preliminary work

Identification of Drug was done by FTIR Spectrophotometer and all the Drug-excipients compatibility study was performed. Then the drug L-Arginine was sifted as well as dry mixing was carried out and granulation was formed with adding binder PVK-30 then kept for drying and moisture content was checked. Milling of the granules was done then polymer HPMC-K 100 was added and

proper mixing was carried out and under gone lubrication with Magnesium Stearate. Then compression was carried out and all the in process evaluation of tablet was checked and finally Coating was done with film coating material (Pearl white).

Swelling Study

For each batch of HPMC formulation tablets were weighed and placed in beaker containing the set of condition as specified in dissolution media. The tablet was removed by using small basket and swollen weight of each tablet was determined. The swelling index was calculated using following formula:

$$S.I = \frac{W_t - W_o}{W_o} \times 100$$

Where, S.I = Swelling index, W_t = Weight of tablet at time "t" W_o = Weight of tablet before placing in beaker.

In-Vitro Dissolution Study

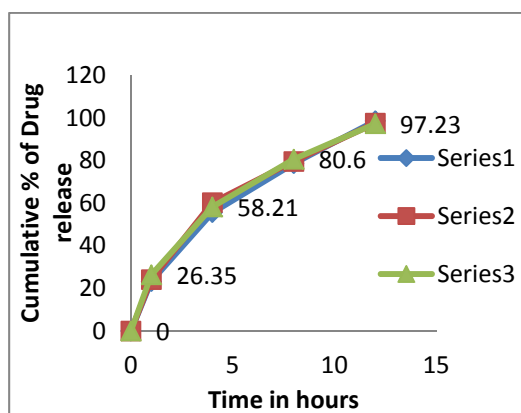
In-vitro studies were performed by using USP -22 Types-I dissolution apparatus. The dissolution medium is phosphate buffer pH 6.8, and 75 Rpm at temperature 37°C as per clinical studies. An aliquot 10 ml was withdrawn at specific intervals and drug content was determined by using HPLC and UV detector at 210 nm. It was made clear that none of the ingredients used in the matrix formulations interfered with the assay. The release studies were conducted in triplicate for the reproducibility of the best batch.

Table 1: L-Arginine 525mg SR tablets (Cumulative % of drug release)

Time in Hrs	B-I	B-II	B-III	B-IV	B-V	B-VI
1 hr	22.80	22.20	23.06	22.06	22.12	21.20
2 hr	36.70	36.08	35.30	36.43	38.88	36.88
4 hr	68.10	48.20	56.25	44.66	46.35	44.90
6 hr	90.80	68.70	66.28	69.30	67.21	66.55
8 hr		78.60	75.04	73.48	74.03	77.29
10 hr		82.78	80.98	85.44	81.28	85.45
12hr				95.78	96.82	99.65

Table 2: Comparative study of Batch 6 after 1st, 2nd, & 3rd months

Time in Hours	1 st Month	2 nd Month	3 rd Month
1	23.22	24.08	26.35
4	55.54	60.20	58.21
8	78.56	79.54	80.60
12	98.56	97.56	97.23

**Results and Discussion:**

My objective is to reduce the dose, multiple intake, also reduced the side effects. By using the HPMC K-100 and HPMC K-15 Polymer the release of the drug can be achieved up to 12 hours. The drug and excipients compatibility was done at 25°C/60% ± 5% RH, 30°C/65% ± 5% RH and 40°C/75% ± 5% RH. The result does not show any physical change to the mixture after 4 weeks. Chemical compatibility was analysed by the spectrum study. This fact concluded that the drug and the excipients are compatible

with each other. So all the criteria of a product can be maintained by formulating 525mg of L- Arginine SR tablets using twice daily.

Conclusion:

L- Arginine is an essential amino acid which could play a role in lowering blood pressure because a major cause of high blood pressure is narrowing of the arteries. It is available as 5-8 gm powder or granules in sachet. Since its biological half life is less than 1 hours it is metabolized and disappears shortly from the body and my objective is to reduce the dose, multiple intakes, reduce the cost and side effects. Hence Sustained release of the drug can be achieved by formulating 525mg of L- Arginine SR tablets using twice daily.

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